

Scheme and Syllabus
Rajasthan Technical University, Kota
B. Tech. in 1st Year
(Session 2017-18)



RAJASTHAN TECHNICAL UNIVERSITY

Scheme & Syllabus of Teaching & Examination for I year B. Tech. I Semester Effective from the session: 2017-18

		Course Title	L	T	P	Marks		
						IA	External	Total
S.N	Subject Code	Theory Papers						
1.	MA-101	Engineering Mathematics-I	3	1	0	20	80	100
2.	HU-101/ HU-103	Communication Skills / Human Values	3	0	0	20	80	100
3.	PY-101/ CY-101	Engineering Physics/ Engineering Chemistry	3	1	0	20	80	100
4.	CS-101	Computer Programming-I	3	0	0	20	80	100
5.	CE-101	Environmental Engineering and Disaster Management	3	0	0	20	80	100
		Total	15	2	0	100	400	500
		Practical						
6.	HU-102/ HU-104	Communication Skills Lab./ Human Values: Activities	0	0	2	45	30	75
7.	PY-102/ CY-102	Engineering Physics Lab/ Engineering Chemistry Lab	0	0	2	45	30	75
8.	CS-102	Computer Programming-I Lab.	0	0	2	60	40	100
9.	CE-102	Computer Aided Engineering Graphics	0	0	3	60	40	100
10.	ME-101	Mechanical Workshop Practice	0	0	2	60	40	100
11.		Discipline & Extra Curricular Activity	0	0	0	50	0	50
		Total	0	0	11	320	180	500
		Grand Total	15	2	11	420	580	1000

(Total **28** periods per week)

L = Lecture, **T** = Tutorial, **P** = Practical, **IA**=Internal Assessment



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Scheme & Syllabus of Teaching & Examination for I year B. Tech. II Semester Effective from the session: 2017-18

S.N	Subject Code	Course Title	L	T	P	Marks		
						IA	External	Total
		Theory Papers						
1.	MA-102	Engineering Mathematics-II	3	1	0	20	80	100
2.	HU-103/ HU-101/	Human Values/ Communication Skills	3	0	0	20	80	100
3.	CY-101/ PY-101	Engineering Chemistry/ Engineering Physics	3	1	0	20	80	100
4.	CS-103	Computer Programming-II	3	0	0	20	80	100
		Elective (any two)*						
5.	EE-101	Basic Electrical and Electronics Engineering	3	0	0	20	80	100
6.	CE-103	Basic Civil Engineering						
7.	ME-102	Basic Mechanical Engineering	3	0	0	20	80	100
8.	OE-101	Engineering Mechanics						
		Total	18	2	0	120	480	600
		Practical						
9.	HU-104/ HU-102	Human Values: Activities Communication Skills Lab.	0	0	2	45	30	75
10.	CY-102/ PY-102	Engineering Chemistry Lab/ Engineering Physics Lab	0	0	2	45	30	75
11.	CS-104	Computer Programming-II Lab	0	0	2	60	40	100
12.	ME-104	Computer Aided Machine Drawing	0	0	3	60	40	100
13.		Discipline & Extra Curricular Activity	0	0	0	50	0	50
		Total	0	0	9	260	140	400
		Grand Total	18	2	9	380	620	1000

(Total **29** periods per week)

L = Lecture, **T** = Tutorial, **P** = Practical, **IA**=Internal Assessment

***Elective: The student of a particular branch will not be allowed to opt for his own branch subject.**



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1. For Internal Assessment (IA) of the theory papers: Two Mid-Term Tests of 20 Marks.
2. Institute can arrange a third Mid-Term Test as per the convenience of the students.
3. Syllabus shall be prepared without units.
4. The question paper shall contain seven (07) questions of 16 marks each. The first question shall cover the entire syllabus and it shall be compulsory, it shall contain eight parts of 2 marks each, and answer to be given in about 25 words. From remaining six questions, student shall attempt any four questions.
5. Passing Rules for B.Tech. (4 Yr. Course)

The result of a candidate will be worked out at the end of each Semester Examination.

For a Pass, candidate must obtain marks for each theory.

(A)	Theory Paper	Passing%	(B)	Practical/Sessionals	Passing%
(i)	Internal Assessment	Nil	(i)	Sessional (60% component)	40%
(ii)	End Semester (B.Tech.) University Exam	35%	(ii)	Practical (40% component) University Exam	40%
(iii)	Total of (i) & (ii)	40%	(iii)	Total of (i) & (ii)	50%



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MA-101 ENGINEERING MATHEMATICS-I

Course Code: MA-101
L-T-P: 3-1-0

Course Name: Engineering Mathematics-I
Maximum Marks: 80

Differential Calculus:

Asymptotes (Cartesian coordinates only), concavity, convexity and point of inflection, Curve tracing (Cartesian and standard Polar curves- Cardioids, Lemniscates of Bernoulli, Limacon, Equiangular Spiral only).

Limit, continuity and differentiability of functions of two variables, Partial differentiation, Euler's theorem on homogeneous functions, change of variables, chain rule, Gradient, Directional derivative, Tangent planes and Normals.

Taylor's theorem (two variables), approximate calculations, Jacobian, maxima & minima of two and more independent variables, Lagrange's method of multipliers.

Integral Calculus:

Double integral, change of order of integration, Double integral by changing into Polar form, Applications of Double integrals for evaluating areas & volumes, triple integral; Beta function and Gamma function (simple properties).

Vector Calculus:

Scalar and vector field, differentiation & integration of vector functions: Gradient, Divergence, Curl and Differential Operator; Line, Surface and Volume integrals; Green's theorem in a plane, Gauss's and Stoke's theorem (without proof) and their applications.

Suggested Readings:

1. Thomas' Calculus, George B. Thomas, Jr., Maurice D. Weir, Joel R. Hass, Pearson Educations.
2. Calculus with Early Transcendental Functions, James Stewart, Cengage Learning Publication.
3. Engineering Mathematics, C.B. Gupta, S.R. Singh and Mukesh Kumar, McGraw Hill Education.
4. Engineering Mathematics, S. Pal and S.C. Bhunia, Oxford University Press.
5. Higher Engineering Mathematics, B.V. Ramana, McGraw Hill Education.
6. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley.



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HU-101 COMMUNICATION SKILLS

Course Code: HU-101
L-T-P: 3-0-0

Course Name: Communication Skills
Maximum Marks: 80

Communication: Meaning, Importance and Cycle of Communication, Media and Types of Communication, Formal and Informal Channels of Communication, Barriers to Communication, Division of Human Communication and Methods to Improve Interpersonal Communication, Qualities of Good Communication.

Grammar: Passive Voice, Indirect Speech, Conditional Sentences, Modal Verbs, Linking Words.

Composition: Curriculum Vitae Writing, Business Letter Writing, Job Application Writing, Paragraph Writing, Report Writing.

Short Stories: 'The Luncheon' by Somerset Maugham, 'How much Land does a Man Need?' by Leo Tolstoy, 'The Night Train at Deoli' by Ruskin Bond.

Poems: 'No Men are Foreign' by James Kirkup, 'If' by Rudyard Kipling, 'Where the Mind is without Fear' by Rabindranath Tagore.

Suggested Readings:

1. Communication Skills, Pushplata & Sanjay Kumar, Oxford University Press, India.
2. The Written Word, Vandana Singh, Oxford University Press, India.
3. Current English Grammar and Usage with Composition, R. P. Sinha, Oxford University Press, India.
4. Rodrigues M. V., 'Effective Business Communication', Concept Publishing Company, New Delhi, 1992 reprint (2000).
5. Bansal, R K and Harrison J B, 'Spoken English' Orient Longman, Hyderabad.
6. Binod Mishra & Sangeeta Sharma, 'Communication Skills for Engineers and Scientists, PHI Learning Private Ltd, New Delhi, 2011.
7. Gartside L. 'Modern Business Correspondence, Pitman Publishing, London.



HU-103 HUMAN VALUES

Course Code: HU-103
L-T-P: 3-0-0

Course Name: Human Values
Maximum Marks: 80

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Understanding the need, basic guidelines, content and process for Value Education
Self Exploration-what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration
Continuous Happiness and Prosperity- A look at basic Human Aspirations
Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
Method to fulfill the above human aspirations: understanding and living in harmony at various levels

Understanding Harmony in the Human Being - Harmony in Myself

Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha
Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail
Programs to ensure Sanyam and Swasthya

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding harmony in the Family- the basic unit of human interaction
Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti;
Trust (Vishwas) and Respect (Samman) as the foundational values of relationship
Understanding the meaning of Vishwas; Difference between intention and competence
Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship
Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals
Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family!

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

Understanding the harmony in the Nature
Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space
Holistic perception of harmony at all levels of existence



Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values

Definitiveness of Ethical Human Conduct

Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

Competence in Professional Ethics:

- a) Ability to utilize the professional competence for augmenting universal human order,
- b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models

Case studies of typical holistic technologies, management models and production systems

Strategy for transition from the present state to Universal Human Order:

- a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers

Suggested Readings:

1. R R Gaur, R Sangal, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, Excel Books, 2009. ISBN: 978-9-350-62091-5
2. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
3. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
4. R. Subramanian, Professional Ethics includes Human Values, Oxford Univ. Press.
5. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
6. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
7. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
8. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
9. A N Tripathy, 2003, Human Values, New Age International Publishers.
10. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
11. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press
12. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
13. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
14. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.



PY-101 ENGINEERING PHYSICS

Course Code: PY-101
L-T-P: 3-1-0

Course Name: Engineering Physics
Maximum Marks: 80

Interference of light: Michelson's Interferometer: Production of circular & straight line fringes; Determination of wavelength of light; Determination of wavelength separation of two nearby wavelengths. Optical technology: Elementary idea of anti-reflection coating and interference filters.

Diffraction and Polarization of light: Fraunhofer Diffraction at Single Slit. Diffraction grating: Construction, theory and spectrum; Determination of wavelength of light. Resolving power: Raleigh criterion; Resolving power of diffraction grating and telescope. Plane, circularly and elliptically polarized light on the basis of electric (light) vector: Malus law; Double Refraction; Phase retardation plates and their use in production and detection of circularly and elliptically polarized light; Optical activity and laws of optical rotation; specific rotation and its measurement using half-shade device.

Elements of Material Science: Bonding in solids; covalent bonding and Metallic bonding; Classification of solids as Insulators, Semiconductors and Conductors; X-Ray diffraction and Bragg's Law. Hall Effect: Theory, Hall Coefficient and applications.

Quantum Mechanics: Compton effect & quantum nature of light; Derivation of time dependent and time independent Schrodinger's Wave Equation; Physical interpretation of wave function and its properties; boundary conditions; Particle in one dimensional box.

Coherence and Optical Fibers: Spatial and temporal coherence; Coherence length; Coherence time and 'Q' factor for light; Visibility as a measure of Coherence and spectral purity; Optical fiber as optical wave guide; Numerical aperture; Maximum angle of acceptance and applications of optical fiber.

Laser and Holography: Theory of laser action; Einstein's coefficients; Components of laser; Threshold conditions for laser action; Theory, Design and applications of He-Ne and semiconductor lasers; Holography versus photography, Basic theory of holography; basic requirement of a Holographic laboratory; Applications of Holography in microscopy and interferometry.

Suggested Readings:

1. Engineering Physics: Malik and Singh (Tata McGraw Hill)
2. Engineering Physics: Naidu (Pearson)
3. Optics : Ajay Ghatak (Tata McGraw Hill)
4. Concept of Modern Physics: A. Baisier (Tata McGraw Hill)
5. Fundamental of Optics : Jetkins and White (Tata McGraw Hill)
6. Material Science: Smith (McGraw Hill)



CY-101 ENGINEERING CHEMISTRY

Course Code: CY-101
L-T-P: 3-1-0

Course Name: Engineering Chemistry
Maximum Marks: 80

Water:

Common natural impurities, hardness, determination of hardness by complexometric (EDTA method), degree of hardness. Municipal water supply, requisite of drinking water, purification of water, sedimentation, filtration, sterilization, breakpoint chlorination. Water for steam making and boiler troubles, formation of solids (Scale and Sludge formation), carryover (Foaming and Priming), boiler corrosion and caustic embrittlement, Methods of boiler water treatment (water softening) preliminary treatments, preheating, Lime-Soda process, Zeolite (Permutit) process, Deionization (Demineralization) process. Numerical problems based on hardness, Lime-Soda and zeolite process.

Organic Fuels:

Origin and classification of fuels. Solid fuels-, coal, classification of coal, significance of constituents, proximate and ultimate analyses of coal, gross and net calorific value, determination of calorific value of coal by Bomb Calorimeter. Metallurgical coke, carbonization processes- Beehive coke oven and Hoffmann Oven (by-products oven) method. Liquid fuels- Advantages of liquid fuels, petroleum and refining of petroleum, reforming, cracking, synthetic petrol, knocking, octane number, anti-knocking agents. Gaseous fuels-advantages, manufacture, composition and uses of coal gas and oil gas, determination of calorific value of gaseous fuels by Junker's calorimeter, flue gas analysis by Orsat's apparatus.

Numerical problems based on determination of calorific value (bomb calorimeter/Junkers calorimeter/Dulong's formula, proximate analysis & ultimate and combustion of fuel.

Polymers:

Classification, constituents, general properties of polymers and their uses. Preparation properties and uses of polyethylene, polyethylene terephthalate (PET), nylon 6, nylon 66, nylon 6, 10, Kevlar, Bakelite. **Elastomers** – natural rubber and vulcanization, synthetic rubbers viz. Buna-S, Buna -N, Butyl and Neoprene Rubbers. Conducting polymers-.

Lubricants:

Classification, types of lubrication, properties and uses. Viscosity and viscosity index, flash and fire point, cloud and pour point. Emulsification and steam emulsion number.

Corrosion and its control:

Definition and its significance. Mechanism of chemical (dry) and electrochemical (wet) corrosion, galvanic corrosion, concentration type corrosion and pitting corrosion. Protection from corrosion- protective coatings-galvanization and tinning, cathodic protection, sacrificial anode and modifications in design.

Inorganic Engineering Materials:

Cement: Manufacture of Portland cement. Rotary kiln technology. Chemistry of hardening and setting of cement. Role of gypsum. **Refractories:** Definition properties and classification. Silica and fire clay refractories. **Glass:** Definition, type and properties of glasses. Manufacture of glass, annealing of glass. Optical fibre grade glass.



Suggested Readings:

1. Engineering Chemistry by Monica Jain and P C Jain, Dhanpat Rai Publishing Company (P) Ltd, New Delhi.
2. Engineering Chemistry Wiley, India.
3. The Chemistry and Technology of Coal, by J G Speigh, CRC Press.
4. The Chemistry and Technology of Petroleum, by J G Speigh, CRC Press.
5. Polymer Chemistry: An Introduction, Malcolm P. Stevens, Oxford University Press.
6. Lubricants and Lubrications, Theo Mang, Wilfeied, Wiley-VCH.
7. Chemistry of water treatment, Samuel Faust & Osman M Aly, CRC Press.
8. Boilers water treatment. Principles and Practice, Colin Frayne, CRC Press.
9. Corrosion Understanding the Basic, by Joseph R Davis, ASM International.
10. Engineering Chemistry, by O.G. Palanna, McGraw Hill Education, India.



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CS-101 COMPUTER PROGRAMMING-I

Course Code: CS-101

L-T-P: 3-0-0

Course Name: Computer Programming-I

Maximum Marks: 80

Computer Fundamentals: Flow chart, pseudocode. binary, octal and hexadecimal number system. ASCII, EBCDIC and UNICODE. boolean operations, primary and secondary memory. Difference among low-level & high-level languages.

C Programming: Structure of a 'C' program, Datatypes, enumerated, assignment statements, input output statements, If statement, for loops, while loops, do-while loops, switch statement, break statement, continue statement. Datatype conversion. Functions & program structure (function call and return), scope of variables, parameter passing methods, recursion v/s iteration.

Suggested Readings:

1. Fundamental of Computers By R. Thareja, Oxford University Press.
2. Programming in ANSI C by E Balagurusamy, Tata McGraw-Hill Education.
3. The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie, PHI.
4. C:The Complete Reference by Herbert Schildt, McGraw-Hill Education.
5. Let us C by Yashavant P. Kanetkar, bpb publications.



CE-101 ENVIRONMENTAL ENGINEERING AND DISASTER MANAGEMENT

Course Code: CE-101

Course Name: Environmental Engineering and
Disaster Management

L-T-P: 3-0-0

Maximum Marks: 80

Basics of Environment: Environmental Pollution, Environmental Acts and Regulations, Ecosystem, Hydrological and chemical cycles, Energy flow in ecosystems. Biodiversity, population dynamics.

Water Pollution: Water pollutants, effects of oxygen demand, water quality in lakes, reservoirs and groundwater, contaminant transport, self cleaning capacity of streams and water bodies, water quality standards, Waste water management, Treatment & disposal of wastewater.

Rain water harvesting: Reuse and saving in use of water, methods of rain water harvesting.

Solid Waste Management: Classification of solid waste, Collection, transportation, treatment, and disposal of solid waste. Economic recovery of solid waste. Sanitary landfill, on site sanitation. Energy interaction from solid waste.

Air and Noise Pollution: Primary and Secondary air pollutants, Air Pollution, Harmful effects of Air Pollution, Control of Air Pollution. Noise Pollution, Harmful effects of noise pollution, control of noise pollution, Global warming, Acid rain, Ozone depletion, Green House effect

Natural Disasters: Hydro-meteorological Based Disasters like Flood, Flash Flood, Cloud Burst, Drought, Cyclone, Forest Fires; Geological Based Disasters like Earthquake, Tsunami, Landslides, Volcanic Eruptions. Man made Disasters: Chemical Industrial Hazards, Major Power Break Downs, Traffic Accidents, Fire Hazards, Nuclear Accidents. Disaster profile of Indian continent. Study of recent major disasters. Disaster Management Cycle and its components.

Disaster Management: Understanding Disasters and Hazards and related issues social and environmental. Risk and Vulnerability. Types of Disasters, their occurrence/ causes, technical terminology involved, impact and preventive measures.

Suggested Readings:

1. Towards Basics of Natural Disaster Reduction by Prof. D.K. Sinha. Researchco Book Center, Delhi.
2. Understanding Earthquake Disasters by Amita Sinvhal. Tata McGraw Hill, New Delhi.
3. Selected Resources available on www.nidmindia.nic.in
4. Basic Environmental Engineering by Prof. R.C. Gaur, New Age International Publication.



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HU-102 COMMUNICATION SKILLS LAB

Course Code: HU-102
L-T-P: 0-0-2

Course Name: Communication Skills Lab.
Maximum Marks: 75

1. Phonetic Symbols and Transcriptions
2. Extempore
3. Group Discussion
4. Dialogue Writing
5. Listening Comprehension
6. Word Formation
7. Synonyms and Antonyms
8. Affixes

(Note: Wherever appropriate, Language Lab Software is to be used to improve listening comprehension and speaking skills.)

Suggested Readings:

1. Technical Communication: principles and Practice, Meenakshi Raman & Sangeeta Sharma, Oxford University Press, India.
2. Effective Technical Communication, Barun K. Mitra, Oxford University Press, India.
3. Binod Mishra & Sangeeta Sharma, 'Communication Skills for Engineers and Scientists, PHI Learning Private Ltd, New Delhi, 2011.
4. Communication Skills, Pushplata & Sanjay Kumar, Oxford University Press, India.
5. Bhattacharya, Indrajit, An Approach to Communication Skills, Dhanpat Rai & Co. (Pvt) Ltd., New Delhi.
6. Wright, Crissy, Handbook of Practical Communication Skills, Jaico Publishing House, Mumbai.
7. Gimson, A C, 'An Introduction to the Pronunciation of English', ELBS.



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PY-102 ENGINEERING PHYSICS LAB

Course Code: HU-102
L-T-P: 0-0-2

Course Name: Engineering Physics Lab
Maximum Marks: 75

1. To determine the wave length of monochromatic light with the help of Michelson's interferometer.
2. To determine the wave length of sodium light by Newton's Ring.
3. To determine the specific rotation of glucose (sugar) solution using polarimeter.
4. To determine the wave length of prominent lines of mercury by plane diffraction grating with the help of spectrometer.
5. To study the variation of a semiconductor resistance with temperature and hence determine the band gap of the semi conductor in the form of reverse biased P-N junction diode.
6. To determine the height of water tank with the help of sextant.
7. To determine the dispersive power of material of a prism for violet and yellow colour's of mercury light with the help of spectrometer.
8. To study the charge and discharge of a condenser and hence determine the same constant (both current and voltage graphs are to be plotted).
9. To verify the expression for the resolving power of a Telescope.
10. To determine the coherence length and coherence time of laser using He – Ne laser.
11. To determine the specific resistance of the material of a wire by Carey Foster's bridge.

CY-102 ENGINEERING CHEMISTRY LAB

Course Code: HU-102
L-T-P: 0-0-2

Course Name: Engineering Chemistry Lab
Maximum Marks: 75

1. To determine the hardness of water by HCL method.
2. To determine the hardness of water by EDTA method
3. Measurement of conductivity of a given sample by conductivity meter.
4. Study of Bomb Calorimeter.
5. To determine the strength of Ferrous Ammonium sulphate solution with the help of $K_2Cr_2O_7$ solution.
6. To determine the strength of $CuSO_4$ solution with the help of hypo solution.
7. To determine the strength of NaOH and Na_2CO_3 in a given alkali mixture.
8. To determine the flash and fire point of a given lubricating oil.
9. To determine the viscosity of a given lubricating oil by Redwood viscometer.
10. To determine cloud and pour point of lubricating oil.



CS-102 COMPUTER PROGRAMMING-I LAB

Course Code: CS-102
L-T-P: 0-0-2

Course Name: Computer Programming-I Lab
Maximum Marks: 100

The programs shall be developed in C language related with the following concepts:

1. Eight programs using input output statements, if statement, for loops, while loops, do-while loops, switch statement, break statement, continue statement, datatype conversion etc.
2. Check a number- palindrome, prime, etc.
3. Eight programs using functions.
4. Two programs using recursion and Iteration.



CE-102 COMPUTER AIDED ENGINEERING GRAPHICS

Course Code: CE-102
L-T-P: 0-0-3

Course Name: Computer Aided Engineering Graphics
Maximum Marks: 100

Projections of Point & Lines: Positions of Point, Notation system, systematic Approach for projections of points, Front view & Top view of point, Positions of straight lines, line parallel to Both the RPs, Line perpendicular to either of the RPs, Line inclined to one RP and parallel to the other, Line Inclined to Both the RPs, Traces of a line (One drawing sheet, one assignment in sketch book)

Projections of planes: Positions of planes, Terms used in projections of planes, plane parallel to RP, plane inclined to one RP and perpendicular to the other RP, plane perpendicular to Both the RPs, plane Inclined to Both RPs, True shape of the plane, Distance of a point from plane, Angle between two planes (no drawing sheet required, only assignment in sketch book)

Projection of solids: Basic solids, Frustums and truncated solids, Positions of the solids, solid with Axis perpendicular to an RP, solid with axis inclined to one RP and parallel to the other solid with axis Inclined to Both the RPs Solid with Axis parallel to Both the RPs (One drawing sheet, one assignment in sketch book)

Section of solids: Theory of sectioning, section of prisms and cubes, sections of pyramids and Tetrahedron section of Cylinders, Section of cones, Section of spheres (One drawing sheet, one assignment in sketch book)

Development of surfaces: Methods of development, parallel line developments, Radial line Development, Anti- Development (One drawing sheet, one assignment in sketch book)

Isometric Projection: Principle of Isometric Projection Isometric scale, Isometric projections and Isometric Views, Isometric Views of standard shapes, Isometric views of standard solids (One drawing sheet, one assignment in sketch book)

Computer Aided Drafting: Introduction to CAD, Advantages of CAD software's, Auto CAD, Auto CAD Commands and tool bars, Creating the Drawing, Changing properties, Dimensioning other object, Text editing, Isometric drawing (Four assignments on the computer)

Suggested Readings:

1. Engineering Drawing Geometrical Drawing P.S.Gill , S.K.Katara & Sons
2. Engineering Drawing,Dhanarajay A Jolhe ,Tata McGraw Hill.
3. Engineering Drawing, Basant Agarwal & CM Agarwal ,Tata McGraw Hill
4. Engineering Drawing, N.D.Bhatt, Charotar Publishing House Pvt. Ltd.
5. Engineering Drawing with an introduction to AutoCAD, Dhananjay A Jolhe
6. Engineering Drawing with AutoCAD, B.V.R. Gupta and M. Rajaroy
7. AutoCAD 2017 for Engineers & Designers (Basic and Intermediate), Sham Tickoo,



ME-101 MECHANICAL WORKSHOP PRACTICE

Course Code: ME-101
L-T-P: 0-0-2

Course Name: Mechanical Workshop Practice
Maximum Marks: 100

Carpentry Shop:

1. T – Lap joint
2. Bridle joint

Foundry Shop:

1. Mould of any pattern
2. Casting of any simple pattern

Welding Shop:

1. Lap joint by gas welding
2. Butt joint by arc welding
3. Lap joint by arc welding
4. Demonstration of brazing, soldering & gas cutting

Machine Shop Practice:

1. Demonstration of various machine tools such as Lathe, Shaper, Milling, Grinding and Drilling

Fitting Shop

1. Finishing of two sides of a square piece by filing
2. Making mechanical joint and soldering of joint on sheet metal
3. To cut a square notch using hacksaw and to drill a hole and tapping

Sheet Metal Shop

Making of Funnel using sheet metal

Suggested Readings:

1. Elements of Workshop Technology Hajra & Choudhary, Media Promoters & Publisher.
2. Workshop Practice HS Bawa, Tata McGraw Hill 2nd ed. India.
3. Mechanical Workshop Practice, K.C. John, PHI Learning New Delhi.
4. Workshop Technology, W.A.J.Chapman, CBS Publisher & Distributor New Delhi.



MA-102 ENGINEERING MATHEMATICS-II

Course Code: MA-102
L-T-P: 3-1-0

Course Name: Engineering Mathematics-II
Maximum Marks: 80

Linear Algebra:

Rank of a matrix, Normal forms, consistency of systems of linear simultaneous equations and its solutions, Linear dependence and independence of vectors, Eigen values and Eigen vectors, Cayley-Hamilton theorem (without proof), orthogonal matrices, diagonalization of matrix.

Fourier Series:

Orthogonal functions, periodic functions, Fourier series of periodic functions, Euler formula, change of intervals, Even and Odd functions, half range Fourier sine and cosine series; Harmonic analysis.

Differential Equations:

Linear differential equations of first order, Reducible to linear form, Exact differential equations, reducible to exact form; Linear Differential Equations of Higher order with constant coefficients, Simultaneous linear differential equations.

Second order linear ODE with variable coefficients, Homogenous and exact forms, Change of dependent and independent variables; Variation of parameters, Method of Undetermined coefficients, Euler-Cauchy equations.

Partial Differential Equations: Order and Degree, Formation; Linear partial differential equations of first order: Lagrange's form, Standard forms, Charpit's method.

Solutions of PDE of Second order using separation of variable method.

Suggested Readings:

1. Advanced Engineering Mathematics, Peter O Neil, Cengage Learning Publication.
2. Advanced Engineering Mathematics, 4th Edition, Dennis G. Zill, Warren S. Wright, Jones & Bartlett Publications.
3. Engineering Mathematics, S. Pal and S.C. Bhunia, Oxford University Press.
4. Engineering Mathematics, C.B. Gupta, S.R. Singh and Mukesh Kumar, McGrawHill Education.
5. Advanced Engineering Mathematics, Jain and Iyengar, Narosa Publications.
6. Higher Engineering Mathematics, B.V. Ramana, McGraw Hill Education.
7. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley.



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CS-103 COMPUTER PROGRAMMING-II

Course Code: CS-103
L-T-P: 3-0-0

Course Name: Computer Programming-II
Maximum Marks: 80

Computer System Fundamentals: System software, firmware, freeware/open-source, loader, compiler, peripherals.

Computer Programming: one-dimensional arrays, multi-dimensional arrays, character arrays and strings, Pointers, Pointers arithmetic, Dynamic memory allocation: functions like malloc, calloc, free. Preprocessor, command line arguments, difference between macro and inline function. Structure & Union, typedef. File operations and multi-file handling, sscanf()/sprintf(). Graphics using C.

Suggested Readings:

1. Programming in ANSI C by E Baluguamsamy, TaTa McGraw-Hill Education
2. Programming in C by Thareja, Oxford University Press.
3. The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie, PHI.
4. C: The Complete Reference by Herbert Schildt, McGraw-Hill Education.
5. Graphics Under C by Yashavant P. Kanetkar, bpb publications.



EE-101 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code: EE-101
L-T-P: 3-0-0

Course Name: Basic Electrical and Electronics Engineering
Maximum Marks: 80

Basic Concepts of Electrical Engineering: Electric Current, Electromotive force, Electric Power, Ohm's Law, Basic Circuit Components, Faraday's Law of Electromagnetic Induction, Lenz's Law, Kirchhoff's laws, Network Sources, Resistive Networks, Series-Parallel Circuits, Node Voltage Method, Mesh Current Method, Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorems.

Transformers: Construction, EMF equation, ratings, phasor diagram on no load and full load, equivalent circuit, regulation and efficiency calculations, open and short circuit tests, auto-transformers.

Alternating Quantities: Introduction, Generation of AC Voltages, Root Mean Square and Average Value of Alternating Currents and Voltages, Form Factor and Peak Factor, Phasor Representation of Alternating Quantities, Single Phase RLC Circuits, Introduction to 3-Phase AC System.

Rotating Electrical Machines; DC Machines: Principle of Operation of DC Machine, EMF Equation, Applications of DC Machines. AC Machines: Principle of Operation of 3-Phase Induction Motor, 3-Phase Synchronous Motor and 3-Phase Synchronous Generator (Alternator), Applications of AC Machines.

Basic Electronics: Conduction in Semiconductors, Conduction Properties of Semiconductor Diodes, Behavior of PN Junction, PN Junction Diode, Zener Diode, Photovoltaic Cell, Rectifiers, Bipolar Junction Transistor, Field Effect Transistor, Transistor as an Amplifier.

Digital Electronics: Boolean algebra, Binary System, Logic Gates and Their Truth Tables.

Electrical Measuring Instruments: PMMC instruments, shunt and series multipliers, multimeters, Moving iron ammeters and voltmeters, dynamometer, wattmeter, AC watt-hour meter, extension of instrument ranges.

Suggested Readings:

1. Basic Electrical and Electronics Engineering by Sukhija and Nagsarkar, Oxford Publication
2. Basic Electrical & Electronics Engineering by Kothari, Nagrath, TMH
3. Basic Electrical & Electronics Engineering by V. Jagathesan, K. Vinod Kumar & R. Saravan Kumar, Wiley India.
4. Basic Electrical & Electronics Engineering by Prasad/Sivanagraju, Cengage learning Indian Edition
5. Basic Electrical and Electronics Engineering by Muthusubramaniam, TMH
6. Fundamentals of Electrical and Electronics Engineering by Ghosh, Smarajit, PHI India
7. Basic Electrical & Electronics Engineering by Ravish Singh, TMH
8. Electrical and Electronic Technology by Edward Hughes et al, Pearson Publication



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9. Basic Electrical Engineering by A.E.Fitzgerald, TMH

10. Fundamental of Electrical Engineering by Leonard S.Bobrow, Oxford

CE-103 BASIC CIVIL ENGINEERING

Course Code: CE-103
L-T-P: 3-0-0

Course Name: Basic Civil Engineering
Maximum Marks: 80

Introduction: Specialization of Civil Engineering, scope of Civil Engineering, Role of civil Engineer in Society, Impact of infrastructural development on economy of country.

Surveying: Object & principles of Surveying, plans and maps, Scales, Unit of measurement.

Linear measurements: Direct measurements- Tape & Chain, Ranging out survey lines, taking measurements of sloping ground.

Tape correction, conventional symbols. Introduction to Compass Surveying & Leveling. Introduction to total station.

Building & Building materials:

Construction materials: Stone, Brick, Cement, Mortar, Concrete, Steel – their properties & uses.

Selection of site for Buildings, types of buildings, plinth area, carpet area, floor space index, Introduction to building byelaws, concept of sun light and ventilation.

Components of Buildings & their functions, Basic concept of R.C.C., Introduction to types of foundation.

Transportation, Traffic and Road Safety: Types and characteristics of various modes of transportation, various road traffic signs, causes of accidents and road safety measures.

Suggested Readings:

1. Palancharmy, Basic Civil Engineering, McGraw Hill publishers.
2. Satheesh Gopi, Basic Civil Engineering, Pearson Publishers.
3. Ketki Ranwala Dalal, Essentials of Civil Engineering, Charotar Publishing House.



ME-102 BASIC MECHANICAL ENGINEERING

Course Code: ME-102

Course Name: Basic Mechanical Engineering

L-T-P: 3-0-0

Maximum Marks: 80

Fundamentals:

Introduction to mechanical engineering, concepts of thermal engineering, mechanical machine design, industrial engineering and manufacturing technology.

Steam Boilers, Steam Turbines and Power Plants:

Introduction, classification and types of steam boilers and steam turbines. Discuss working of steam boilers and steam turbines.

Introduction and Classification of power plants.

Pumps and IC Engines:

Applications and working of Reciprocating and Centrifugal pumps.

Introduction, Classification of IC Engines, Main Components of IC Engines, Working of IC Engines and its components.

Refrigeration and Air Conditioning:

Introduction, classification and types of refrigeration systems and air-conditioning. Applications of refrigeration and Air-conditioning.

Transmission of Power:

Introduction and types of Belt and Rope Drives.

Introduction to Gears and Gear Trains.

Primary Manufacturing Processes:

Metal Casting Process: Introduction to Casting Process, Patterns, Molding, Furnaces.

Metal Forming Processes: Introduction to Forging, Rolling, Extrusion, Drawing.

Metal Joining Processes: Introduction to various types of Welding, Gas Cutting, Brazing, and Soldering.

Metal Removal or Machining Processes: Introduction to machining process and various machine tools.

Engineering Materials and Heat Treatment of Steel:

Introduction to various engineering materials and their properties.

Introduction to Heat Treatment and types of Heat Treatment Processes.

Introduction to CAD, CAM, FMS, MEMS and CIM:

Introduction to modern manufacturing systems and their applications.

Suggested Readings:

1. G. Shanmugam and S Ravindran, Basic Mechanical Engineering, Mc Graw hill, fourth edition.
2. K Venu Gopal and Prabhu Raja V, Basic Mechanical Engineering, Anuradha agencies pub, Chennai.



OE-101 ENGINEERING MECHANICS

Course Code: OE-101

L-T-P: 3-0-0

Course Name: Engineering Mechanics

Maximum Marks: 80

Statics of particles and rigid bodies: Fundamental laws of mechanics, Principle of transmissibility, System of forces, Resultant force, Resolution of force, Moment and Couples, Resolution of a force into a force and a couple, Free body diagram, Equilibrium, Conditions for equilibrium, Lami's theorem.

Centroid & Moment of inertia (M.I): Location of centroid, Moment of inertia (mass and area), Parallel axis and perpendicular axis theorems, M.I of composite section, M.I. of solid bodies, Polar moment of inertia.

Virtual work: Principle of Virtual Work, Active forces and active force diagram, Stability of equilibrium.

Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction.

Kinematics of particles and rigid bodies: Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular acceleration, Radial and transverse velocities and accelerations, Projectiles motion on plane and Inclined Plane, Relative Motion.

Kinetics of particles and rigid bodies: Newton's second law, Equation of motion in rectangular coordinate, Equation of motion in radial and transverse components, Equation of motion in plane for a rigid body, D'Alembert principle.

Work, Energy and Power: Work of a force, weight, spring force and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservative and Non-conservative Force, Conservation of energy.

Impulse and Momentum: Linear and angular momentum, Linear and angular impulse, Principle of momentum for a particle and rigid body, Principle of linear impulse and momentum for a particle and rigid body, Principle of angular momentum and Impulse, Conservation of angular momentum, Angular momentum of rigid body, Principle of impulse and momentum for a rigid body, Central impact, System of variable mass.

Suggested Readings:

1. Engineering Mechanics, Sharma, Pearson Education.
2. Engineering Mechanics, Beer and Johnston, Tata McGraw-Hill.
3. Engineering Mechanics, Basudeb Bhattacharya, Oxford University Press
4. Engineering Mechanics, Hibbeler, Pearson Education.
5. Engineering Mechanics, Meriam and Kraige, John Wiley & Sons.
6. Engineering Mechanics, Timoshenko and Young, Tata McGraw-Hill.
7. Engineering Mechanics, Shames, Pearson Education.



CS-104 COMPUTER PROGRAMMING-II LAB

Course Code: CS-104
L-T-P: 0-0-2

Course Name: Computer Programming-II Lab
Maximum Marks: 100

The programs shall be developed in C language related with the following concepts:

1. Input roll numbers of your friends in an array & print in reverse order.
2. Input names of your friends in an array & print in reverse order.
3. Input two matrices and output third matrix after performing add/subtract the corresponding elements.
4. Four programs using malloc, calloc, free & scanf()/sprintf() functions.
5. Two programs using macro and online functions.
6. Two programs using structure & union.
7. Two programs using pointers.
8. Three programs belonging to file operations and multi-file handling.
9. Three programs belonging to graphics using C.



ME-104 COMPUTERS AIDED MACHINE DRAWING

Course Code: ME-104
L-T-P: 0-0-3

Course Name: Computer Aided Machine Drawing
Maximum Marks: 100

Introduction: Principles of drawing, conventional representation of machine components and materials, lines, types of lines, dimensioning types, rules of dimensioning.

Conversion of pictorial views into orthographic views: (1 drawing sheet) Introduction to orthographic projection, concept of first angle and third angle projection, drawing of simple machine elements in first angle projection, missing view problems.

Sectional view : (1 drawing sheet) Introduction, cutting plane line, type of sectional views-full section, half section, partial or broken section, revolved section, removed section, offset section, sectioning conventions-spokes, web, rib, shaft, pipes, different types of holes, conventions of section lines for different metals and materials.

Fasteners: (1 drawing sheet) Temporary and permanent fasteners, thread nomenclature and forms, thread series, designation, representation of threads, bolted joints, locking arrangement of nuts, screws, washers, foundation bolts etc., keys, types of keys, cotter and knuckle joints. Riveted joints, rivets and riveting, types of rivets, types of riveted joints etc.

Assembly drawing: (1 drawing sheet) Introduction to assembly drawing, assembly drawing of simple machine elements; like rigid or flexible coupling, muff coupling, plummer block, footstep bearing, bracket etc.

Free hand sketching: Need for free hand sketching, Free hand sketching of conventional representation of materials, screw fasteners, foundation bolts, studs.

Bearing: Ball, roller, needle, foot step bearing.

Coupling: Protected type, flange, and pin type flexible coupling.

Other components: Welded joints, belts and pulleys, pipes and pipe joints, valves etc.

Computer aided drafting: Concepts of computer aided 2D drafting using any drafting software like AutoCAD/ Solid works/Creo/Catia etc., basic drawing and modify commands, making 2D drawings of simple machine parts.

Suggested Readings:

1. Laxminarayan and M.L. Mathur, Machine Drawing, Jain Brothers
2. Gill P S, Machine Drawing, Kataria & Sons 2009
3. Basudeb Bhattacharya, Machine Drawing, Oxford University Press 2011
4. Dhawan, R.K., A Text Book of Machine Drawing, S. Chand & Company, 1996
5. Ostrowsky, O., Engineering Drawing with CAD Applications, ELBS, 1995
6. Siddeshwar N., P Kannaiah, VVS Shastry, Machine Drawing, Tata McGraw Hill



HU-104 HUMAN VALUES: ACTIVITIES

Course Code: HU-104
L-T-P: 0-0-2

Course Name: Human Values: Activities
Maximum Marks: 75

PS 1:

Introduce yourself in detail. What are the goals in your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your salient achievements and shortcomings in your life? Observe and analyze them.

PS 2:

Now-a-days, there is a lot of talk about many technogenic maladies such as energy and material resource depletion, environmental pollution, global warming, ozone depletion, deforestation, soil degradation, etc. - all these seem to be manmade problems, threatening the survival of life Earth - What is the root cause of these maladies & what is the way out in opinion?

On the other hand, there is rapidly growing danger because of nuclear proliferation, arms race, terrorism, breakdown of relationships, generation gap, depression & suicidal attempts etc. - what do you think, is the root cause of these threats to human happiness and peace - what could be the way out in your opinion?

PS 3:

1. Observe that each of us has the faculty of 'Natural Acceptance', based on which one can verify what is right or not right for him. (As such we are not properly trained to listen to our 'Natural Acceptance' and may a time it is also clouded by our strong per-conditioning and sensory attractions).

Explore the following:

- (i) What is 'Naturally Acceptable' to you in relationship the feeling of respect or disrespect for yourself and for others?
- (ii) What is 'naturally Acceptable' to you - to nurture or to exploit others?

Is your living in accordance with your natural acceptance or different from it?

2. Out of the three basic requirements for fulfillment of your aspirations - right understanding, relationship and physical facilities - observe how the problems in your family are related to each. Also observe how much time & effort you devote for each in your daily routine.

PS 4:

list down all your important desires. Observe whether the desire is related to Self (I) or the Body. If it appears to be related to both, visualize which part of it is related to Self (I) and which part is related to Body.



PS 5:

1. a. Observe that any physical facility you use, follows the given sequence with time:

Necessary and tasteful - unnecessary but still tasteful - unnecessary and tasteless - intolerable

b. In contrast, observe that any feeling in you is either naturally acceptable or not acceptable at all. If not acceptable, you want it continuously and if not acceptable, you do not want it any moment!

2. List down all your important activities. Observe whether the activity is of 'I' or of Body or with the participation of both or with the participation of both 'I' and Body.
3. Observe the activities within 'I'. Identify the object of your attention for different moments (over a period of sy 5 to 10 minutes) and draw a line diagram connecting these points. Try observe the link between any two nodes.

PS 6:

1. Chalk out some programs towards ensuring your harmony with the body - in terms of nurturing, protection and right utilisation of the body.
2. Find out the plants and shrubs growing in and around your campus, which can be useful in curing common diseases.

PS 7:

Form small groups in the class and make them carry out a dialogue focusing on the following eight questions related to 'TRUST';

- 1a. Do I want to make myself happy?
- 2a. Do I want to make the other happy?
- 3a. Does the other want to make himself/herself happy?
- 4a. Does the other want to make me happy?

What is the answer?

Intention (Natural Acceptance)

- 1b. Am I able to always make myself happy?
- 2b. Am I able to always make the other happy?
- 3b. Is the other able to always make himself/herself happy?

What is the answer?

Let each student answer the questions for himself and everyone else. Discuss the difference between intention and competence. Observe whether you evaluate yourself and others on the basis of intention/competence.



PS 8:

1. Observe, on how many occasions, you are able to respect your related ones (by doing the right evaluation) and on how many occasions you are disrespecting by way of under-evaluation, over-evaluation or otherwise evaluation.
2. Also, observe whether your feeling of respect is based on treating the other as you would treat yourself or on differentiations based on body, physical facilities or beliefs.

PS 9:

1. Write a narration in the form of a story, poem, skit or essay to clarify a salient Human Value to the children.
2. Recollect and narrate an incident in your life where you were able to exhibit willful adherence to values in a difficult situation.

PS 10:

List down some common units (things) of Nature which you come across in your daily life and classify them in the four orders of Nature. Analyse and explain the aspect of mutual fulfillment of each unit with other orders.

PS 11:

Make a chart to show the whole existence as co-existence. With the help of this chart try to identify the role and the scope of some of the courses of your study. Also indicate the areas which are being either over-emphasized or ignored in the present context.

PS 12:

Identify any two important problems being faced by the society today and analyze the root cause of these problems. Can these be solved on the basis of natural acceptance of human values. If so, how should one proceed in this direction from the present situation?

PS 13:

1. Suggest ways in which you can use your knowledge of Science/Technology/Management etc. for moving towards a universal human order.
2. Propose a broad outline for humanistic Constitution at the level of Nation.

PS 14:

The course is going to be over now. It is time to evaluate what difference in your thinking it has made. Summarize the core message of this course grasped by you. How has this affected you in terms of;

- a. Thought
- b. Behavior
- c. Work and
- d. Realization



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What practical steps are you able to visualize for the transition of the society from its present state.

Project:

Every student required to take-up a social project e.g. educating children in needy/weaker section, services in hospitals, NGO's and other such work

Scheme and Syllabus
Rajasthan Technical University, Kota
B. Tech. in Computer Engineering
(Session 2017-18)

Rajasthan Technical University, Kota

Scheme for B.Tech. Computer Science & Engineering-w.e.f. session 2012-13

III	Computer Science and Engineering	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject	L	T	P		IA	TE	Total	Common with
3CS1A	Electronic Devices and Circuits	3			3	20	80	100	CS,IT
3CS2A	Data Structures and Algorithms	3			3	20	80	100	EE, EEE, EC, EIC, CS & IT
3CS3A	Digital Electronics	3			3	20	80	100	EE, EEE, EC, EIC, CS & IT
3CS4A	Linux and Shell Programming	3			3	20	80	100	EE, EEE, EC, EIC, CS & IT
3CS5A	Object Oriented Programming	3			3	20	80	100	CS,IT
3CS6A	Advanced Engineering Mathematics	3	1		3	20	80	100	EE, EEE, CS & IT
3CS7A	Electronic Devices Lab			3	3	45	30	75	CS,IT
3CS8A	Data Structures Lab			3	4	60	40	100	CS,IT
3CS9A	Digital Electronics Lab			2	3	30	20	50	CS,IT
3CS10A	C++ Programming			3	4	45	30	75	CS,IT
3CS11A	Unix Shell Programming			2	3	30	20	50	CS,IT
3CSDC	Discipline & extra Curricular Activities							50	
	Total	18	1	13				1000	

IV	Computer Science and Engineering	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject	L	T	P		IA	TE	Total	Common with
4CS1A	Microprocessors and Interfaces	3			3	20	80	100	CS,IT
4CS2A	Discrete Mathematical Structures	3	1		3	20	80	100	CS,IT
4CS3A	Statistics and Probability Theory	3			3	20	80	100	CS,IT
4CS4A	Software Engineering	3			3	20	80	100	CS,IT
4CS5A	Principles of Communication	3			3	20	80	100	CS,IT
4CS6A	Principles of Programming Languages	3			3	20	80	100	CS,IT
4CS7A	Microprocessor Lab			3	3	60	40	100	CS,IT
4CS8A	Communication Lab			3	3	60	40	100	CS,IT
4CS9A	Computer Aided Software Engineering Lab			3	4	60	40	100	CS,IT
4CS10A	Business Entrepreneurship Development			2	3	30	20	50	
4CSDC	Discipline & extra Curricular Activities							50	
	Total	18	1	11				1000	

V	Computer Science and Engineering	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject Name (Revised)	L	T	P		IA	TE	TOTAL	Common to
5CS1A	Computer Architecture	3			3	20	80	100	CS, IT
5CS2A	Digital Logic Design	3	-		3	20	80	100	
5CS3A	Telecommunication Fundamentals	3	-	-	3	20	80	100	CS, IT
5CS4A	Database Management Systems	3			3	20	80	100	CS, IT
5CS5A	Operating Systems	3	-		3	20	80	100	CS, IT
5CS6.1A	Advanced Data Structure	3	-		3	20	80	100	CS, IT
5CS6.2A	Digital Signal Processing								CS, IT
5CS6.3A	Information Theory & Coding								CS, IT
5CS7A	DataBase Lab			3		60	40	100	CS, IT
5CS8A	System Design in UML Lab.	-	-	3		45	30	75	
5CS9A	Operating Systems Simulation Lab			3		60	40	100	CS, IT
5CS10	Digital Hardware Design Lab			3		45	30	75	CS, IT
5CSDC	Discipline & Extra Curricular Activities							50	CS, IT
		18	0	12				1000	

VI	Computer Science and Engineering	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject Name (Revised)	L	T	P		IA	TE	TOTAL	Common to
6CS1A	Computer Networks	3	-		3	20	80	100	CS, IT
6CS2A	Design and Analysis of Algorithms	3	-		3	20	80	100	CS, IT
6CS3A	Theory Of Computation	3			3	20	80	100	CS, IT
6CS4A	Computer Graphics and Multimedia Techniques	3			3	20	80	100	
6CS5A	Embedded System Design	3	-		3	20	80	100	
6CS6.1A	Advance Topics in Operating Systems	3	-		3	20	80	100	CS, IT
6CS6.2A	Artificial Intelligence								
6CS6.3A	Human Computer Interface								CS, IT
6CS7A	Java Programming Lab			3		45	30	75	CS, IT
6CS8A	Computer Graphics & Multimedia Lab			2		30	20	50	
6CS9A	Design and Analysis of Algorithms Lab.			3		60	40	100	CS, IT
6CS10A	Embedded System Design Lab.			2		45	30	75	
6CS11A	Humanities and Social Sciences			2		30	20	50	CS, IT
6CSDC	Discipline & Extra Curricular Activities							50	CS, IT
		18	0	12				1000	

VII	Computer Science and Engineering	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject Name (Revised)	L	T	P		IA	TE	TOTAL	Common to
7CS1A	Cloud Computing	3	-		3	20	80	100	
7CS2A	Information System Security	3			3	20	80	100	CS, IT
7CS3A	Data Mining & Ware Housing	3			3	20	80	100	CS, IT
7CS4A	Computer Aided Design for VLSI	3	-		3	20	80	100	
7CS5A	Compiler Construction	3			3	20	80	100	
7CS6.1A	Advance DataBase Management Systems	3	-		3	20	80	100	
7CS6.2A	Robotics								
7CS6.3A	Data Compression Techniques								
7CS7A	Web Development Lab			2		30	20	50	
7CS8A	VLSI Physical Design Lab			3		45	30	75	
7CS9A	Compiler Design Lab			3		45	30	75	
7CSPR	Project-I			2		50		50	CS, IT
7CSTR	Practical Training*			2			100	100	CS, IT
7CSDC	Discipline & Extra Curricular Activities							50	CS, IT
		18	0	12				1000	

VIII	Computer Science and Engineering	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject Name (Revised)	L	T	P		IA	TE	TOTAL	Common to
8CS1A	Mobile Computing	3			3	20	80	100	CS, IT
8CS2A	Digital Image Processing	3	-		3	20	80	100	CS, IT
8CS3A	Distributed Systems	3			3	20	80	100	
8CS4.1A	Hardware Testing & Fault Tolerance	3	-		3	20	80	100	CS, IT
8CS4.2A	Real Time Systems								CS, IT
8CS4.3A	Information Retrieval								CS, IT
8CS5A	Unix Network Programming & Simulation Lab			3		60	40	100	
8CS6A	FPGA Lab.			3		60	40	100	
8CS7A	Digital Image Processing lab			2		30	20	50	CS, IT
8CSPR	Project-II			2		120	80	200	CS, IT
8CSSM	Seminar			2		60	40	100	CS, IT
8CSDC	Discipline & Extra Curricular Activities							50	CS, IT
		12	0	12				1000	

3CS1A ELECTRONIC DEVICES & CIRCUITS (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]
Units	Contents of the subject
I	Mobility and conductivity, charge densities in a semiconductor, Fermi Dirac distribution, carrier concentrations and fermi levels in semiconductor, Generation and recombination of charges, diffusion and continuity equation, Mass action Law, Hall effect. Junction diodes, Diode as a ckt. element, load line concept, clipping and clamping circuits, Voltage multipliers.
II	Transistor characteristics, Current components, Current gains: alpha and beta. Operating point. Hybrid model, h-parameter equivalent circuits. CE, CB and CC configuration. DC and AC analysis of CE,CC and CB amplifiers. Ebers-Moll model. Biasing & stabilization techniques. Thermal runaway, Thermal stability.
III	SMALL SIGNAL AMPLIFIERS AT LOW FREQUENCY : Analysis of BJT and FET, RC coupled amplifiers. Frequency response, midband gain, gains at low and high frequency. Miller's Theorem. Cascading Transistor amplifiers, Emitter follower. JFET, MOSFET, Equivalent circuits and biasing of JFET's & MOSFET's. Low frequency CS and CD JFET amplifiers. FET as a voltage variable resistor. Source follower.
IV	FEEDBACK AMPLIFIERS : Classification, Feedback concept, Transfer gain with feedback, General characteristics of negative feedback amplifiers. Analysis of voltage-series, voltage-shunt, current-series and current-shunt feedback amplifier. Stability criterion.
V	OSCILLATORS : Classification. Criterion for oscillation. Tuned collector, Hartley, Colpitts, RC Phase shift, Wien bridge and crystal oscillators, Astable, monostable and bistable multivibrators. Schmitt trigger.

Text/References:

1. Electronic devices & circuits theory By R.L. Boylestad, Louis Nashelsky ,Pearson education
2. Integrated Electronics By Millman Halkias, T.M.H
3. Electronic devices & circuits By David Bell, Oxford Publications
4. Grob's Basic Electronics By Schultz, T.M.H.

3CS2A DATA STRUCTURES & ALGORITHMS (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.		Evaluation	
Branch: Computer Science and Engineering Schedule per Week Lectures: 3		Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]	
Units	Contents of the subject		
I	Definition & characteristics of algorithms, structures. Difficulties in estimating exact execution time of algorithms. Concept of complexity of program. Asymptotic notations: Big-Oh, theta, Omega- Definitions and examples, Determination of time and space complexity of simple algorithms without recursion. Representing a function in asymptotic notations viz $5n^2-6n=\theta(n^2)$ Arrays: Array as storage element, Row major & column major form of arrays, computation of address of elements of n dimensional array.		
II	Arrays as storage elements for representing polynomial of one or more degrees for addition & multiplication, sparse matrices for transposing & multiplication, stack, queue, dequeue, circular queue for insertion and deletion with condition for over and underflow, transposition of sparse matrices with algorithms of varying complexity (Includes algorithms for operations as mentioned). Evaluation of Expression: Concept of precedence and associativity in expressions, difficulties in dealing with infix expressions, Resolving precedence of operators and association of operands, postfix & prefix expressions, conversion of expression from one form to other form using stack (with & without parenthesis), Evaluation of expression in infix, postfix & prefix forms using stack. Recursion.		
III	Linear linked lists: singly, doubly and circularly connected linear linked lists- insertion, deletion at/ from beginning and any point in ordered or unordered lists. Comparison of arrays and linked lists as data structures. Linked implementation of stack, queue and dequeue. Algorithms for of insertion, deletion and traversal of stack, queue, dequeue implemented using linked structures. Polynomial representation using linked lists for addition, Concepts of Head Node in linked lists. Searching: Sequential and binary search		
IV	Non-Linear Structures: Trees definition, characteristics concept of child, sibling, parent child relationship etc, binary tree: different types of binary trees based on distribution of nodes, binary tree (threaded and unthreaded) as data structure,		

	insertion, deletion and traversal of binary trees, constructing binary tree from traversal results. Threaded binary Tree. Time complexity of insertion, deletion and traversal in threaded and ordinary binary trees. AVL tree: Concept of balanced trees, balance factor in AVL trees, insertion into and deletion from AVL tree, balancing AVL tree after insertion and deletion. Application of trees for representation of sets.
V	Graphs: Definition, Relation between tree & graph, directed and undirected graph, representation of graphs using adjacency matrix and list. Depth first and breadth first traversal of graphs, finding connected components and spanning tree. Single source single destination shortest path algorithms. Sorting: Insertion, quick, heap, topological and bubble sorting algorithms for different characteristics of input data. Comparison of sorting algorithms in term of time complexity. NOTE: 1. Algorithm for any operation mentioned with a data structure or required to implement the particular data structure is included in the curriculum.

Text/References:

1. An introduction to data structures with applications By Jean-Paul Tremblay, P. G. Sorenson, TMH
2. Data Structures in C/C++, Horowitz, Sawhney, Galgotia
3. Data Structures in C/C++, Tanenbaum, Pearson
4. Data Structures in C++, Weiss, Parson

3CS3A DIGITAL ELECTRONICS (Common to Computer Science and Engineering & Info. Tech)

Class: III Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]
Units	Contents of the subject
I	NUMBER SYSTEMS, BASIC LOGIC GATES & BOOLEAN ALGEBRA: Binary Arithmetic & Radix representation of different numbers. Sign & magnitude representation, Fixed point representation, complement notation, various codes & arithmetic in different codes & their inter conversion. Features of logic algebra, postulates of Boolean algebra. Theorems of Boolean algebra. Boolean function. Derived logic gates: Exclusive-OR, NAND, NOR gates, their block diagrams and truth tables. Logic diagrams from Boolean expressions and vice-versa. Converting logic diagrams to universal logic. Positive, negative and mixed logic. Logic gate conversion.
II	DIGITAL LOGIC GATE CHARACTERISTICS: TTL logic gate characteristics. Theory & operation of TTL NAND gate circuitry. Open collector TTL. Three state output logic. TTL subfamilies. MOS & CMOS logic families. Realization of logic gates in RTL, DTL, ECL, C-MOS & MOSFET. Interfacing logic families to one another.
III	MINIMIZATION TECHNIQUES: Minterm, Maxterm, Karnaugh Map, K map upto 4 variables. Simplification of logic functions with K-map, conversion of truth tables in POS and SOP form. Incomplete specified functions. Variable mapping. Quinn-McKlusky minimization techniques.
IV	COMBINATIONAL SYSTEMS: Combinational logic circuit design, half and full adder, subtractor. Binary serial and parallel adders. BCD adder. Binary multiplier. Decoder: Binary to Gray decoder, BCD to decimal, BCD to 7-segment decoder. Multiplexer, demultiplexer, encoder. Octal to binary, BCD to excess-3 encoder. Diode switching matrix. Design of logic circuits by multiplexers, encoders, decoders and demultiplexers.
V	SEQUENTIAL SYSTEMS: Latches, flip-flops, R-S, D, J-K, Master Slave flip flops. Conversions of flip-flops. Counters : Asynchronous (ripple), synchronous and asynchronous decade counter, Modulus counter, skipping state counter, counter design. Ring counter. Counter applications. Registers: buffer register, shift register.

Text/References:

1. Digital integrated electronics, By Herbert Taub, Donald L. Schilling, TMH
2. Digital Logic and Computer Design By M. Morris Mano, Pearson
3. Modern Digital Electronics By R.P. Jain, TMH
4. Fundamentals of Digital circuits By A. Anand kumar, PHI
5. Digital circuit design By S. Salivahanan, Sarivazhagan, Vikas publications

3CS4A LINUX AND SHELL PROGRAMMING

Class: III Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction: Logging in, changing password (<i>passwd</i> command only), <i>man</i> , <i>xman</i> , <i>info</i> commands to access on line help. Simple commands like <i>ls</i> , <i>cp</i> , <i>mv</i> , <i>grep</i> , <i>head</i> , <i>tail</i> , <i>sort</i> , <i>uniq</i> , <i>diff</i> , <i>echo</i> , <i>date</i> , <i>which</i> , <i>whereis</i> , <i>whatis</i> , <i>who</i> , <i>finger</i> w (option and variations included). Directory commands, access permissions, changing access permissions for files and directories, hard & symbolic links. Environment and path setting.
II	vi editor: Creating and editing files, features of vi, insertion deletion, searching, substitution operations, yank, put, delete commands, reading & writing files, <i>exrc</i> file for setting parameters, advance editing techniques. vim(improved vi). Programming utilities: Compiling & linking C, C++ programs, <i>make</i> utility, debugging C programs using <i>gdb</i> , system call.
III	Introduction to X-window system: x-window as client/ server system, concept of window manager, remote computing & local displays, <i>xinitrc</i> file, customize X work environment and applications, customizing the <i>fwm</i> window manager.
IV	Shell: Meaning and purpose of shell, Introduction to types of shell. The command line, standard input and standard output, redirection, pipes, filters special characters for searching files and pathnames. Bourne Again SHell: shell script-writing and executing, command separation & grouping, redirection, directory stack manipulation, processes, parameters & variables, keyword variables.
V	Shell Programming: Control structures, the <i>Here</i> document, expanding <i>NULL</i> or <i>USET</i> variables, Builtins, functions, history, aliases, job control, filename substitution. source code management- RCS and CVS. <i>awk</i> utility.

Text/References:

1. A practical Guide to Linux, Sobell, Pearson.
2. A Practical Guide to Linux Commands, Editors, and Shell Programming, Sobell, Pearson.
3. A Practical Guide to Fedora and Red Hat Enterprise Linux, Sobell, 5e, Pearson
4. Harley Hahn: Guide to Unix & Linux, TMH

5. Blum, Bresnahan, Linux Command and Shell Scripting Bible, Wiley India, 2nd Ed.

3CS5A OBJECT ORIENTED PROGRAMMING (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction: Review of structures in C, accessing members of structures using structure variables, pointer to structures, passing structures to functions, structures as user defined data types.
II	Introduction to programming paradigms- (Process oriented and Object oriented). Concept of object, class, objects as variables of class data type, difference in structures and class in terms of access to members, private and public Basics of C++: Structure of C++ programs, introduction to defining member functions within and outside a class, keyword <i>using</i> , declaring class, creating objects, constructors & destructor functions, Initializing member values with and without use of constructors, simple programs to access & manipulate data members, <i>cin</i> and <i>cout</i> functions. Dangers of returning reference to a private data member, constant objects and members function, composition of classes, friend functions and classes, using <i>this</i> pointer, creating and destroying objects dynamically using <i>new</i> and <i>delete</i> operators. Static class members, container classes and iterators, proxy classes. members of a class, data & function members. Characteristics of OOP- Data hiding, Encapsulation, data security.
III	Operator overloading: Fundamentals, Restrictions, operator functions as class members v/s as friend functions. Overloading stream function, binary operators and unary operators. Converting between types.
IV	Inheritance: Base classes and derived classes, protected members, relationship between base class and derived classes, constructors and destructors in derived classes, public, private and protected inheritance, relationship among objects in an inheritance hierarchy, abstract classes, virtual functions and dynamic binding, virtual destructors.
V	Multiple inheritance, virtual base classes, pointers to classes and class members, multiple class members. Templates, exception handling.

Text/References:

1. How to Program C++, Dietel, Pearson
2. Mastering C++ By K.R.Venugopal, TMH
3. Object Oriented Programming in C++ By Robert Lafore, Pearson
4. Object Oriented Design & Modelling, Rumbaugh, Pearson

3CS6A Advanced Engineering Mathematics (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Lectures: 3, Tutorial: 1	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]
Units	Contents of the subject
I	Introduction: Engineering application of optimization, Statement and classification of optimization problem, single variable and multivariable optimization with and without constraints.
II	Linear Programming: Formulation of Linear Programming problem, Graphical Approach, General Linear Programming problem, Simplex Method. Duality in Linear Programming and Transportation Problems.
III	Elements of Number Theory: Divisibility and Euclid Algorithm, Primes and the Sieve of Eratosthenes, testing for primes, Prime Number Theorem, Euler's, Fermat's Little theorems, Congruences, Computing Inverse in Congruences, Legendre and Jacobi Symbols, Chinese Remainder Theorem, Algebraic Structures in Computing (Definitions, properties and Elementary Operations Only): Groups, subgroup, order of group, cyclic group, ring, field, division algorithm, polynomial over a field. Galois Field
IV	LAPLACE TRANSFORM: Laplace transform with its simple properties. Inverse Laplace transform, convolution theorem (without proof), solution of ordinary differential equation with constant coefficient, solution of partial differential equation having constant coefficient with special reference to diffusion, Heat conduction and wave equation. Boundary value problems
V	NUMERICAL ANALYSIS: Difference operators forward, backward, central, shift and average operators and relation between them. Newton's and Gauss forward and backward interpolation formula for equal interval, Stirling's formula for central difference. Lagrange's Interpolation formula and Inverse Interpolation. Numerical differentiation by Newton's, Gauss and Sterling's formula. Numerical Integration by Simpson's one third and there eight rule. Numerical Integration of ordinary differential equation of first order by Picard's method, Euler's and modified Euler's method, Milne's method and Runge-Kutta fourth order method. Solution of difference equation.

Text/References:

1. Elementary Number Theory with applications: Thomas Koshy, 2nd Ed., Elsevier.
2. Operation Research By Kanti Swaroop, P. K. Gupta & Manmohan, Sultan chand & sons
3. Integral Transform By Dr. R.K. Gupta, A.R. Vashishtha, Krishna Prakashan Mandir Meerut

4. Calculus of Finite Differences & Numerical Analysis By Dr. Gupta & Malik Krishna
Prakashan Mandir Meerut

5. 3CS7A ELECTRONIC DEVICES LAB (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Practical Hrs : 3	Examination Time = Three (3) Hours Maximum Marks = 75 [Sessional/Mid-term (45) & End-term (30)]

S. No.	List of Experiments
1	Plot V-I characteristic of P-N junction diode & calculate cut-in voltage, reverse Saturation current and static & dynamic resistances.
2	Plot V-I characteristic of zener diode and study of zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.
3	Plot frequency response curve for single stage amplifier and to determine gain bandwidth product.
4	Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of I_{dss} & V_p
5	Application of Diode as clipper & clamper
6	Plot gain- frequency characteristic of two stages RC coupled amplifier & calculate its bandwidth and compare it with theoretical value.
7	Plot gain- frequency characteristic of emitter follower & find out its input and output resistances.
8	Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h-parameters.
9	Plot gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1kHz with and without negative feedback.
10	Plot and study the characteristics of small signal amplifier using FET.
11	Study Wein bridge oscillator and observe the effect of variation in R & C on oscillator frequency
12	Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.
13	To plot the characteristics of UJT and UJT as relaxation.
14	To plot the characteristics of MOSFET and CMOS.

3CS8A DATA STRUCTURES LAB (Common to Computer Science and Engineering& Info.

Class: III Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Practical Hrs : 3 Tech)	Examination Time = Three (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]

S. No.	List of Experiments
1	Write a simple C program on a 32 bit compiler to understand the concept of array storage, size of a word. The program shall be written illustrating the concept of row major and column major storage. Find the address of element and verify it with the theoretical value. Program may be written for arrays upto 4-dimensions.
2	Simulate a stack, queue, circular queue and dequeue using a one dimensional array as storage element. The program should implement the basic addition, deletion and traversal operations.
3	Represent a 2-variable polynomial using array. Use this representation to implement addition of polynomials.
4	Represent a sparse matrix using array. Implement addition and transposition operations using the representation.
5	Implement singly, doubly and circularly connected linked lists illustrating operations like addition at different locations, deletion from specified locations and traversal.
6	Repeat exercises 2, 3 & 4 with linked structures.
7	Implementation of binary tree with operations like addition, deletion, traversal.
8	Depth first and breadth first traversal of graphs represented using adjacency matrix and list.
9	Implementation of binary search in arrays and on linked Binary Search Tree.
10	Implementation of insertion, quick, heap, topological and bubble sorting algorithms.

3CS9A DIGITAL ELECTRONICS LAB (Common to Computer Science and Engineering & Info. Tech)

Class: III Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Practical Hrs : 2	Examination Time = Three (3) Hours Maximum Marks = 50 [Sessional/Mid-term (30) & End-term (20)]

S. No.	List of Experiments
1	To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR. Also to verify the truth table of Ex-OR, Ex-NOR (For 2, 3, & 4 inputs using gates with 2, 3, & 4 inputs).
2	To verify the truth table of OR, AND, NOR, Ex-OR, Ex-NOR realized using NAND & NOR gates.
3	To realize an SOP and POS expression.
4	To realize Half adder/ Subtractor & Full Adder/ Subtractor using NAND & NOR gates and to verify their truth tables.
5	To realize a 4-bit ripple adder/ Subtractor using basic Half adder/ Subtractor & basic Full Adder/ Subtractor.
6	To verify the truth table of 4-to-1 multiplexer and 1-to-4 demultiplexer. Realize the multiplexer using basic gates only. Also to construct and 8-to-1 multiplexer and 1-to-8 demultiplexer using blocks of 4-to-1 multiplexer and 1-to-4 demultiplexer
7	Design & Realize a combinational circuit that will accept a 2421 BCD code and drive a TIL -312 seven-segment display.
8	Using basic logic gates, realize the R-S, J-K and D-flip flops with and without clock signal and verify their truth table
9	Construct a divide by 2,4 & 8 asynchronous counter. Construct a 4-bit binary counter and ring counter for a particular output pattern using D flip flop.
10	Perform input/output operations on parallel in/Parallel out and Serial in/Serial out registers using clock. Also exercise loading only one of multiple values into the register using multiplexer. Note: As far as possible, the experiments shall be performed on bread board. However, experiment Nos. 1-4 are to be performed on bread board only.

3CS10A C++ PROGRAMMING (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.		Evaluation
Branch: Computer Science and Engineering Schedule per Week Practical Hrs.: 3		Examination Time = Three (4) Hours Maximum Marks = 100 [Sessional/Mid-term (45) & End-term (30)]
S. No.	List of Experiments	
1	To write a simple program for understanding of C++ program structure without any CLASS declaration. Program may be based on simple input output, understanding of keyword using.	
2	Write a C++ program to demonstrate concept of declaration of class with public & private member, constructors, object creation using constructors, access restrictions, defining member functions within and outside a class. Scope resolution operators, accessing an object's data members and functions through different type of object handle name of object, reference to object, pointer to object, assigning class objects to each other.	
3	Program involving multiple classes (without inheritance) to accomplish a task. Demonstrate composition of class.	
4	Demonstration Friend function friend classes and this pointer.	
5	Demonstration dynamic memory management using new & delete & static class members.	
6	Demonstration of restrictions an operator overloading, operator functions as member function and/ or friend function, overloading stream insertion and stream extraction, operators, overloading operators etc.	
7	Demonstrator use of protected members, public & private protected classes, multi-level inheritance etc.	
8	Demonstrating multiple inheritance, virtual functions, virtual base classes, abstract classes	

3CS11A UNIX SHELL PROGRAMMING (Common to Computer Science and Engineering & Info. Tech)

Class: III Sem. B.Tech.		Evaluation
Branch: Computer Science and Engineering		Examination Time = Four (3) Hours
Schedule per Week		Maximum Marks = 50
Practical Hrs : 2		[Sessional/Mid-term (30) & End-term (20)]
S. No.	List of Experiments	
1.	Use of Basic Unix Shell Commands: ls, mkdir, rmdir, cd, cat, banner, touch, file, wc, sort, cut, grep, dd, dfspace, du, ulimit.	
2.	Commands related to inode, I/O redirection and piping, process control commands, mails.	
3.	Shell Programming: Shell script exercises based on following (i) Interactive shell scripts (ii) Positional parameters (iii) Arithmetic (iv) if-then-fi, if-then-else-fi, nested if-else (v) Logical operators (vi) else + if equals elif, case structure (vii) while, until, for loops, use of break (viii) Metacharacters (ix) System administration: disk management and daily administration	
4.	Write a shell script to create a file in \$USER /class/batch directory. Follow the instructions (i) Input a page profile to yourself, copy it into other existing file; (ii) Start printing file at certain line (iii) Print all the difference between two file, copy the two files at \$USER/CSC/2007 directory. (iv) Print lines matching certain word pattern.	
5.	Write shell script for- (i) Showing the count of users logged in, (ii) Printing Column list of files in your home directory (iii) Listing your job with below normal priority (iv) Continue running your job after logging out.	
6.	Write a shell script to change data format .Show the time taken in execution of this script	
7.	Write a shell script to print files names in a directory showing date of creation & serial number of the file.	
8.	Write a shell script to count lines, words and characters in its input(do not use wc).	

9.	Write a shell script to print end of a Glossary file in reverse order using Array. (Use awk tail)
10.	Write a shell script to check whether Ram logged in, Continue checking further after every 30 seconds till success.

4CS1A MICROPROCESSOR AND INTERFACES (Common to Computer Science and

Class: IV Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Lectures: 3 Engineering& Info. Tech)	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction to Microprocessors, microcontroller; 8085 Microprocessor Architecture, pin description, Bus concept and organization; concept of multiplexing and demultiplexing of buses; concept of static and dynamic RAM, type of ROM, memory map.
II	Software architecture registers and signals, Classification of instruction, Instruction set, addressing modes, Assembly Language Programming and Debugging, Programming Technique, instruction Format and timing.
III	Advance Assembly Language Programming, Counter and time delay; types of Interrupt and their uses, RST instructions and their uses, 8259 programmable interrupt controller; Macros, subroutine; Stack- implementation and uses with examples; Memory interfacing.
IV	8085 Microprocessor interfacing:, 8255 Programmable Peripheral Interface, 8254 programmable interval timer, interfacing of Input/output device, 8279 Key board/Display interface.
V	Microprocessor Application: Interfacing scanned multiplexed display and liquid crystal display, Interfacing and Matrix Keyboard, MPU Design; USART 8251, RS232C and RS422A, Parallel interface- Centronics and IEEE 488 .

Text/References:

1. Microprocessor architecture, programming, and applications with the 8085 By Ramesh S. Gaonkar
2. Introduction to Microprocessor By Aditya P. Mathur, TMH
3. Microprocessor & Interfaceing By Douglas V. Hall, TMH
4. Microprocessor & Peripheral By A.K.Ray, K.M. Bhurchandi, TMH

4CS2A DISCRETE MATHEMATICAL STRUCTURES

(Common to Computer Science and Engineering & Info. Tech)

Class: IV Sem. B.Tech.		Evaluation
Branch: Computer Science and Engineering Schedule per Week Lectures: 3, Tutorial:1		Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]
Units	Contents of the subject	
I	Sets: Definition and types, Set operations, Partition of set, Cardinality (Inclusion-Exclusion & Addition Principles), Recursive definition of set. Functions: Concept, Some Special Functions (Polynomial, Exponential & Logarithmic, Absolute Value, Floor & Ceiling, Mod & Div Functions), Properties of Functions, Cardinality of Infinite Set, Countable & Uncountable Sets, The Pigeonhole & Generalized Pigeonhole Principles, Composition of Functions.	
II	Relations: Boolean Matrices, Binary Relation, Adjacency Matrix of Relation, Properties of Relations, Operations on Relations, The Connectivity Relations, Transitive Closure-Warshall's Algorithm, Equivalence relations- Congruence Relations, Equivalence Class, Number of Partitions of a Finite Set, Partial & Total Orderings.	
III	Proof Methods: Vacuous, Trivial, Direct, Indirect by Contrapositive and Contradiction, Constructive & Non-constructive proof, Counter example. The Division Algorithm, Divisibility Properties (Prime Numbers & Composite Numbers), Principle of Mathematical Induction, The Second Principle of Mathematical Induction, Fundamental Theorem of Arithmetic. Algorithm Correctness: Partial Correctness, Loop Invariant. Testing the partial correctness of linear & binary search, bubble & selection sorting.	
IV	Graph Theory: Graphs – Directed, Undirected, Simple, Adjacency & Incidence, Degree of Vertex, Subgraph, Complete graph, Cycle & Wheel Graph, Bipartite & Complete Bipartite Graph, Weighted Graph, Union of Simple Graphs. Complete Graphs. Isomorphic Graphs, Path, Cycles & Circuits Eulerian & Hamiltonian Graphs. Planar Graph: Kuratowski's Two Graphs, Euler's Formula, Kuratowski's Theorem. Trees: Spanning trees- Kruskal's Algo, Finding Spanning Tree using Depth First Search, Breadth First Search, Complexity of Graph, Minimal Spanning Tree.	
V	Language of Logic: Proposition, Compound Proposition, Conjunction, Disjunction, Implication, Converse, Inverse & Contrapositive, Biconditional Statements, tautology, Contradiction & Contingency, Logical Equivalences, Quantifiers, Arguments.	

Text/References:

1. Discrete Mathematics with Applications, Koshy, ELSEVIER
2. Discrete Mathematical Structures By Lipschutz & Lipson, TMH
3. Discrete Mathematical Structures, Kolman et.al, Pearson

4CS3A STATISTICS & PROBABILITY THEORY (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Lectures: 3, Tutorial:1	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction & Discrete random variables Sample space, events, algebra of events, Bernoulli's trials, Probability & Baye's theorem. Random variable & their event space, probability generating function, expectations, moments, computations of mean time to failure, Bernoulli & Poisson processes.
II	Discrete & continuous distributions Probability distribution & probability densities: Binomial, Poisson, normal rectangular and exponential distribution & their PDF's, moments and MGF's for above distributions.
III	Correlation & Regression Correlation & regression: Linear regression, Rank correlation, Method of least squares Fitting of straight lines & second degree parabola. Linear regression and correlation analysis.
IV	Queuing Theory Pure birth, pure death and birth-death processes. Mathematical models for M/M/1, M/M/N, M/M/S and M/M/S/N queues.
V	Discrete Parameter Markov chains: M/G/1 Queuing model, Discrete parameter birth-death process.

Text/References:

1. Probability, Statistics & Random Process By T. Veerajan, TMH
2. Fundamental of Mathematical Statistics By S.C.Gupta and V.K. Kapoor, Sultanchand & sons.
3. Statistics and Probability Theory By Jain & Rawat ,CBC
4. Statistics and Probability Theory By Schaum's, T.M.H.

4CS4A SOFTWARE ENGINEERING (Common to Computer Science and Engineering& Info.

Class: IV Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Lectures: 3 Tech)	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	System Analysis: Characteristics, Problems in system Development, System Level project Planning, System Development Life cycle (SDLC), computer system engineering & system analysis, modeling the architecture, system specification.
II	Software & its characteristics: Software Development, Process Model, Prescriptive model, The water fall model, Incremental Process Modes, Evolutionary process model, specialized process model.
III	Requirement Analysis: Requirement analysis tasks, Analysis principles, Software prototyping and specification data dictionary finite state machine (FSM) models. Structured Analysis: Data and control flow diagrams, control and process specification behavioral modeling, extension for data intensive applications.
IV	Software Design: Design fundamentals, Effective modular design: Data architectural and procedural design, design documentation, coding – Programming style, Program quality, quantifying program quality, complete programming example
V	Object Oriented Analysis: Object oriented Analysis Modeling, Data modeling Object Oriented Design: OOD concepts and methods class and object definitions, refining operations, Class and object relationships, object modularization, Introduction to Unified Modeling Language

Text/References:

1. Software Engineering By Roger S. Pressman, TMH
2. Software Engineering Fundamental By Ali Behforooz, Frederick J Hudson, Oxford University Press
3. Software Engineering By Ian Sommerville
4. Software Engineering Concepts By **Richard E. Fairley** (Mcgraw-Hill)

4CS5A PRINCIPLES OF COMMUNICATION (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	ANALOG MODULATION: Concept of frequency translation. Amplitude Modulation: Description of full AM, DSBSC, SSB and VSB in time and frequency domains, methods of generation & demodulation, frequency division multiplexing (FDM). Angle Modulation: Phase and frequency modulation. Descriptions of FM signal in time and frequency domains, methods of generation & demodulation, pre-emphasis & de-emphasis, PLL.
II	PULSE ANALOG MODULATION: Ideal sampling, Sampling theorem, aliasing, interpolation, natural and flat top sampling in time and frequency domains. Introduction to PAM, PWM, PPM modulation schemes. Time division multiplexing (TDM)
III	PCM & DELTA MODULATION SYSTEMS: Uniform and Non-uniform quantization. PCM and delta modulation, Signal to quantization noise ratio in PCM and delta modulation. DPCM, ADM, T1 Carrier System, Matched filter detection. Error probability in PCM system.
IV	DIGITAL MODULATION: Baseband transmission: Line coding (RZ, NRZ), inter symbol interference (ISI), pulse shaping, Nyquist criterion for distortion free base band transmission, raised cosine spectrum. Pass band transmission: Geometric interpretation of signals, orthogonalization. ASK, PSK, FSK, QPSK and MSK modulation techniques, coherent detection and calculation of error probabilities.
V	SPREAD-SPECTRUM MODULATION: Introduction, Pseudo-Noise sequences, direct-sequence spread spectrum (DSSS) with coherent BPSK, processing gain, probability of error, frequency-hop spread spectrum (FHSS). Application of spread spectrum: CDMA.

Text/References:

1. Principles of communication systems By Taub Schilling, T.M.H.
2. Fundamentals of communication systems By Proakis & Salehi, Pearson education
3. Communication Systems by Simon Haykin, John Wiley
4. Communication Systems (Analog and Digital) By R.P. Singh, S.D. Sapre, T.M.H.
5. Modern Digital & Analog Communication By B.P. Lathi, Oxford Publications

6. Digital & Analog Communication Systems By K.S. Shanmugam, John Wiley

4CS6A PRINCIPLES OF PROGRAMMING LANGUAGES

(Common to Computer Science and Engineering & Info. Tech)

Class: IV Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Programming Language: Definition, History, Features. Issues in Language Design: Structure and Operation of computer, Programming Paradigms. Efficiency, Regularity. Issues in Language Translation: Syntax and Semantics.
II	Specifications and Implementation of Elementary and Structured Data Types. Type equivalence, checking and conversion. Vectors and Arrays, Lists, Structures, Sets, Files.
III	Sequence control with Expressions, Conditional Statements, Loops, Exception handling. Subprogram definition and activation, simple and recursive subprogram, subprogram environment.
IV	Scope – Static and Dynamic, Block structures, Local Data and Shared Data, Parameters and Parameter Transmission. Local and Common Environments, Tasks and Shared Data.
V	Abstract Data type, information hiding, encapsulation, type definition. Static and Stack-Based Storage management. Fixed and Variable size heap storage management, Garbage Collection.

Text/References:

1. Programming languages: design and implementation, Terrence W. Pratt., Pearson
2. Programming languages: concepts and constructs, Ravi Sethi, ISBN 9780201590654.
3. Programming Language Pragmatics, Scott, ELSEVIER

4CS7A MICROPROCESSOR LAB (Common to Computer Science and Engineering& Info.

Class: IV Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Practical Hrs.: 3 Tech)	Examination Time = Three (3) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]

S. No.	List of Experiments
1	Add the contents of memory locations XX00 &XX01 & place the result in memory location XX02.
2	Add the 16 bit numbers stored in memory location & store the result in another memory location.
3	Transfer a block of data from memory location XX00 to another memory location XX00 in forward & reverse order.
4	Write a program to Swap two blocks of data stored in memory.
5	Write a program to find the square of a number.
6	Write a main program & a conversion subroutine to convert Binary to its equivalent BCD.
7	Write a program to find largest & smallest number from a given array.
8	Write a program to Sort an array in ascending & descending order.
9	Write a program to multiply two 8 bit numbers whose result is 16 bit.
10	Write a program of division of two 8 bit numbers.
11	Generate square wave from SOD pin of 8085 & observe on CRO.
12	Write a program to perform traffic light control operation.
13	Write a program to control the speed of a motor.

4CS8A COMMUNICATION LAB (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Practical Hrs : 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]

S. No.	List of Experiments
1	Harmonic analysis of a square wave of modulated waveform Observe the amplitude modulated waveform and measures modulation index. Demodulation of the AM signal
2	To modulate a high frequency carrier with sinusoidal signal to obtain FM signal. Demodulation of the FM signal
3	To observe the following in a transmission line demonstrator kit : i. The propagation of pulse in non-reflecting Transmission line. ii. The effect of losses in Transmission line. iii. The resonance characteristics of a half wavelength long transmission line.
4	To study and observe the operation of a super heterodyne receiver
5	To modulate a pulse carrier with sinusoidal signal to obtain PWM signal and demodulate it.
6	To modulate a pulse carrier with sinusoidal signal to obtain PPM signal and demodulate it.
7	To observe pulse amplitude modulated waveform and its demodulation.
8	To observe the operation of a PCM encoder and decoder. To consider reason for using digital signal transmissions of analog signals.
9	Produce ASK signals, with and without carrier suppression. Examine the different processes required for demodulation in the two cases
10	To observe the FSK wave forms and demodulate the FSK signals based on the properties of (a) tuned circuits (b) on PLL.
11	To study & observe the amplitude response of automatic gain controller (AGC).

4CS9A COMPUTER AIDED SOFTWARE ENGINEERING LAB**(Common to Computer Science and Engineering& Info. Tech)**

Class: IV Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Practical Hrs : 3	Examination Time = Three (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]

For the instructor: Assign any two projects to a group of exactly two students covering all of the experiments from given experiment list. Each group is required to prepare the following documents for projects assigned to them and develop the software using software engineering methodology.

1. Problem Analysis and Project Planning Thorough study of the problem- identify project scope, infrastructure.
2. Software Requirement Analysis- Describe the individual Phases/modules of the project deliverables.
3. Data Modeling Use work products – data dictionary, use case diagrams and activity diagrams, build and test class diagrams, sequence diagrams and add interface to class diagrams.
4. Software Developments and Debugging.
5. Software Testing – Prepare test plan, perform validation testing coverage analysis, memory leaks, develop test case hierarchy, Site check and site monitor.
6. Describe: Relevance of CASE tools, high – end and low – end CASE tools, automated support for data dictionaries, DFD, ER diagrams.

S. No.	List of Experiments	Software Recommended:
1	Course Registration System	Case Tools: Rational Suite, Win runner, Empirix Languages: C/C++/JDK, JSDK, INTERNET EXPLORER UML Front End: VB, VC++, Developer 2000, .NET Back End: Oracle, MS – Access, SQL Note: Open Source tools will be preferred.
2	Quiz System	
3	Online ticket reservation system	
4	Remote computer monitoring	
5	Students marks analyzing system	
6	Expert system to prescribe the medicines for the given symptoms	
7	Platform assignment system for the trains in a railway station	
8	Stock maintenance	
9	Student Marks Analyzing System	
10	Online Ticket Reservation System	
11	Payroll System	
12	Export System	

4CS10A Business Entrepreneurship Development (Common to Computer Science and

Class: IV Sem. B.Tech.	Evaluation
Branch: Computer Science and Engineering Schedule per Week Practical Hrs : 2	Examination Time = Three (3) Hours Maximum Marks = 50 [Sessional/Mid-term (30) & End-term (20)]

Engineering& Info. Tech)

1. Introduction to Entrepreneurship- Concept and need, Entrepreneurship and innovation, Entrepreneurship and economic growth.
2. Entrepreneurial competencies, Leadership, Decision making, Motivation, Risk taking.
3. Business Enterprise Planning- Identification of business opportunity, Idea generation, Demand estimation, Preparation of project report, Feasibility analysis.
4. Intellectual Property rights, Patents, Taxation- Central excise & Sales tax, VAT.
5. Government Policies for Entrepreneurs, Entrepreneurial career opportunities for Engineers, case studies. _

5CS1A COMPUTER ARCHITECTURE (Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction to Computer Architecture and Organization. Von Neuman Architecture, Flynn Classification. Register Transfer and Micro operations: Register transfer language, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Bus and memory transfers. Computer Organization and Design: Instruction cycle, computer registers, common bus system, computer instructions, addressing modes, design of a basic computer
II	Central Processing Unit: General register organization, stack organization, Instruction formats, Data transfer and manipulation, program control. RISC, CISC characteristics. Pipeline and Vector processing: Pipeline structure, speedup, efficiency, throughput and bottlenecks. Arithmetic pipeline and Instruction pipeline.
III	Computer Arithmetic: Adder, Ripple carry Adder, carry look Ahead Adder, Multiplication: Add and Shift, Array multiplier and Booth Multiplier, Division: restoring and Non-restoring Techniques. Floating Point Arithmetic: Floating point representation, Add, Subtract, Multiplication, Division.
IV	Memory Organization: RAM, ROM, Memory Hierarchy, Organization, Associative memory, Cache memory, and Virtual memory: Paging and Segmentation.
V	Input-Output Organization: Input-Output Interface, Modes of Transfer, Priority Interrupt, DMA, IOP processor.

Text/References:

1. Computer Organization and Architecture - William Stallings (Pearson Education Asia)
2. Computer Organization and Architecture -John P. Hayes (McGraw -Hill)
3. Computer Organization -V. Carl. Hamacher (McGraw-Hill)

5CS2A Digital Logic Design

Class: V Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Hardware Description Languages and their use in digital logic design. VHDL: Modelling Concepts, Lexical Elements & Syntax Descriptions, Scalar Data types & Operations, Sequential Statements, Composite Data Types & Operations, Basic Modelling Constructs. Case Study: VHDL Simulation of Ripple Carry, & Look Ahead carry Adders.
II	VHDL: Subprograms, Packages & Use Clauses, Aliases, Resolved Signals, Components & Configurations, Generate Statements, Concurrent Statements. Use of VHDL in simulation and synthesis.
III	Clocked Sequential circuits. Design steps for synchronous sequential circuits. Design of a sequence detector. Moore and Mealy Machines. Design using JK flip-flops and D flip-flops. State reduction, State assignment, Algorithmic State Charts, converting ASM charts to hardware, one-hot state assignment. Considerations of clock skew, set-up time, hold-time and other flip-flop parameters, timing constraints. Programmable Logic Devices. Read-only memory. Boolean function implementation through ROM. PLD, PGA, PLA, PAL, FPGA.
IV	Event-driven Circuits. Design procedure for asynchronous circuits, stable and unstable states, races, race-free assignments. State reduction of incompletely specified machines. Compatibility and state reduction procedure. Hazards in combinational networks. Dynamic hazards, Function Hazards, and Essential Hazards. Eliminating hazards.
V	Field Programmable Gate Arrays: Introduction, Logic Elements & programmability, Interconnect structures & programmability, Extended Logic Elements, SRAM, Flash Memory & Antifuse Configuration, Case Studies of Altera Stratix & Xilinx Virtex-II pro. Technology Mapping for FPGAs: Logic Synthesis, Lookup Table Technology Mapping.

Text Book:

1. Brian Holdsworth and Clive Woods. Digital Logic Design. Newnes (Elsevier). [Available in Indian Edition].
2. Ashenden, The Designer's Guide to VHDL, Elsevier.
3. Stephen D. Brown, et.al., Field Programmable Gate Arrays, Kluwer Academic Publishers.
4. Scott Hauck, André DeHon, Reconfigurable computing: the theory and practice of FPGA based computation, Morgan Kaufman
5. Zvi Kohavi: Switching and Finite Automata Theory. TMH.
6. Parag K. Lala, Practical Digital Logic Design and Testing. PHI
7. Stephen H. Unger, The essence of logic circuits. Wiatrowski & House.

5CS3A TELECOMMUNICATION FUNDAMENTALS (Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Data Transmission: Terminology, Frequency, spectrum, bandwidth, analog and digital transmission, Transmission impairments, channel capacity, Transmission Media. Wireless Transmission: Antenna and antenna gain. Network Reference Models (OSI/ISO and TCP/IP) Physical Layer: Line Encoding Schemes. Concept of bit period, effect of clock skew, Synchronous and Asynchronous communication. Data Link Layer: Functions of data link layer and design issues Flow Control: Flow control in loss less and lossy channels using stop-and-wait, sliding window protocols. Performance of protocols used for flow control.
II	Error Control Coding: Error Detection, Two Dimensional Parity Checks, and Internet Checksum. Polynomial Codes, Standardized polynomial codes, error detecting capability of a polynomial codes. Linear codes, performance of linear codes, error detection & correction using linear codes. Data Link Control: HDLC & PPP including frame structures. MAC sublayer: Channel Allocation Problem, Pure and slotted Aloha, CSMA, CSMA/CD, collision free multiple access. Throughput analysis of pure and slotted Aloha. Ethernet Performance.
III	Wireless LAN: Hidden node and Exposed node Problems, RTS/CTS based protocol, 802.11 Architecture, protocol stack, Physical layer, MAC Sublayer. Bluetooth Architecture and Protocol Stack Data Link Layer Switching: Bridges (Transparent, Learning and Spanning Tree), Virtual LANs
IV	Multiplexing: Frequency division, time division (Synchronous and statistical) multiplexing. ADSL, DS1 and DS3 carriers. Multiple Accesses: TDMA frame structure, TDMA Burst Structure, TDMA Frame efficiency, TDMA Superframe structure, Frame acquisition and synchronization, Slip rate in digital terrestrial networks. Switching: Qualitative description of Space division, time division and space-time-space division switching.
V	Spread Spectrum Techniques: Direct sequence(DSSS) & frequency hopping(FHSS); Performance consideration in DSSS & FHSS; Code division Multiple access (CDMA): frequency & channel specifications, forward & reverse CDMA channel, pseudo noise(PN) sequences, m-sequence, gold sequence, orthogonal code, gold sequences, Walsh codes, synchronization, power control, handoff, capacity of CDMA system, IMT-2000, WCDM

Text/References:

1. Stallings, Data and computer communication, 8th ed. Pearson
2. Tri.T.Ha, Digital Satellite Communications, 2/e, Tata McGraw Hill
3. Alberto Leon-Garcia, Indra Widjaja, COMMUNICATION NETWORKS, 2nd ed., TMH
4. Wireless Communications, 2/e, Rappaport, PHI

5. Analysis of Computer and Communication Networks, ISBN: 0387744363, Fayez Gebali, 2008, Springer-verlag, 1st Ed.

5CS4A DATABASE MANAGEMENT SYSTEMS (Common to CS & IT)

Class: V Sem. B.Tech	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	INTRODUCTION TO DATABASE SYSTEMS: Overview and History of DBMS. File System v/s DBMS .Advantage of DBMS Describing and Storing Data in a DBMS. Queries in DBMS. Structure of a DBMS.
II	ENTITY RELATIONSHIP MODEL: Overview of Data Design Entities, Attributes and Entity Sets, Relationship and Relationship Sets. Features of the ER Model- Key Constraints, Participation Constraints, Weak Entities, Class Hierarchies, Aggregation, Conceptual Data Base, Design with ER Model-Entity v/s Attribute, Entity vs Relationship Binary vs Ternary Relationship and Aggregation v/s ternary Relationship Conceptual Design for a Large Enterprise.
III	RELATIONSHIP ALGEBRA AND CALCULUS: Relationship Algebra Selection and Projection, Set Operations, Renaming, Joins, Division, Relation Calculus, Expressive Power of Algebra and Calculus.
IV	SQL QUERIES PROGRAMMING AND TRIGGERS: The Forms of a Basic SQL Query, Union, Intersection and Except, Nested Queries ,Correlated Nested Queries, Set-Comparison Operations, Aggregate Operators, Null Values and Embedded SQL, Dynamic SQL, ODBC and JDBC, Triggers and Active Databases.
V	SCHEMA REFINEMENT AND NORMAL FORMS: Introductions to Schema Refinement, Functional Dependencies, Boyce-Codd Normal Forms, Third Normal Form, Normalization-Decomposition into BCNF Decomposition into 3-NF.

References:

1. H.f. Korth and Silberschatz: Database Systems Concepts, McGraw Hill
2. Almasri and S.B. Navathe: Fundamentals of Database Systems,
3. C.J. Date: Data Base Design, Addison Wesley
4. Hansen and Hansen : DBM and Design, PHI

5CS5A OPERATING SYSTEMS (Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction and need of operating system, layered architecture/logical structure of operating system, Type of OS, operating system as resource manager and virtual machine, OS services, BIOS, System Calls/Monitor Calls, Firmware- BIOS, Boot Strap Loader. Process management- Process model, creation, termination, states & transitions, hierarchy, context switching, process implementation, process control block, Basic System calls- Linux & Windows. Threads- processes versus threads, threading, concepts, models, kernel & user level threads, thread usage, benefits, multithreading models.
II	Interprocess communication- Introduction to message passing, Race condition, critical section problem, mutual exclusion with busy waiting- disabling interrupts, lock variables, strict alteration, Peterson's solution, TSL instructions, busy waiting, sleep and wakeup calls, semaphore, monitors, classical IPC problems. Process scheduling- Basic concepts, classification, CPU and I/O bound, CPU scheduler- short, medium, long-term, dispatcher, scheduling:- preemptive and non-preemptive, Static and Dynamic Priority, Co-operative & Non-cooperative, Criteria/Goals/Performance Metrics, scheduling algorithms- FCFS, SJFS, shortest remaining time, Round robin, Priority scheduling, multilevel queue scheduling, multilevel feedback queue scheduling, Fair share scheduling.
III	Deadlock- System model, resource types, deadlock problem, deadlock characterization, methods for deadlock handling, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock. Memory management- concepts, functions, logical and physical address space, address binding, degree of multiprogramming, swapping, static & dynamic loading- creating a load module, loading, static & dynamic linking, shared libraries, memory allocation schemes- first fit, next fit, best fit, worst fit, quick fit. Free space management- bitmap, link list/free list, buddy's system, memory protection and sharing, relocation and address translation.
IV	Virtual Memory- concept, virtual address space, paging scheme, pure segmentation and segmentation with paging scheme hardware support and implementation details, memory fragmentation, demand paging, pre-paging, working set model, page fault frequency, thrashing, page replacement algorithms- optimal, NRU, FIFO, second chance, LRU, LRU-approximation clock, WS clock; Belady's anomaly, distance string; design issues for paging system- local versus global allocation policies, load control, page size, separate instruction and data spaces, shared pages, cleaning policy, TLB (translation look aside buffer) reach, inverted page table, I/O interlock, program structure, page fault handling, Basic idea of MM in Linux & windows.
V	File System- concepts, naming, attributes, operations, types, structure, file organization & access(Sequential, Direct ,Index Sequential) methods, memory mapped files, directory structures- one level, two level, hierarchical/tree, acyclic graph, general graph, file system mounting, file sharing, path name, directory operations, overview of file system in Linux & windows. Input/Output subsystems- concepts, functions/goals, input/output devices- block and character, spooling, disk structure & operation, disk attachment, disk storage capacity, disk scheduling algorithm- FCFS, SSTF, scan scheduling, C-scan schedule.

Text/Reference Books:

1. A. Silberschatz and Peter B Galvin: Operating System Principals, Wiley India Pvt. Ltd.
2. Achyut S Godbole: Operating Systems, Tata McGraw Hill
3. Tanenbaum: Modern Operating System, Prentice Hall.
4. DM Dhamdhere: Operating Systems – A Concepts Based Approach, Tata McGraw Hill
5. Charles Crowley: Operating System A Design – Oriented Approach, Tata McGraw Hill.

5CS6.1A ADVANCED DATA STRUCTURE (Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	ADVANCED TREES: Definitions, Operations on Weight Balanced Trees (Huffman Trees), 2-3 Trees and Red- Black Trees. Dynamic Order Statistics, Interval Tree; Dictionaries.
II	MERGEABLE HEAPS: Mergeable Heap Operations, Binomial Trees, Implementing Binomial Heaps and its Operations, 2-3-4. Trees and 2-3-4 Heaps. Amortization analysis and Potential Function of Fibonacci Heap, Implementing Fibonacci Heap.
III	GRAPH THEORY DEFINITIONS: Definitions of Isomorphic Components. Circuits, Fundamental Circuits, Cut-sets. Cut- Vertices Planer and Dual graphs, Spanning Trees, Kuratovski's two Graphs. GRAPH THEORY ALGORITHMS: Algorithms for Connectedness, Finding all Spanning Trees in a Weighted Graph, Breadth First and Depth First Search, Topological Sort, Strongly Connected Components and Articulation Point. Single Min-Cut Max-Flow theorem of Network Flows. Ford-Fulkerson Max Flow Algorithms.
IV	SORTING NETWORK: Comparison network, zero-one principle, bitonic sorting and merging network sorter. Priority Queues and Concatenable Queues using 2-3 Trees. Operations on Disjoint sets and its union-find problem, Implementing Sets.
V	NUMBER THEORETIC ALGORITHM: Number theoretic notions, Division theorem, GCD, recursion, Modular arithmetic, Solving Modular Linear equation, Chinese Remainder Theorem, power of an element, Computation of Discrete Logarithms, primality Testing and Integer Factorization.

Text/References:

1. Cormen, Leiserson, Rivest: Introduction to Algorithms, Prentice Hall of India.
2. Horowitz and Sahani: Fundamental of Computer algorithms.
3. Aho A.V , J.D Ulman: Design and analysis of Algorithms, Addison Wesley
4. Brassard : Fundamental of Algorithmics, PHI.

5CS6.2A DIGITAL SIGNAL PROCESSING

Class: V Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	INTRODUCTION : Discrete time signals and systems, properties of discrete time systems, Linear time invariant systems - discrete time. Properties of LTI systems and their block diagrams. Convolution, Discrete time systems described by difference equations.
II	Fourier Transform: Discrete time Fourier transform for periodic and aperiodic signals. Properties of DTFT. Z-transform: The region of convergence for the Z-transform. The Inverse Z-transform. Properties of Z transform.
III	SAMPLING: Mathematical theory of sampling. Sampling theorem. Ideal & Practical sampling. Interpolation technique for the reconstruction of a signal from its samples. Aliasing. Sampling in freq. domain. Sampling of discrete time signals.
IV	THE DISCRETE FOURIER TRANSFORMS (DFT): Properties of the DFT, Linear Convolution using DFT. Efficient computation of the DFT: Decimation-in-Time and Decimation-in frequency FFT Algorithms.
V	FILTER DESIGN TECHNIQUES: Structures for discrete-time systems- Block diagram and signal flow graph representation of LCCD (LCCD – Linear Constant Coefficient Difference) equations, Basic structures for IIR and FIR systems, Transposed forms. Introduction to filter Design: Butterworth & Chebyshev. IIR filter design by impulse invariance & Bilinear transformation. Design of FIR filters by Windowing: Rectangular, Hamming & Kaiser.

Text/References:

1. Oppenheim, Discrete-Time Signal Processing, 2/e, Pearson Education
2. Proakis, Digital Signal Processing, 4/e, Pearson Education
3. S.K.Mitra, Digital Signal Processing, 2/e, Tata McGraw Hill

5CS6.3A INFORMATION THEORY & CODING

Class: V Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction to information theory. Uncertainty, Information and Entropy, Information measures for continuous random variables, source coding theorem. Discrete Memory less channels, Mutual information, Conditional entropy.
II	Source coding schemes for data compaction: Prefix code, Huffman code, Shanon-Fane code & Hempel-Ziv coding channel capacity. Channel coding theorem. Shannon limit.
III	Linear Block Code: Introduction to error correcting codes, coding & decoding of linear block code, minimum distance consideration, conversion of non systematic form of matrices into systematic form.
IV	Cyclic Code: Code Algebra, Basic properties of Galois fields (GF) polynomial operations over Galois fields, generating cyclic code by generating polynomial, parity check polynomial. Encoder & decoder for cyclic codes.
V	Convolutional Code: Convolutional encoders of different rates. Code Tree, Trllis and state diagram. Maximum likelihood decoding of convolutional code: The viterbi Algorithm fee distance of a convolutional code.

Text/References

1. Digital Communication, Simon Haykin, Wiley.

5CS7A DATABASE LAB (Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Practical Hrs.: 3	Examination Time = Four (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End- term (40)]

Objectives: At the end of the semester, the students should have clearly understood and implemented the following:

1. Stating a database design & application problem.
2. Preparing ER diagram
3. Finding the data fields to be used in the database.
4. Selecting fields for keys.
5. Normalizing the database including analysis of functional dependencies.
6. Installing and configuring the database server and the front end tools.
7. Designing database and writing applications for manipulation of data for a stand alone and shared data base including concepts like concurrency control, transaction roll back, logging, report generation etc.
8. Get acquainted with SQL.

In order to achieve the above objectives, it is expected that each students will chose one problem. The implementation shall being with the statement of the objectives to be achieved, preparing ER diagram, designing of database, normalization and finally manipulation of the database including generation of reports, views etc. The problem may first be implemented for a standalone system to be used by a single user.

All the above steps may then be followed for development of a database application to be used by multiple users in a client server environment with access control. The application shall NOT use web techniques.

One exercise may be assigned on creation of table, manipulation of data and report generation using SQL.

Suggested Tool:

For standalone environment, Visual FoxPro or any similar database having both the database and manipulation language may be used.

For multi-user application, MYSql is suggested. However, any other database may also be used. For front end, VB.Net, Java, VB Script or any other convenient but currently used by industry may be chosen.

Indicative List of exercise:

1. Student information system for your college.

2. Student grievance registration and redressal system.

3. A video library management system for a shop.
4. Inventory management system for a hardware/ sanitary item shop.
5. Inventory management system for your college.
6. Guarantee management system for the equipments in your college.

5CS8A SYSTEM DESIGNS in UML LAB

Class: V Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Practical Hrs : 3	Examination Time = Four (4) Hours Maximum Marks = 75 [Sessional/Mid-term (45) & End-term (30)]

Objectives:

1. The students shall be able to use following modules of UML for system description, implementation and finally for product development.
 - Capture a business process model.
 - The User Interaction or Use Case Model - describes the boundary and interaction between the system and users. Corresponds in some respects to a requirements model.
 - The Interaction or Communication Model - describes how objects in the system will interact with each other to get work done.
 - The State or Dynamic Model - State charts describe the states or conditions that classes assume over time. Activity graphs describe the workflows the system will implement.
 - The Logical or Class Model - describes the classes and objects that will make up the system.
 - The Physical Component Model - describes the software (and sometimes hardware components) that make up the system.
 - The Physical Deployment Model - describes the physical architecture and the deployment of components on that hardware architecture.

The students are expected to use the UML models, prepare necessary documents using UML and implement a system. Some hardware products like digital clock, digital camera, washing machine controller, air conditioner controller, an electronic fan regulator, an elementary mobile phone etc. may also be chosen.

The students shall be assigned one problem on software based systems and another involving software as well as hardware.

5CS9A OPERATING SYSTEMS SIMULATION LAB (Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Practical Hrs : 3	Examination Time = Four (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End- term (40)]

Objectives:

- Understand the basic functions of operating systems.
- In depth knowledge of the algorithms used for implementing the tasks performed by the operating systems.
- Understand & simulate strategies used in Linux & Windows operating systems.
- Develop aptitude for carrying out research in the area of operating system.

Suggested Tools:

Operating system simulator- MOSS preferably on Linux platform (Available for free download from <http://www.ontko.com/moss/>).

Recommended Exercises:

- A. Exercises shall be given on simulation of algorithms used for the tasks performed by the operating systems. Following modules of the simulator may be used:

- Scheduling
- Deadlock
- Memory Management Systems
- File system simulator

Algorithms described in the text may be assigned. The simulation results such as average latency, hit & Miss Ratios or other performance parameters may be computed.

- B. One exercise shall be on simulation of algorithms reported in the recent conferences/ journals and reproducing the results reported therein.

5CS10A DIGITAL HARDWARE DESIGN LAB (Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Practical Hrs : 3	Examination Time = Four (4) Hours Maximum Marks = 75 [Sessional/Mid-term (45) & End-term

Objectives: At the end of course, the students shall be able to

- Should be able to design datapath for digital systems
- Create a digital system using discrete digital ICs
- Design a hard wired / micro-programmed control circuit
- Simulate a digital datapath in Hardware Description Language
- Understand IC descriptions and select proper IC in a given circuit based on its timing characteristics

Suggested Methodology and tools: Hardware description language like Verilog /VHDL can be used for simulation.

The exercise shall involve design of datapath, its simulation and finally realization on breadboard. Library of digital ICs have to be built. Similarly, manuals of Digital IC families have to be placed in the laboratories for reference by students.

Suggested Exercises

- Create a microprocessor from ALU 74181. For this, the students may design a small instruction set and attach necessary registers and suitable control unit to realize a microprocessor.
- Simulate and realize a Cordic calculator.
- Simulate & realize a Four bit Adder
 - Design and simulation of a 4-bit Adder
 - VHDL/Verilog HDL (Hardware description language)
 - Interfacing 7-segment decoder
- Combinational Multiplier
 - 4x4-bit multiplier
 - Binary-to-BCD conversion
 - Timing Constraints
- CRC checksum generator & verifier
- Realizing a carry look ahead adder

6CS1A COMPUTER NETWORKS (Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

NOTE: The first 2 lectures shall be devoted to review of the basis architectures and responsibilities of different layers.

Units	Contents of the subject
I	Network layer-design issue, routing algorithms: Distance vector, link state, hierarchical, Broadcast routing. Congestion control: congestion prevention policies, congestion control in Datagram subnets, load shedding, jitter control, Leaky bucket and token bucket algorithms.
II	Internetworking: Differences in networks, Tunneling, Internetwork routing, Fragmentation Network layer in the Internet: IPv4 classful and classless addressing, subnetting Network layer protocols(only working and purpose; packet headers etc. not included), Differences in IPV6 over IPV4. Routing to Mobile Hosts and Mobile IP
III	Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and demultiplexing, crash recovery, introduction to UDP protocol. Principles of Reliable Data Transfer: Reliable data transfer over a perfectly reliable channel, Channel with bit errors and Lossy Channel with bit errors.
IV	Transport Layer in the Internet: Introduction to TCP, TCP service Model, TCP Header and segment structure, TCP connection establishment and release, transmission policy, timer management, Transactional TCP. Mobile TCP TCP Congestion Control: Fairness, TCP delay modeling.
V	Application Layer: World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Introduction to Network security. P2P File Sharing: Centralized Directory, Query flooding, exploiting heterogeneity.

Text/References:

1. Tanenbaum; Computer Network, 4th Ed., Pearson.
2. Kurose; Computer Networking, 3rd Ed., Pearson.
3. Peterson, Davie; Computer Networks, 4rd Ed., ELSEVIER

6CS2A DESIGN AND ANALYSIS OF ALGORITHMS(Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	BACKGROUND: Review of Algorithm Complexity, Order Notations: definitions and calculating complexity. DIVIDE AND CONQUER METHOD: Binary Search, Merge Sort, Quick sort and Strassen's matrix multiplication algorithms. GREEDY METHOD: Knapsack Problem, Job Sequencing, Optimal Merge Patterns and Minimal Spanning Trees.
II	DYNAMIC PROGRAMMING: Matrix Chain Multiplication. Longest Common Subsequence and 0/1 Knapsack Problem. BRANCH AND BOUND: Traveling Salesman Problem and Lower Bound Theory. Backtracking Algorithms and queens problem.
III	PATTERN MATCHING ALGORITHMS: Naïve and Rabin Karp string matching algorithms, KMP Matcher and Boyer Moore Algorithms. ASSIGNMENT PROBLEMS: Formulation of Assignment and Quadratic Assignment Problem.
IV	RANDOMIZED ALGORITHMS. Las Vegas algorithms, Monte Carlo algorithms, randomized algorithm for Min-Cut, randomized algorithm for 2- SAT. Problem definition of Multicommodity flow, Flow shop scheduling and Network capacity assignment problems.
V	PROBLEM CLASSES NP, NP-HARD AND NP-COMPLETE: Definitions of P, NP-Hard and NP-Complete Problems. Decision Problems. Cook's Theorem. Proving NP-Complete Problems - Satisfiability problem and Vertex Cover Problem. Approximation Algorithms for Vertex Cover and Set Cover Problem.

Text/References:

1. Cormen, Leiserson, Rivest: Introduction to Algorithms, Prentice Hall of India.

2. Horowitz and Sahani: Fundamental of Computer algorithms.
3. Aho A.V , J.D Ulman: Design and analysis of Algorithms, Addison Wesley

6CS3A THEORY OF COMPUTATION (Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3,	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Finite Automata & Regular Expression: Basic Concepts of finite state system, Deterministic and non-deterministic finite automation and designing regular expressions, relationship between regular expression & Finite automata minimization of finite automation mealy & Moore Machines.
II	Regular Sets of Regular Grammars: Basic Definition of Formal Language and Grammars. Regular Sets and Regular Grammars, closure proportion of regular sets, Pumping lemma for regular sets, decision Algorithms for regular sets, Myhell_Nerod Theory & Organization of Finite Automata.
III	Context Free Languages& Pushdown Automata: Context Free Grammars – Derivations and Languages – Relationship between derivation and derivation trees – ambiguity – simplification of CEG – Greiback Normal form – Chomsky normal forms – Problems related to CNF and GNF Pushdown Automata: Definitions – Moves – Instantaneous descriptions – Deterministic pushdown automata – Pushdown automata and CFL - pumping lemma for CFL - Applications of pumping Lemma.
IV	Turing Machines: Turing machines – Computable Languages and functions – Turing Machine constructions – Storage in finite control – multiple tracks – checking of symbols – subroutines – two way infinite tape. Undecidability: Properties of recursive and Recursively enumerable languages – Universal Turing Machines as an undecidable problem – Universal Languages – Rice's Theorems.
V	Linear bounded Automata Context Sensitive Language: Chomsky Hierarchy of Languages and automata, Basic Definition & descriptions of Theory & Organization of Linear bounded Automata Properties of context-sensitive languages

Text/References

1. Aho, Hopcroft and Ullman, Introduction to Automata Theory, Formal Languages and Computation, Narosa
2. Cohen, Introduction to Computer Theory, Addison Wesley.
3. Papadimitriou, Introduction to Theory of Computing, Prentice Hall.

6CS4A COMPUTER GRAPHICS & MULTIMEDIA TECHNIQUES.

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction to Raster scan displays, Storage tube displays, refreshing, flicking, interlacing, color monitors, display processors, resolution, Introduction to Interactive. Computer Graphics: Picture analysis, Overview of programmer's model of interactive graphics, Fundamental problems in geometry. Scan Conversion: point, line, circle, ellipse polygon, Aliasing, and introduction to Anti Aliasing (No anti aliasing algorithm).
II	2D & 3D Co-ordinate system: Homogeneous Co-ordinates, Translation, Rotation, Scaling, Reflection, Inverse transformation, Composite transformation. Polygon Representation, Flood Filling, Boundary filling. Point Clipping, Cohen-Sutherland Line Clipping Algorithm, Polygon Clipping algorithms.
III	Hidden Lines & Surfaces: Image and Object space, Depth Buffer Methods, Hidden Facets removal, Scan line algorithm, Area based algorithms. Curves and Splines: Parametric and Non parametric Representations, Bezier curve, B-Spline Curves.
IV	Rendering: Basic illumination model, diffuse reflection, specular reflection, phong shading, Gourand shading, ray tracing, color models like RGB, YIQ, CMY, HSV
V	Multimedia components, Multimedia Input/Output Technologies: Storage and retrieval technologies, Architectural and telecommunication considerations. Animation: Introduction, Rules, problems and Animation techniques.

Text/References:

1. J. Foley, A. Van Dam, S. Feiner, J. Hughes: Computer Graphics- Principles and Practice, Pearson
2. Hearn and Baker: Computer Graphics, PHI
3. Multimedia Systems Design, Prabhat Andleigh and Thakkar, PHI.

4. Multimedia Information Networking, N.K.Sharda, PHI..

6CS5A EMBEDDED SYSTEM DESIGN

Class: VI Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction to embedded systems hardware needs; typical and advanced, timing diagrams, memories (RAM, ROM, EPROM). Tristate devices, Buses, DMA, UART and PLD's. Built-ins on the microprocessor.
II	Interrupts basics, ISR; Context saving, shared data problem. Atomic and critical section, Interrupt latency. Survey of software architectures, Round Robin, Function queue scheduling architecture, Use of real time operating system.
III	RTOS, Tasks, Scheduler, Shared data reentrancy, priority inversion, mutex binary semaphore and counting semaphore. Inter task communication, message queue, mailboxes and pipes, timer functions, events. Interrupt routines in an RTOS environment.
IV	Embedded system software design using an RTOS. Hard real-time and soft real time system principles, Task division, need of interrupt routines, shared data.
V	Embedded Software development tools. Host and target systems, cross compilers, linkers, locators for embedded systems. Getting embedded software in to the target system. Debugging techniques. Testing on host machine, Instruction set emulators, logic analysers. In-circuit emulators and monitors. Regional

Text Books:

1. John Davies, MSP430 Microcontroller Basics, Elsevier, 2008.
2. Andrew N. Sloss et.al. ARM System Developers Guide, ELSEVIER
3. Muhammad Ali Mazidi et.al., The 8051 Microcontroller & Embedded Systems, Pearson
4. Embedded System Design, A Unified Hardware/Software Introduction, Frank Vahid / Tony Givargis, 2006 reprint, John Wiley Student Edition.

6CS6.1A ADVANCE TOPICS IN OPERATING SYSTEMS (Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Operating system structures – policies & mechanism, Structures- monolithic, layered, virtual machines, micro kernel, exokernels, client- server model. Examples from Linux & Windows. Threads Advance Concepts- Libraries- Pthreads, win32 threads, Java threads, Introduction to threading issues, system calls, cancellation, signal handling, thread pool, thread specific data, window threads, Linux threads, Solaris Threads. Message Passing System – Need of Message Passing Systems, design issues, naming, synchronization, Implementation–buffering and delivery; mailboxes; RPC & RMI. Examples Systems – Linux, Windows.
II	File System- file system layouts, file system implementation, contagious allocation, link list allocation, indexed allocation, file allocation table, virtual file system, directory implementation- linear list and hash table. File System reliability and integrity. I/O system: device drivers/ controllers, busses and interfaces- USB, IDE, SCSI, IEEE1394, RAID system, disk caching and buffering, disk management-disk formatting, RAID Structure, boot block, bad block, swap-space management. System Security: Security Problems, Program Threats, System Network Threats, Cryptography as a Security Tool, User Authentication, Implementing Security Defenses, Firewalling to Protect Systems and Network, Computer Security Classifications. Overview of security in Windows. [4]
III	The Linux OS: Unix Vs Linux, Design Principles, Kernel Structure, components Kernel Modules, Shell- usage, types; An overview of- Process Management, Thread Management and Scheduling, Memory Management, Process Scheduling in Linux, File System structure & implementation, I/O Management, Network File System, Inter-process Communications, Booting and login process, security.[3]
IV	The Window OS: Design Principles, System Components- Hardware Abstraction layer, Kernel, Executives; Environmental Subsystems- MS-DOS Environment, 16-bit Windows Environment, Win32 API, POSIX subsystem; Exception and Interrupts; An overview of-memory management, process management and thread; Process Scheduling in Windows; File Systems: Internal Layout, recovery, Volume Management and Fault Tolerance, FAT and NTFS, Security features, window registry, OS organizations.[3]

V	Multiprocessor Operating Systems: Architecture of Multiprocessor Systems, Overview of Multiprocessor OS, Kernel Structure and Multiprocessing support in Linux & Windows, Process Synchronization- Queued Lock, Spin Lock, Sleep Lock; Process Scheduling. Multimedia Operating System- Introduction to Multimedia & Data Compression- concepts, common graphics file formats, common audio file formats; Video server, Process management- real time scheduling; Multimedia file systems, Multimedia file storage mechanisms, Video server organization.[2] Mobile Operating System- Windows CE, Palm OS, Symbian OS, JAVA card, Multos.

Text/Reference Books:

1. DM Dhamdhare: Operating Systems – A Concepts Based Approach, Tata McGraw Hill
2. Achyut S Godbole: Operating Systems, Tata McGraw Hill
3. Tanenbaum: Modern Operating System, Prentice Hall
4. A. Silberschatz and Peter B Galvin: Operating System Principals, Wiley India Pvt. Ltd.
5. Charles Crowley: Operating System A Design – Oriented Approach, Tata McGraw Hill.
6. Bach, Design of Unix Operating Systems.

6CS6.2A ARTIFICIAL INTELLIGENCE

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Meaning and definition of artificial intelligence, Various types of production systems, Characteristics of production systems, Study and comparison of breadth first search and depth first search. Techniques, other Search Techniques like hill Climbing, Best first Search. A* algorithm, AO* algorithms etc, and various types of control strategies.
II	Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, comparison of propositional and predicate logic, Resolution, refutation, deduction, theorem proving, inferencing, monotonic and nonmonotonic reasoning.
III	Probabilistic reasoning, Baye's theorem, semantic networks scripts schemas, frames, conceptual dependency and fuzzy logic, forward and backward reasoning.
IV	Game playing techniques like minimax procedure, alpha-beta cut-offs etc, planning, Study of the block world problem in robotics, Introduction to understanding and natural languages processing.
V	Introduction to learning, Various techniques used in learning, introduction to neural networks, applications of neural networks, common sense, reasoning, some example of expert systems.

Text Books & References:

1. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-Graw Hill.
2. Introduction to AI & Expert System: Dan W. Patterson, PHI.
3. Artificial Intelligence by Luger (Pearson Education)
4. Russel & Norvig, Artificial Intelligence: A Modern Approach, Prentice-Hall

6CS6.3A HUMANCOMPUTER INTERFACE (Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: Comp. Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	The Human: input-output channels, Human memory, thinking, emotions, individual differences, psychology and the design of interactive systems. The Computer: Text entry devices with focus on the design of key boards, positioning, pointing and drawing, display devices. The Interaction: Models of interaction, ergonomics, interaction styles, elements of WIMP interfaces, interactivity, experience, engagement and fun. Paradigms for Interaction.
II	Design Process: The process of design, user focus, scenarios, navigation design screen design and layout, iteration & prototyping. Usability Engineering Design rules: Principles to support usability, standards, guidelines, rules and heuristics, HCI patterns.
III	Evaluation Techniques: Definition and goals of evaluation, evaluation through expert analysis and user participation, choosing an evaluation method. User support, requirement, approaches, adaptive help systems, designing user support systems
IV	Cognitive methods: Goals and task hierarchies, linguistic models, challenges of display based systems, physical and device models, cognitive architectures.
V	Communications and collaborations models: Face to Face communication, conversations, Text based communication, group working. Task Analysis: Differences between task analysis and other techniques, task decomposition, knowledge based analysis, ER based analysis, sources of information and data collection, use of task analysis.

Text/References:

1. Human Computer Interaction; Alan Dix et.al, 3rd ed., Pearson

6CS7A JAVA PROGRAMMING LAB (Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Practical Hrs.: 3	Examination Time = Four (4) Hours Maximum Marks = 75 [Sessional/Mid-term (60) & End-term

Objectives: At the end of the semester, the students should have clearly understood and implemented the following:

1. Develop an in depth understanding of programming in Java: data types, variables, operators, operator precedence, Decision and control statements, arrays, switch statement, Iteration Statements, Jump Statements, Using break, Using continue, return.
2. Write Object Oriented programs in Java: Objects, Classes constructors, returning and passing objects as parameter, Inheritance, Access Control, Using super, final with inheritance Overloading and overriding methods, Abstract classes, Extended classes.
3. Develop understanding to developing packages & Interfaces in Java: Package, concept of CLASSPATH, access modifiers, importing package, Defining and implementing interfaces.
4. Develop understanding to developing Strings and exception handling: String constructors, special string operations, character extraction, searching and comparing strings, string Buffer class. Exception handling fundamentals, Exception types, uncaught exceptions, try, catch and multiple catch statements. Usage of throw, throws and finally.
5. Develop applications involving file handling: I/O streams, File I/O.
6. Develop applications involving concurrency: Processes and Threads, Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Interrupts, Joins, and Synchronization.
7. Develop applications involving Applet: Applet Fundamentals, using paint method and drawing polygons.

It is expected that each laboratory assignments to given to the students with an aim to In order to achieve the above objectives

Indicative List of exercises:

7. Programs to demonstrate basic concepts e.g. operators, classes, constructors, control & iteration statements, recursion etc. such as complex arithmetic, matrix arithmetic, tower of Hanoi problem etc.
8. Development of programs/projects to demonstrate concepts like inheritance, exception handling, packages, interfaces etc. such as application for electricity department, library management, ticket reservation system, payroll system etc.
9. Development of a project to demonstrate various file handling concepts.
10. Development of a project to demonstrate various applet concepts.

6CS8A Computer graphics & multimedia lab

Class: VI Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Practical Hrs:2	Examination Time = Three (3) Hours Maximum Marks = 50 [Mid-term (60) & End-term (40)]

S. No.	List of Experiment
1	Implementation of Line, Circle and ellipse attributes
2	Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear
3	Composite 2D Transformations
4	Cohen Sutherland 2D line clipping and Windowing
5	Sutherland – Hodgeman Polygon clipping Algorithm
6	Three dimensional transformations - Translation, Rotation, Scaling
7	Composite 3D transformations
8	Drawing three dimensional objects and Scenes
9	Generating Fractal images
10	To plot a point (pixel) on the screen
11	To draw a straight line using DDA Algorithm
12	Implementation of mid-point circle generating Algorithm
13	Implementation of ellipse generating Algorithm
14	To translate an object with translation parameters in X and Y directions
15	To scale an object with scaling factors along X and Y directions
16	To rotate an object with a certain angle about origin
17	Perform the rotation of an object with certain angle about an arbitrary point

6CS9A DESIGN AND ANALYSIS OF ALGORITHMS Lab(Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: Comp. Engg. Schedule per Week Practical Hrs : 3	Examination Time = Four (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End- term (40)]

Objectives: Upon successful completion of this course, students should be able to:

- Prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains;
- Apply the algorithms and design techniques to solve problems;
- Analyze the complexities of various problems in different domains.

Suggested Tools: For implementation and estimation of running time on various sizes of input(s) or output(s) as the case may be, Linux platform is suggested.

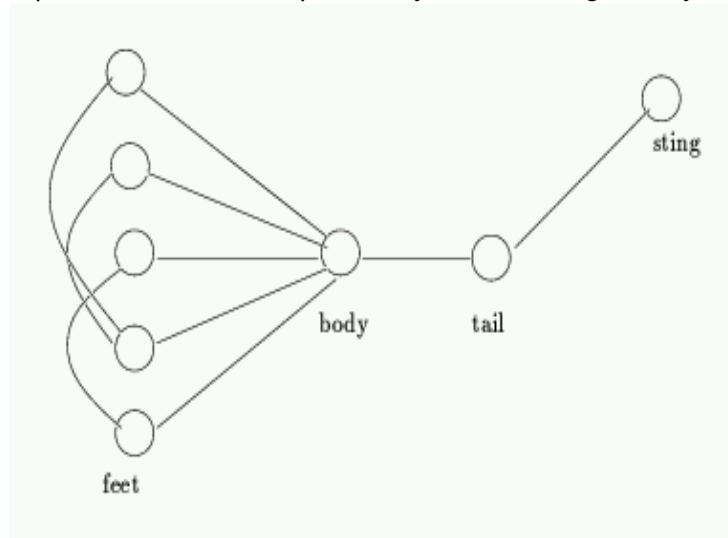
Suggested Exercises:

- A. It is expected that teachers will assign algorithms to the students for estimation of time & space complexity. Algorithms reported in various research journals may be chosen by the teachers.
- B. Problem on designing algorithms to meet complexity constraints may be assigned. For example, a problem on design, analysis and implementation for transposing a sparse matrix requiring not more than one pass from the original matrix may be assigned.
- C. A guide to such problems is given below:
 1. Exploring a Binary Heap: Consider a binary heap containing n numbers (the root stores the greatest number). You are given a positive integer $k < n$ and a number x . You have to determine whether the k^{th} largest element of the heap is greater than x or not. Your algorithm must take $O(k)$ time. You may use $O(k)$ extra storage.
 2. Merging two search trees: You are given two height balanced binary search trees T and T' , storing m and n elements respectively. Every element of tree T is smaller than every element of tree T' . Every node u also stores height of the subtree rooted at it. Using this extra information how can you merge the two trees in time $O(\log m + \log n)$ (preserving both the height balance and the order)?
 3. Complete binary tree as an efficient data-structure:
You are given an array of size n (n being a power of two). All the entries of the array are initialized to zero. You have to perform a sequence of the following online operations :
 1. (i) Add(i, x) which adds x to the entry $A[i]$.
 2. (ii) Report sum(i, j) = sum of the entries in the array from indices i to j for any $0 < i < j \leq n$.

It can be seen easily that we can perform the first operation in $O(1)$ time whereas the second operation may cost $O(n)$ in worst case. Your objective is to perform these operations efficiently. Give a data-structure which will guarantee $O(\log n)$ time per operation.

4. Problems on Amortized Analysis
 - a. Delete-min in constant time!!! Consider a binary heap of size n , the root storing the smallest element. We know that the cost of insertion of an element in the heap is $O(\log n)$ and the cost of deleting the smallest element is also $O(\log n)$. Suggest a valid potential function so that the amortized cost of insertion is $O(\log n)$ whereas amortized cost of deleting the smallest element is $O(1)$.
 - b. Implementing a queue by two stack
 - c. Show how to implement a queue with two ordinary stacks so that the amortized cost of each Enqueue and each Dequeue operation is $O(1)$.
5. Computing a spanning tree having smallest value of largest edge weight: Describe an efficient algorithm that, given an undirected graph G , determines a spanning tree of G whose largest edge weight is minimum over all spanning trees of G .
6. Shortest Path Problems:
 - i. From a subset of vertices to another subset of vertices
 - a. Given a directed graph $G(V,E)$, where edges have nonnegative weights. S and D are two disjoint subsets of the set of vertices. Give an $O(|V| \log |V| + |E|)$ time algorithm to find the shortest path among the set of paths possible from any node in S to any node in D .
 - ii. Paths in Directed Acyclic Graph
 - a. Counting the number of paths
Given two nodes u,v in a directed acyclic graph $G(V,E)$. Give an $O(|E|)$ time algorithm to count all the paths from u to v .
 - b. Path passing through a subset of nodes
Given two nodes u,v and a set of vertices $w_1, w_2, \dots, w_k$ in a directed acyclic graph $G(V,E)$. Give an $O(|E|)$ time algorithm to output a path(if exists) from u to v which passes through each of the nodes $w_1, \dots, w_k$. If there is no such path then your algorithm must report that "no such path exists".
7. Searching for a friend:
You are standing at a crossing from where there emerge four roads extending to infinity. Your friend is somewhere on one of the four roads. You don't know on which road he is and how far he is from you. You have to walk to your friend and the total distance traveled by you must be at most a constant times the actual distance of your friend from you. In terminology of algorithms, you should traverse $O(d)$ distance, where d is the distance of your friend from you.

8. A simple problem on sorted array: Design an $O(n)$ -time algorithm that, given a real number x and a sorted array S of n numbers, determines whether or not there exist two elements in S whose sum is exactly x .
9. Finding the decimal dominant in linear time: You are given n real numbers in an array. A number in the array is called a decimal dominant if it occurs more than $n/10$ times in the array. Give an $O(n)$ time algorithm to determine if the given array has a decimal dominant.
10. Finding the first one: You are given an array of infinite length containing zeros followed by ones. How fast can you locate the first one in the array?
11. Searching for the Celebrity: Celebrity is a person whom everybody knows but he knows nobody. You have gone to a party. There are total n persons in the party. Your job is to find the celebrity in the party. You can ask questions of the form Does Mr. X know Mr. Y? You will get a binary answer for each such question asked. Find the celebrity by asking only $O(n)$ questions.
12. Checking the Scorpion: An n -vertex graph is a scorpion if it has a vertex of degree 1 (the sting) connected to a vertex of degree two (the tail) connected to a vertex of degree $n-2$ (the body) connected to the other $n-3$ (the feet). Some of the feet may be connected to other feet. Design an algorithm that decides whether a given adjacency matrix represents a scorpion by examining only $O(n)$ entries.



13. Endless list: You are having a pointer to the head of singly linked list. The list either terminates at null pointer or it loops back to some previous location (not necessarily to the head of the list). You have to determine whether the list loops back or ends at a null location in time proportional to the length of the list. You can use at most a constant amount of extra storage.
14. Nearest Common Ancestor:
Given a rooted tree of size n . You receive a series of online queries: "Give nearest common ancestor of u, v ". Your objective is to preprocess the tree in $O(n)$ time to get a data structure of size $O(n)$ so that you can answer any such query in $O(\log n)$ time.

6CS10A Embedded System Design Lab.

Class: VI Sem. B.Tech.	Evaluation
Branch: Comp. Engg. Schedule per Week Practical Hrs :2	Examination Time = Four (4) Hours Maximum Marks = 75 [Sessional/Mid-term (60) & End-term (40)]

Course Objectives

Upon successful completion of the course, students will be able to design simple embedded systems and develop related software. Students also learn to work in a team environment and communicate the results as written reports and oral presentations.

Suggested Microcontroller Platform: Texas Instruments MSP430, ARM 9, 68HC12, 8051.

It is assumed that there are 14 weeks in the semester and about 5 to 6 experiments will be carried out. More experiments are provided to bring in variation.

Experiment #0

Get familiar with the microcontroller kit and the development software. Try the sample programs that are supplied to get familiar with the Microcontroller.

Experiment #1

a) Blink an LED which is connected to your microcontroller using the built-in timer in the microcontroller. Assume that the LED should be on for x milliseconds and off for y milliseconds; assume that these values are stored in memory locations X and Y. We should be able to change the value of x and y and rerun the program.

b) Consider an alternate way to program this application. Here, the microcontroller turns the LED on and waits in a busy loop to implement a delay of x milliseconds. Then it turns the LED off and waits in a busy loop to implement a delay of y milliseconds. How do you compare these two solutions?

Experiment #2

Assume that in Experiment #1, the values of x and y have been chosen to be 200 and 500 respectively. When the LED blinking program runs, pressing a key on the keyboard should generate an interrupt to the microcontroller. If the key that has been pressed is a numeric key, the value of x and y must be interchanged by the interrupt service routine. If the key that has been pressed is not a numeric key, then the LED must be turned off for 2 seconds before resuming the blinking.

Experiment #3

If your microcontroller kit has an LCD interface, write a program to display a character string on the LCD. Assume that the string is stored at a location

STRING and consists of alphanumeric characters. The string is null-terminated. Modify your program to scroll the displayed string from left to right.

Experiment #4

Modern microcontrollers usually have an in-built Digital-to-Analog and Analog-to-Digital converter. Use the built-in DAC to generate voltage waveforms such as (a) pulse train (b) triangular waveform (c) sinusoidal waveform. Observe these waveforms on an oscilloscope.

Experiment #5

Your microcontroller may have a built-in temperature sensor. If not, interface an external temperature sensor to the microcontroller. Write a program to take several measurements of temperature at regular intervals and display the average temperature on the LCD display. Test if the readings change when the ambient temperature changes.

Experiment #6

Your microcontroller may have a built-in ADC. Build a voltmeter that can measure stable voltages in a certain range. The measured value must be displayed on the LCD display. Measure the same voltage using a multimeter and record the error in measurement. Tabulate the error for several values of the voltage.

Experiment #7

Build a simple security device based on the microcontroller kit. Interface an external motion sensor to the microcontroller. An alarm must be generated if motion is sensed in a specified region. There must be a provision to record the time at which the intrusion was detected. Similarly, there must be a provision to turn the alarm off by pressing a key.

Experiment #8

A voltage waveform $v(t)$ is available as an input to the microcontroller. We must continuously check the waveform and record the maximum value of the waveform and display the maximum value on the LCD display. Test the program by using a DC supply to generate $v(t)$ and varying the DC value.

6CS11A Humanities and Social Sciences (Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: Computer Engg.	Examination Time = Three (3) Hours
Schedule per Week Practical Hrs :2	Maximum Marks = 50
	[Sessional/Mid-term (30) & End-term (20)]

Units	Contents of the subject
I	India-brief history of Indian constitution ,framing-features fundamental rights,duties,directive principles of states,History of Indian National movement,Socio economic growth after independence.
II	Society-Social groups-concepts and types,socialization-concept theory,social control:concept,social problem in contemporary India,status and role.
III	The fundamental of Economics-meaning,definition animportance of economics,Logic of choice,central economic problems,positive and normative approaches,economic systems-socialism and capitalism.
IV	Microeconomics-Law of demand and supply,utility approach,indifferencecurves,elasticity of demand & supply and applications,consumer surplus,Law of returns to factors and returns to scale.
V	Macroeconomics- concept relating to National product-National income and its measurement,simple Keynesian theory,simple multiplier, money and banking.Meaning,concept of international trade,determination of exchange rate,Balance of payments.

References:

1. Economics-Lipsey & Chrystal, Oxford Univ.Press,2010
Nordhaus, William, Samuelson,Paul-2009-10

7CS1A Cloud Computing

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction Cloud Computing: Nutshell of cloud computing, Enabling Technology, Historical development, Vision, feature Characteristics and components of Cloud Computing. Challenges, Risks and Approaches of Migration into Cloud. Ethical Issue in Cloud Computing, Evaluating the Cloud's Business Impact and economics, Future of the cloud. Networking Support for Cloud Computing. Ubiquitous Cloud and the Internet of Things
II	Cloud Computing Architecture: Cloud Reference Model, Layer and Types of Clouds, Services models, Data center Design and interconnection Network, Architectural design of Compute and Storage Clouds. Cloud Programming and Software: Fractures of cloud programming, Parallel and distributed programming paradigms-MapReduce, Hadoop , High level Language for Cloud. Programming of Google App engine,
III	Virtualization Technology: Definition, Understanding and Benefits of Virtualization. Implementation Level of Virtualization, Virtualization Structure/Tools and Mechanisms , Hypervisor VMware, KVM, Xen. Virtualization: of CPU, Memory, I/O Devices, Virtual Cluster and Resources Management, Virtualization of Server , Desktop, Network, and Virtualization of data-center
IV	Securing the Cloud : Cloud Information security fundamentals, Cloud security services, Design principles, Policy Implementation, Cloud Computing Security Challenges, Cloud Computing Security Architecture . Legal issues in cloud Computing. Data Security in Cloud: Business Continuity and Disaster Recovery , Risk Mitigation , Understanding and Identification of Threats in Cloud, SLA-Service Level Agreements, Trust Management
V	<i>Cloud Platforms in Industry:</i> Amazon web services , Google AppEngine, Microsoft Azure Design, Aneka: Cloud Application Platform -Integration of Private and Public Clouds <i>Cloud applications:</i> Protein structure prediction, Data Analysis, Satellite Image Processing, CRM and ERP ,Social networking . Cloud Application- Scientific Application, Business Application. <i>Advance Topic in Cloud Computing:</i> Federated Cloud/InterCloud, Third Party Cloud Services

Recommended Text:

1. “ Distributed and Cloud Computing “ By Kai Hawang , Geoffrey C.Fox, Jack J. Dongarra Pub: Elsevier
2. Cloud Computing ,Principal and Paradigms, Edited By Rajkumar Buyya, Jemes Broberg, A. Goscinski, Pub.- Wiley
3. Kumar Saurabh, “Cloud Computing” , Wiley Pub
4. Krutz , Vines, “Cloud Security “ , Wiley Pub
5. Velte, “Cloud Computing- A Practical Approach” ,TMH Pub

7CS2A Information System Security (Common to CS & IT)

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction to security attacks, services and mechanism, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, stream and block ciphers. Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion and diffusion, fiestal structure, data encryption standard(DES), differential and linear cryptanalysis of DES, block cipher modes of operations, triple DES.
II	AES, RC6, random number generation. S-box theory: Boolean Function, S-box design criteria, Bent functions, Propagation and nonlinearity, construction of balanced functions, S-box design.
III	Public Key Cryptosystems: Principles of Public Key Cryptosystems, RSA Algorithm, security analysis of RSA, Exponentiation in Modular Arithmetic. Key Management in Public Key Cryptosystems: Distribution of Public Keys, Distribution of Secret keys using Public Key Cryptosystems. X.509 Discrete Logarithms, Diffie-Hellman Key Exchange.
IV	Message Authentication and Hash Function: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MAC, MD5 message digest algorithm, Secure hash algorithm(SHA). Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm. Remote user Authentication using symmetric and Asymmetric Authentication
V	Pretty Good Privacy. IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulation Security Payload in Transport and Tunnel mode with multiple security associations (Key Management not Included). Strong Password Protocols: Lamport's Hash, Encrypted Key Exchange.

Text/References:

1. Stalling Williams: Cryptography and Network Security: Principles and Practices, 4th Edition, Pearson Education, 2006.
2. Kaufman Charlie et.al; Network Security: Private Communication in a Public World, 2nd Ed., PHI/Pearson.
3. Pieprzyk Josef and et.al; Fundamentals of Computer Security, Springer-Verlag, 2008.
4. Trappe & Washington, Introduction to Cryptography, 2nd Ed. Pearson.

7CS3A Data Mining & Ware Housing (Common to CS & IT)

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Overview, Motivation(for Data Mining),Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.
II	Concept Description: Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases– Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi- Dimensional Association rules from Relational Databases.
III	What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods K-nearest neighbour classifiers, Genetic Algorithm. Cluster Analysis: Data types in cluster analysis, Categories of clustering methods, Partitioning methods. Hierarchical Clustering- CURE and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method –Statistical Approach, Neural Network approach, Outlier Analysis
IV	Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Mining.
V	Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.

Text Books & References:

1. Data Warehousing in the Real World – Anahory and Murray, Pearson Education.
2. Data Mining – Concepts and Techniques – Jiawei Han and Micheline Kamber.
3. Building the Data Warehouse – WH Inmon, Wiley.

7CS4A COMPUTER AIDED DESIGN FOR VLSI

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg.	Examination Time = Three (3) Hours
Schedule per Week	Maximum Marks = 100
Lectures: 3	[Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Complexity in microelectronic circuit design and Moore's Law, design styles -Full-custom design, standard-cell design, Programmable Logic Devices, Field Programmable Gate Arrays, Design Stages, Computer-Aided Synthesis and Optimizations, design flow and related problems.
II	Boolean functions and its representations – co-factor, unite, derivatives, consensus and smoothing; tabular representations and Binary Decision Diagram (BDD), OBDD, ROBDD and Bryant's reduction algorithm and ITE algorithm. Hardware abstract models – structures and logic networks, State diagram, data-flow and sequencing graphs, hierarchical sequencing graphs. Compilation and behavioral optimizations.
III	Architectural Synthesis – Circuit description and problem definition, temporal and spatial domain scheduling, synchronization problem. Scheduling algorithms - ASAP and ALAP scheduling algorithms, scheduling under constraints, relative scheduling, list scheduling heuristic. Scheduling in pipelined circuits.
IV	Resource Sharing & Binding in sequencing graphs for resource dominated circuits, sharing of registers and busses; binding variables to registers. Two-level logic optimization principles – definitions and exact logic minimizations. Positional cube notations, functions with multi-valued logic. List-oriented manipulations.
V	Physical Design. Floor planning – goals and objectives. Channel definition, I/O and power planning. Clock Planning. Placement – goals and objectives. Placement algorithms. Iterative improvement algorithms. Simulated Annealing. Timing-driven Placement. Global routing – goals and objectives. Global routing methods. Timing-driven global routing. Detailed Routing – goals and objectives. Left-edge algorithm. Constraints and routing graphs. Channel routing algorithms. Via minimization. Clock routing, power routing, circuit extraction and Design Rule Checking.

Text Books:

1. S.H. Gerez. Algorithms VLSI Design Automation. Wiley India. (Indian edition available.)
2. Michael John Sebastian Smith. Application-Specific Integrated Circuits. Addison-Wesley. (Low-priced edition is available.)
3. G.D. Micheli, Synthesis and optimization of digital circuits, TMH.

References:

1. <http://www.fie-conference.org/fie98/papers/1002.pdf>
2. S. Sait and H. Youssef. VLSI Physical Design Automation: Theory and Practice.

7CS5A COMPILER CONSTRUCTION

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg.	Examination Time = Three (3) Hours
Schedule per Week	Maximum Marks = 100
Lectures: 3	[Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Compiler, Translator, Interpreter definition, Phase of compiler introduction to one pass & Multipass compilers, Bootstrapping, Review of Finite automata lexical analyzer, Input, buffering, Recognition of tokens, Idea about LEX: A lexical analyzer generator, Error handling.
II	Review of CFG Ambiguity of grammars, Introduction to parsing. Bottom up parsing Top down parsing techniques, Shift reduce parsing, Operator precedence parsing, Recursive descent parsing predictive parsers. LL grammars & passers error handling of LL parser. LR parsers, Construction of SLR, Conical LR & LALR parsing tables, parsing with ambiguous grammar. Introduction of automatic parser generator: YACC error handling in LR parsers.
III	Syntax directed definitions; Construction of syntax trees, L-attributed definitions, Top down translation. Specification of a type checker, Intermediate code forms using postfix notation and three address code, Representing TAC using triples and quadruples, Translation of assignment statement. Boolean e xpression and control structures.
IV	Storage organization, Storage allocation, Strategies, Activation records, Accessing local and non local names in a block structured language, Parameters passing, Symbol table organization, Data structures used in symbol tables.
V	Definition of basic block control flow graphs, DAG representation of basic block, Advantages of DAG, Sources of optimization, Loop optimization, Idea about global data flow analysis, Loop invariant computation, Peephole optimization, Issues in design of code generator, A simple code generator, Code generation from DAG.

Text/References:

1. Aho, Ullman and Sethi: Compilers, Addison Wesley.
2. Holub, Compiler Design in C, PHI.

7CS6.1A ADVANCE DATABASE MANGEMENT SYSTEMS

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Query Processing and Optimization: Overview of Relational Query Optimization, System Catalog in a Relational DBMS, Alternative Plans, Translating SQL, Queries into Algebra, Estimating the Cost of a Plan, Relational Algebra Equivalences, Enumeration of Alternative Plans. [2]
II	Object Database Systems: Motivating Examples, Structured Data Types, Operations On Structured Data, Encapsulation and ADT's, Inheritance, Objects, OIDs and Reference Types, Database Design for an ORDBMS, ORDBMS Implementation Challenges, ORDBMS, Comparing RDBMS, OODBMS, and ORDBMS.
III	Parallel and Distributed Databases: Architectures for Parallel, Databases, Parallel Query Evaluation, Parallelizing Individual Operations, Parallel Query Optimization, Distributed DBMS Architectures, Storing Data in a Distributed DBMS, Distributed Catalog Management, Distributed Query Processing, Updating Distributed Data, Introduction to Distributed Transactions, Distributed Concurrency Control, Distributed Recovery. [2]
IV	Database Security and Authorization: Introduction to Database Security, Access Control, Discretionary Access Control- Grant and Revoke on Views and Integrity Constraints, Mandatory Access Control- Multilevel Relations and Polyinstantiation, Covert Channels, DoD Security Levels, Additional Issues Related to Security- Role of the Database Administrator, Security in Statistical Databases, Encryption. [2]
V	POSTGES: POSTGRES user interfaces, sql variations and extensions, Transaction Management, Storage and Indexing, Query processing and optimizations, System Architectures. XML: Motivation, Structure of XML data, XML Document Schema, Querying and Transformation, Application Program Interface to XML, Storage of XML Data, XML applications. [2]

Text/References

1. Elmasri R and Navathe SB, Fundamentals of Database Systems, 3rd Edition, Addison Wesley, 2000.
2. Connolly T, Begg C and Strachan A, Database Systems, 2nd Edition, Addison Wesley, 1999
3. Ceri Pelagatti, Distributed Database: Principles and System - (McGraw Hill)
4. Simon AR, Strategic Database Technology: Management for the Year 2000, Morgan Kaufmann, 1995
5. A. Silversatz, H. Korth and S. Sudarsan: Database Concepts 5th edition, Mc-Graw Hills 2005.

7CS6.2A Robotics

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Unit	Contents
I	Introduction -- brief history, types, classification and usage, Science and Technology of robots, Some useful websites, textbooks and research journals.
II	Elements of robots -- joints, links, actuators, and sensors Position and orientation of a rigid body, Homogeneous transformations, Representation of joints, link representation using D-H parameters, Examples of D-H parameters and link transforms, different kinds of actuators – stepper, DC servo and brushless motors, model of a DC servo motor, Types of transmissions, Purpose of sensors, internal and external sensors, common sensors – encoders, tachometers, strain gauge based force-torque sensors
III	Introduction, Direct and inverse kinematics problems, Examples of kinematics of common serial manipulators, workspace of a serial robot, Inverse kinematics of constrained and redundant robots, Tractrix based approach for fixed and free robots and multi-body systems, simulations and experiments, Solution procedures using theory of elimination, Inverse kinematics solution for the general 6R serial manipulator.
IV	Degrees-of-freedom of parallel mechanisms and manipulators, Active and passive joints, Constraint and loop-closure equations, Direct kinematics problem, Mobility of parallel manipulators, Closed-form and numerical solution, Inverse kinematics of parallel manipulators and mechanisms, Direct kinematics of Gough-Stewart platform.
V	Linear and angular velocity of links, Velocity propagation, Manipulator Jacobians for serial and parallel manipulators, Velocity ellipse and ellipsoids, Singularity analysis for serial and parallel manipulators, Loss and gain of degree of freedom, Statics of serial and parallel manipulators, Statics and force transformation matrix of a Gough-Stewart platform, Singularity analysis and statics.

Text Books :

1. Mittal and Nagrath, Robotics and Control, Tata McGraw-Hill Education, 2003.
2. Fred G. Martin, Robotic Explorations: A Hands On Introduction to Engineering, Pearson Education, 2001.

7CS6.3A Data Compression Techniques

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Compression Techniques: Lossless, lossy, measure of performance, modeling & coding. Lossless compression: Derivation of average information, data models, uniquely decodable codes with tests, prefix codes, Kraft-Mc Millan inequality. Huffman coding: Algorithms, minimum variance Huffman codes, optimality, length extended codes, adaptive coding, Rice codes, using Huffman codes for lossless image compression.
II	Arithmetic coding with application to lossless compression. Dictionary Techniques: LZ77, LZ78, LZW Predictive coding: Burrows-Wheeler Transform and move-to-front coding, JPEG-LS Facsimile Encoding: Run length, T.4 and T.6
III	Lossy coding- Mathematical preliminaries: Distortion criteria, conditional entropy, average mutual information, differential entropy, rate distortion theory, probability and linear system models. Scalar quantization: The quantization problem, uniform quantizer, Forward adaptive quantization, non-uniform quantization-Formal adopting quantization, companded Quantization Vector quantization: Introduction, advantages, The Linde-Ruzo-Grey algorithm, lattice vector quantization.
IV	Differential encoding – Introduction, Basic algorithm, Adaptive DPCM, Delta modulation, speech and image coding using delta modulation. Sampling in frequency and time domain, z-transform, DCT, DST, DWHT, quantization and coding of transform coefficient.
V	Sub band coding: Introduction, Filters, Basic algorithm, Design of Filter banks, G.722, MPEG. Wavelet based compression: Introduction, wavelets multi-resolution analysis and the scaling function implementation using filters.

Text Books & References:

1. Sayood K: Introduction to Data Compression: ELSEVIER 2005.

7CS7A Web Development Lab

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Practical Hrs: 2	Examination Time = Three (3) Hours Maximum Marks = 50 [Mid-term (60) & End-term (40)]

S. No.	List of Experiment
1	. Creation of HTML Files
2	Working with Client Side Scripting : VBScript, JavaScript
3	Configuration of web servers: Apache Web Server, Internet Information Server (IIS)
4	Working with ActiveX Controls in web documents
5	Experiments in Java Server Pages: Implementing MVC Architecture using Servlets, Data Access Programming (using ADO), Session and Application objects, File System Management
6	Working with other Server Side Scripting: Active Server Pages, Java Servlets, PHP
7	Experiments in Ajax Programming
8	Developing Web Services
9	Developing any E-commerce application (Mini Project)
10	Application Development in cloud computing Environment
11	Experiment Using Open Source Tool e.g. ANEKA

7CS8A VLSI PHYSICAL DESIGN LAB

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Practical Hrs : 3	Examination Time = Four (4) Hours Maximum Marks = 75 [Sessional/Mid-term (45) & End-term (30)]

VLSI Physical Design Automation is essentially the research, development and productization of algorithms and data structures related to the physical design process. The objective is to investigate optimal arrangements of devices on a plane (or in three dimensions) and efficient interconnection schemes between these devices to obtain the desired functionality and performance. Since space on a wafer is very expensive real estate, algorithms must use the space very efficiently to lower costs and improve yield. In addition, the arrangement of devices plays a key role in determining the performance of a chip. Algorithms for physical design must also ensure that the layout generated abides by all the rules required by the fabrication process. Fabrication rules establish the tolerance limits of the fabrication process. Finally, algorithms must be efficient and should be able to handle very large designs. Efficient algorithms not only lead to fast turn-around time, but also permit designers to make iterative improvements to the layouts. The VLSI physical design process manipulates very simple geometric objects, such as polygons and lines. As a result, physical design algorithms tend to be very intuitive in nature, and have significant overlap with graph algorithms and combinatorial optimization algorithms. In view of this observation, many consider physical design automation the study of graph theoretic and combinatorial algorithms for manipulation of geometric objects in two and three dimensions. However, a pure geometric point of view ignores the electrical (both digital and analog) aspect of the physical design problem. In a VLSI circuit, polygons and lines have inter-related electrical properties, which exhibit a very complex behavior and depend on a host of variables. Therefore, it is necessary to keep the electrical aspects of the geometric objects in perspective while developing algorithms for VLSI physical design automation. With the introduction of Very Deep Sub-Micron (VDSM), which provides very small features and allows dramatic increases in the clock frequency, the effect of electrical parameters on physical design will play a more dominant role in the design and development of new algorithms.

(Source: Algorithms For VLSI Physical Design Automation, by Naveed A. Sherwani).

The exercise should be such that the above objectives are met.

Automation tools such as Synopsis/ Cadence are available in the area. However, to begin, the students shall be assigned exercises on route optimization, placement & floor planning. Small circuits may be taken & algorithms implemented. At a later stage, the students may use tools and design more complex circuits.

7CS9A COMPILER DESIGN LAB

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Practical Hrs : 3	Examination Time = Four (4) Hours Maximum Marks = 75 [Sessional/Mid-term (60) & End-term (40)]

Objectives: At the end of the semester, the students should have clearly understood and implemented the following:

1. Develop an in depth understanding of system programming concept. Lexical analysis, syntax analysis, semantics analysis, code optimization, code generation. Language specification and processing
2. Develop an Understanding of Scanning by using concept of Finite state automaton. Parse tree and syntax tree, Top down parsing (recursive decent parsing, LL (1) parser) Bottom up parsing (operator precedence parsing) .Managing symbol table, opcode table, literal table, pool table
3. Develop an Understanding of Intermediate code form: Three address code, Polish notation (Postfix strings)
4. Develop an Understanding of Allocation data structure. Heaps
5. Develop an Understanding about Language processor development tools: LEX, YACC. Language processing activities (Program generation and execution)

It is expected that each laboratory assignments to given to the students with an aim to In order to achieve the above objectives

Indicative List of exercises:

1. Write grammar for a fictitious language and create a lexical analyzer for the same.
2. Develop a lexical analyzer to recognize a few patterns in PASCAL and C (ex: identifiers, constants, comments, operators etc.)
3. Write a program to parse using Brute force technique of Top down parsing
4. Develop on LL(1) parser (Construct parse table also).
5. Develop an operator precedence parser (Construct parse table also)
6. Develop a recursive descent parser
7. Write a program for generating for various intermediate code forms
 - i) Three address code ii) Polish notation
8. Write a program to simulate Heap storage allocation strategy
9. Generate Lexical analyzer using LEX
10. Generate YACC specification for a few syntactic categories
11. Given any intermediate code form implement code optimization techniques

Reference

V.V Das, Compiler Design using FLEX and YACC, PHI

8CS1A MOBILE COMPUTING (Common to CS & IT)

Class: VIII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Mobile computing: Definitions, adaptability issues (transparency, Environmental Constraints, application aware adaptation), mechanisms for adaptation and incorporating adaptations. Mobility management: mobility management, location management principle and techniques, PCS location management Scheme.
II	Data dissemination and management: challenges, Data dissemination, bandwidth allocation for publishing, broadcast disk scheduling, mobile cache maintenance schemes, Mobile Web Caching. Introduction to mobile middleware.
III	Middleware for application development: adaptation, Mobile agents. Service Discovery Middleware: Service Discovery & standardization Methods (universally Unique Identifiers, Textual Description & using interfaces), unicast Discovery, Multicast Discovery & advertisement, service catalogs, Garbage Collection, Eventing.
IV	Mobile IP, Mobile TCP, Database systems in mobile environments, World Wide Web and mobility
V	Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

Text/References:

1. Frank Adelstein, Sandeep Gupta, Golden Richard III, Loren Schwiebert, Fundamentals of Mobile and Pervasive Computing, TMH.
2. Principles of mobile computing Hansmann & Merk., Springer
3. Mobile communications Jochen Schiller , Pearson
4. 802.11 wireless networks Matthew S.Gast, O'REILLY.
5. Wireless LANs: Davis & McGuffin, McGraw Hill
6. Mobile Communications Handbook by Jerry D. Gybson
7. Mobile Communications Handbook by R

8CS2A Digital Image Processing (Common to CS & IT)

Class: VIII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction to Image Processing: Digital Image representation, Sampling & Quantization, Steps in image Processing, Image acquisition, color image representation
II	Image Transformation & Filtering: Intensity transform functions, histogram processing, Spatial filtering, Fourier transforms and its properties, frequency domain filters, colour models, Pseudo colouring, colour transforms, Basics of Wavelet Transforms
III	Image Restoration: Image degradation and restoration process, Noise Models, Noise Filters, degradation function, Inverse Filtering, Homomorphism Filtering
IV	Image Compression: Coding redundancy, Interpixel redundancy, Psychovisual redundancy, Huffman Coding, Arithmetic coding, Lossy compression techniques, JPEG Compression
V	Image Segmentation & Representation: Point, Line and Edge Detection, Thresholding, Edge and Boundary linking, Hough transforms, Region Based Segmentation, Boundary representation, Boundary Descriptors, Regional

References:

1. Gonzalez and Woods: Digital Image Processing ISDN 0-201-600- 781, Addison Wesley 1992.
Boyle and Thomas: Computer Vision - A First Course 2nd Edition, ISBN 0-632-028-67X, Blackwell Science 1995.
2. Gonzalez and Woods: Digital Image Processing ISDN 0-201-600- 781, Addison Wesley 1992.
3. Pakhera Malay K: Digital Image Processing and Pattern Recognition, PHI.

4. Trucco&Verri: Introductory Techniques for 3-D Computer Vision, Prentice Hall, Latest Edition
5. Low: Introductory Computer Vision and Image Processing, McGraw-Hill 1991, ISBN 0-07-707403-3.

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8CS3A DISTRIBUTED SYSTEMS

Class: VIII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Distributed Systems: Features of distributed systems, nodes of a distributed system, Distributed computation paradigms, Model of distributed systems, Types of Operating systems: Centralized Operating System, Network Operating Systems, Distributed Operating Systems and Cooperative Autonomous Systems, design issues in distributed operating systems. Systems Concepts and Architectures: Goals, Transparency, Services, Architecture Models, Distributed Computing Environment (DCE).[1,2] Theoretical issues in distributed systems: Notions of time and state, states and events in a distributed system, time, clocks and event precedence, recording the state of distributed systems.[2]
II	Concurrent Processes and Programming: Processes and Threads, Graph Models for Process Representation, Client/Server Model, Time Services, Language Mechanisms for Synchronization, Object Model Resource Servers, Characteristics of Concurrent Programming Languages (Language not included).[1] Inter-process Communication and Coordination: Message Passing, Request/Reply and Transaction Communication, Name and Directory services, RPC and RMI case studies.[1]
III	Distributed Process Scheduling: A System Performance Model, Static Process Scheduling with Communication, Dynamic Load Sharing and Balancing, Distributed Process Implementation.[1] Distributed File Systems: Transparencies and Characteristics of DFS, DFS Design and implementation, Transaction Service and Concurrency Control, Data and File Replication.[1,2] Case studies: Sun network file systems, General Parallel file System and Window's file systems. Andrew and Coda File Systems [2,3]
IV	Distributed Shared Memory: Non-Uniform Memory Access Architectures, Memory Consistency Models, Multiprocessor Cache Systems, Distributed Shared Memory, Implementation of DSM systems.[1] Models of Distributed Computation: Preliminaries, Causality, Distributed Snapshots, Modeling a Distributed Computation, Failures in a Distributed System, Distributed Mutual Exclusion, Election, Distributed Deadlock handling, Distributed termination detection. [1]
V	Distributed Agreement: Concept of Faults, failure and recovery, Byzantine Faults, Adversaries, Byzantine Agreement, Impossibility of Consensus and Randomized Distributed Agreement.[1] Replicated Data Management: concepts and issues, Database Techniques, Atomic Multicast, and Update Propagation.[1] CORBA case study: Introduction, Architecture, CORBA RMI, CORBA Services.[3]

Text Books:

1. Distributed operating systems and algorithm analysis by Randy Chow and T. Johnson, Pearson
2. Operating Systems A concept based approach by DM Dhamdhere, TMH
3. Distributed Systems- concepts and Design, Coulouris G., Dollimore J, and Kindberg T., Pearson

8CS4.1A Hardware Testing and Fault Tolerance

Class: VIII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Overview of hardware testing. Reliability and Testing, Difference between Verification and Testing, Concepts of fault models, test pattern generation and fault coverage. Types of tests – exhaustive testing, pseudo-exhaustive testing, pseudo-random testing, and deterministic testing. Test Application. Design for Test. Testing Economics. Defects, Failures and Faults. How are physical defects modeled as faults. Stuck-at faults, Single stuck-at-faults multiple stuck-at faults, bridging faults, delay faults, transient faults.
II	Relation between VLSI Design and Testing. a) Design Representation for the purpose of testing – Representation in the form of mathematical equations, tabular format, graphs, Binary Decision Diagrams, Netlists, or HDL descriptions. b) Recap of VLSI Design Flow and where testing fits in the flow. Importance of Simulation and Fault Simulation. Compiled and event-driven simulation. Parallel and deductive fault simulation. Using fault simulation to estimate fault coverage and building a fault dictionary
III	Combinational Test Pattern Generation. D-algorithm. Critical Path Tracking. PODEM algorithm for test generation. Testing sequential circuits. Functional and deterministic ATPG for sequential circuits and the associated challenges. Motivation for Design for Testability. Test Points, Partitioning for Testability. Scan Testing. Scan Architectures. Cost of Scan Testing. Boundary Scan Testing. Board-level testing. Boundary-scan Architecture and various modes of operation.
IV	a) Built-in Self Test. Pseudo-random test generation. Response Compaction. Random pattern-resistant faults. BIST architectures – Circular BIST, BILBO, STUMPS. b) Testing of Memories – Fault models, Functional tests for memories, Memory BIST. c) Testing of microprocessors.
V	Hardware fault tolerance. Failure Rate, Reliability, Mean Time to Failure. Different kinds of redundancy schemes for fault-tolerance (Space, Time, and Information Redundancy). N-modular Redundancy. Watch Dog Processors, Byzantine Failures. Information Redundancy – parity codes, checksums, m-of-n codes. RAID architectures for disk storage systems. Fault tolerance in interconnection networks. Fault-tolerant routing techniques.

Text Book:

1. Samiha Mourad and Yervant Zorian. Principles of Electronic Systems. Wiley Student Editon. [Available in Indian Edition].
2. Koren and C. Mani Krishna. Fault-Tolerant Systems. Elsevier. (Indian Edition Available.)

Text/References:

1. Abramovici, M., Breuer, M. A. and Friedman, A. D. Digital systems testing and testable design. IEEE press (Indian edition available through Jayco Publishing house), 2001.2. Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits by Bushnell and Agrawal, Springer, 2000.

8CS4.2A REAL TIME SYSTEMS

Class: VIII Sem. B.Tech.	Evaluation
Branch: Computer Engg.	Examination Time = Three (3) Hours
Schedule per Week	Maximum Marks = 100
Lectures: 3	[Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction: Definition, Typical Real Time Applications, concept of tasks, types of tasks and real time systems, block diagram of RTS, and tasks parameters -Release Times, execution time, period, Deadlines, and Timing Constraints etc. RTS requirements.
II	Reference Models for Real Time Systems: processors and Resources, Temporal Parameters of Real-Time Workload, Periodic and Aperiodic Task Model, Precedence Constrains and Data Dependency, Other Types of Dependencies, Functional Parameters, Resource Parameters. Real Time Scheduling: classification of Real Time Scheduling, scheduling criteria, performance metrics, schedulability analysis, Introduction to Clock Driven scheduling, Weighted Round Robin Approach and Priority Driven Approach. Dynamic Versus Static systems, Offline Versus Online Scheduling.
III	Periodic tasks scheduling: Clock Driven Scheduling – definition, notations and assumption, scheduler concepts, general scheduling structure, cyclic executives. Priority Driven Scheduling; notations and assumption, fixed priority verses dynamic priority, fixed priority scheduling algorithms (RM and DM) and their schedulability analysis, concept of schedulability tests – Inexact and exact schedulability tests for RM and DM, Optimality of the RM and DM algorithms, practical factors.
IV	Aperiodic task scheduling; assumption and approaches, server based and non-server based fixed priority scheduling algorithms – polling server, deferrable server , simple sporadic server, priority exchange, extended priority exchange, slack stealing. Introduction to scheduling of flexible computations –flexible applications, imprecise computation model and firm deadline model.
V	Resources Access Control: Assumptions on Resources and their usage, Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, priority inversion problem, need of new resource synchronization primitives/protocols for RTS, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority-Ceiling Protocol, Use of Priority- Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Unit Resources, Controlling Concurrent Accesses to Data Objects.

Text & References:

1. J.W.S.Liu: Real-Time Systems, Pearson Education Asia
2. P.D.Laurence, K.Mauch: Real-time Microcomputer System Design, An Introduction, McGraw Hill
3. C.M. Krisna & K. G. Shim- Real time systems- TMH

8CS4.3A AInformation Retrieval (Common to CS & IT)

Class: VIII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Knowledge Representation: Knowledge representation, Basics of Propositional logic, Predicate logic, reasoning using first order logic, unification, forward chaining, backward chaining, resolution Production rules, frames, semantic networks scripts.
II	Ontology Development: Description logic-taxonomies, Topic maps Ontology, Definition expressing ontology, logically ontology representations, – XML, RDF, RDFS, OWL, OIL, ontology development for specific domain, ontology engineering, Semantic web services.
III	Information Retrieval Modeling: Information retrieval, taxonomy, formal characterization, classic information retrieval, set theoretic model, algebraic model, probabilistic model, structured text, retrieval models, models for browsing, retrieval performance evaluation, keyword based querying, pattern matching, structural queries, query operations.
IV	Text and Multimedia Languages and Properties: Introduction, metadata, markup languages, multimedia. Text operations: document preprocessing, document clustering text Compressionbasic concepts - statistical methods. Indexing and searching: inverted files, suffix trees, signature file, Boolean queries, sequential searching, pattern matching.
V	Recent Trends in IR: Parallel and distributed IR, multimedia IR, data modeling, query languages, A generic Multimedia indexing Approach, one dimensional time series, two dimensional color images, Automatic feature extraction. Web Searching, Characterizing the Web, Search Engines, Browsing, Meta searchers, Searching using hyperlinks

TEXT BOOKS :

1. Stuart Russell and Peter Norvig, “Artificial Intelligence – A Modern Approach”, Pearson Education, Second edition, 2003. (UNIT I)
2. Michael C. Daconta, Leo J. Obart and Kevin J. Smith, “Semantic Web – A Guide to the Future of XML, Web Services and Knowledge Management”, Wiley Publishers, 2003 (UNIT II)
3. Ricardo Baeza-Yates, BerthierRibeiro-Neto, “Modern Information Retrieval”, Addison Wesley, 1999. (UNITs III, IV & V)

REFERENCES

1. Elain Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-Hill, Third edition, 2003
2. Christopher D. Manning, PrabhakarRaghavan and HinrichSchutze, “Introduction to Information Retrieval”, Cambridge University Press, 2008.

8CS5A UNIX NETWORK PROGRAMMING & SIMULATION LAB

Class: VIII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Practical Hrs.: 3	Examination Time = Four (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]

Objectives:

At the end of course, the students should be able to

- Understand various distributions of Unix viz. BSD, POSIX etc.
- Write client/server applications involving unix sockets involving TCP or UDP involving iterative or concurrent server.
- Understand IPV4 & IPV6 interoperability issues
- Use fork() system call.
- Understand the network simulator NS2 and Simulate routing algorithm on NS2 (Available on <http://www.isi.edu/nsnam/ns/>).

Suggested Platform: For Socket Programming- Linux, For NS2 Any of Microsoft Windows or Linux (In case of Microsoft, Virtual environment cygwin will also be required).

Suggested Exercises

S.No.	List of Experiments
1.	Write two programs in C: hello_client and hello_server • The server listens for, and accepts, a single TCP connection; it reads all the data it can from that connection, and prints it to the screen; then it closes the connection • The client connects to the server, sends the string "Hello, world!", then closes the connection
2.	Write an Echo_Client and Echo_server using TCP to estimate the round trip time from client to the server. The server should be such that it can accept multiple connections at any given time.
3.	Repeat Exercises 1 & 2 for UDP.
4.	Repeat Exercise 2 with multiplexed I/O operations
5.	Simulate Bellman-Ford Routing algorithm in NS2

References:

- Stevens, Unix Network Programming, Vol-I

8CS6A FPGA LAB.

Class: VIII Sem. B.Tech.		Evaluation
Branch: Computer Engg. Schedule per Week Practical Hrs : 3		Examination Time = Four (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]
S. No.	List of Experiments	
1.	Fundamental Theory Introduction to DSP architectures and programming Sampling Theory, Analog-to-Digital Converter (ADC), Digital-to-Analog Converter (DAC), and Quantization; Decimation, Interpolation, Convolution, Simple Moving Average; Periodic Signals and harmonics; Fourier Transform (DFT/FFT), Spectral Analysis, and time/spectrum representations; FIR and IIR Filters;	
2.	Design (Simulation) using MATLAB/ Simulink Simulate the lab exercises using MATLAB/Simulink	
3.	Implementation using pure DSP, pure FPGA and Hybrid DSP/FPGA platforms Digital Communications: On-Off- Keying (OOK), BPSK modulation, and a simple transceiver design Adaptive Filtering: Echo/Noise Cancellation, Least Mean Square (LMS) algorithm (2 weeks) Wireless Communications: Channel coding/decoding, Equalization, Simple Detection Algorithm, OFDM Speech Processing: Prediction Algorithms, Speech Classification and Synthesis	

8CS7A Digital Image Processing lab(Common to Comp. Engg. & Info. Tech)

Class: VIII Sem. B.Tech.	Evaluation
Branch: Computer Engg.	Examination Time = Three (3) Hours
Schedule per Week	Maximum Marks = 50
Practical Hrs: 2	[Mid-term (60) & End-term (40)]

S. No.	List of Experiment
1	Color image segmentation algorithm development
2	Wavelet/vector quantization compression
3	Deformable templates applied to skin tumor border finding
4	Helicopter image enhancement
5	High-speed film image enhancement
6	Computer vision for skin tumor image evaluation
7	New Border Images

Scheme and Syllabus
Rajasthan Technical University, Kota
B. Tech. in Electronics &
Communication Engineering
(Session 2017-18)

Rajasthan Technical University, KOTA
B.Tech. (Effective from 12-13)

BRANCH CODE	EC	EC					
Course Code	ELECTRONICS AND COMMUNICATION ENGG	Hrs. / Week					
SEMESTER III	Title	L	T	P	IA	Exam	Total
3EC1A	Electronic Devices & Circuits	3	0		20	80	100
3EC2A	Data Structures & Algorithms	3	0		20	80	100
3EC3A	Digital Electronics	3	0		20	80	100
3EC4A	Circuit Analysis & Synthesis	3	1		20	80	100
3EC5A	Electromagnetic Properties Of Materials	3	0		20	80	100
3EC6A	Advanced Engineering Mathematics-I	3	1		20	80	100
	Total						600
3EC7A	Electronic Instrumentation Workshop			2	45	30	75
3EC8A	Computer Programming Lab-I			2	45	40	75
3EC9A	Electronic Device Lab			2	45	40	75
3EC10A	Digital Electronics Lab			2	45	30	75
3EC11A	Business Entrepreneurship			2	30	20	50
3ECDCA	Discipline & Extra Curricular Activity						50
	Total						400
	Grand Total	18	2	10			1000

BRANCH CODE	EC	EC					
Course Code	ELECTRONICS AND COMMUNICATION ENGG	Hrs. / Week					
SEMESTER - IV	Title	L	T	P	IA	Exam	Total
4EC1A	Analog Electronics	3	0		20	80	100
4EC2A	Random Variables & Stochastic Processes	3	1		20	80	100
4EC3A	Electronic Measurement & Instrumentation	3	0		20	80	100
4EC4A	Electromagnetic Field Theory	3	1		20	80	100
4EC5A	Optimization Techniques	3	1		20	80	100
4EC6A	Advanced Engineering Mathematics-II	3	1		20	80	100
	Total						600
4EC7A	Computer Programming Lab-II			2	60	40	100
4EC8A	Analog Electronics Lab			2	60	40	100
4EC9A	Measurement & Instrumentation Lab			2	60	40	100
4EC10A	Humanities & Social Sciences			2	30	20	50
4ECDCA	Discipline & Extra Curricular Activity						50
	Total						400
	Grand Total	18	4	8			1000

BRANCH CODE	EC						
Course Code	ELECTRONICS AND COMMUNICATION ENGG	Hrs. / Week					
SEMESTER - V	Title	L	T	P	IA	Exam	Total
5EC1A	Signals & Systems	3	1		20	80	100
5EC2A	Linear Integrated Circuits	3	0		20	80	100
5EC3A	Telecommunication Engg.	3	0		20	80	100
5EC4A	Analog Communication	3	1		20	80	100
5EC5A	Microwave Engg. -I	3	0		20	80	100
5EC6A	Elective (any one of the following)						
5EC6.1A	Biomedical Instrumentation	3	0		20	80	100
5EC6.2A	Advanced Data Structures						
5EC6.3A	Computer Oriented Numerical & Statistical Methods						
	Total						600
5EC7A	Electronic Engineering Design Lab			2	45	30	75
5EC8A	Microwave Engg. Lab			2	45	30	75
5EC9A	Communication Lab-I			2	45	30	75
5EC10A	Signal Processing Lab			2	45	30	75
5EC11A	Professoinal Ethics and Disaster Management			2	30	20	50
5ECDCA	Discipline & Extra Curricular Activity						50
	Total						400
	Grand Total	18	2	10			1000

BRANCH CODE	EC						
Course Code	ELECTRONICS AND COMMUNICATION ENGG	Hrs. / Week					
SEMESTER - VI	Title	L	T	P	IA	Exam	Total
6EC1A	Microwave Engg.-II	3	1		20	80	100
6EC2A	Microprocessors	3	0		20	80	100
6EC3A	Industrial Electronics	3	0		20	80	100
6EC4A	Digital Communication	3	1		20	80	100
6EC5A	Control Systems	3	0		20	80	100
6EC6A	Elective (any one of the following)						
6EC6.1A	Neural Networks	3	0		20	80	100
6EC6.2A	Parallel Computation & Architecture						
6EC6.3A	Optical Fiber Communication						
	Total						600
6EC7A	Communication Lab-II			3	45	30	75
6EC8A	Microprocessor Lab			2	45	30	75
6EC9A	RF Simulation Lab			3	45	30	75
6EC10A	Industrial Electronics Lab			2	45	30	75
6EC11A	Personality Development & General Aptitude			2	30	20	50
6ECDCA	Discipline & Extra Curricular Activity						50
	Total						400
	Grand Total	18	2	10			1000

BRANCH CODE	EC						
Course Code	ELECTRONICS AND COMMUNICATION ENGG	Hrs. / Week					
SEMESTER - VII		L	T	P	IA	Exam	Total
7EC1A	Antenna & Wave Propagation	3	0		20	80	100
7EC2A	Digital Signal Processing	3	1		20	80	100
7EC3A	Digital Image Processing	3	1		20	80	100
7EC4A	Wireless Communication	3	0		20	80	100
7EC5A	VLSI Design	3	0		20	80	100
7EC6A	Elective (any one of the following)						
7EC6.1A	Advanced Microprocessors	3	0		20	80	100
7EC6.2A	Artificial Intelligence and Expert Systems						
7EC6.3A	VHDL						
	Total						600
7EC7A	Signal & Image Processing Lab			3	60	40	100
7EC8A	Wireless Communication Lab			3	60	40	100
7EC9A	Practical Training & Industrial Visit			2	60	40	100
7EC10A	Project-I			2	50		50
7ECDCA	Discipline & Extra Curricular Activity						50
	Total						400
	Grand Total	18	2	10			1000

BRANCH CODE	EC						
Course Code	ELECTRONICS AND COMMUNICATION ENGG	Hrs. / Week					
SEMESTER - VIII		L	T	P	IA	Exam	Total
8EC1A	IC Technology	3	0		20	80	100
8EC2A	Radar & TV Engineering	3	1		20	80	100
8EC3A	MEMS and Nanotechnology	3	1		20	80	100
8EC4.1A	Computer Networks	3	0		20	80	100
8EC4.2A	Operating Systems						
8EC4.3A	Microcontroller and Embedded Systems						
	Total						400
8EC5A	RF Fabrication Lab			3	60	40	100
8EC6A	Industrial Economics & Management.			2	30	20	50
8EC7A	VLSI & Optical Fiber Lab			3	60	40	100
8EC8A	Project -II			4	120	80	200
8EC9A	Seminar			2	60	40	100
8ECDCA	Discipline & Extra Curricular Activity						50
	Total						600
	Grand Total	12	2	14			1000

3EC1A ELECTRONIC DEVICES & CIRCUITS**B.Tech. (EC) 3rd Sem.
3L+0T****Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	SEMICONDUCTOR PHYSICS - Mobility and conductivity, Charge densities in a semiconductor, Fermi Dirac distribution, Fermi-Dirac statistics and Boltzmann approximation to the Fermi-Dirac statistics, Carrier concentrations and Fermi levels in semiconductor, Generation and recombination of charges, Diffusion and continuity equation, Transport equations, Mass action Law, Hall effect.	8
II	JUNCTION DIODES - Formation of homogenous and heterojunction diodes and their energy band diagrams, Calculation of contact potential and depletion width, V-I characteristics, Small signal models of diode, Diode as a circuit element, Diode parameters and load line concept, C-V characteristics and dopant profile. Applications of diodes in rectifier, Clipping, Clamping circuits and voltage multipliers, Transient behavior of PN diode, Breakdown diodes, Schottky diodes, and Zener diode as voltage regulator, Construction, Characteristics and operating principle of UJT.	8
III	TRANSISTORS - Characteristics, Current components, Current gains: alpha and beta. Variation of transistor parameter with temperature and current level, Operating point, Hybrid model, DC model of transistor, h-parameter equivalent circuits. CE, CB and CC configuration. DC and AC analysis of single stage CE, CC (Emitter follower) and CB amplifiers AC & DC load line, Ebers-Moll model. Biasing & stabilization techniques. Thermal runaway, Thermal stability.	8
IV	JFET & MOSFET - Construction and operation, Noise performances of FET, Parasitic of MOSFET, Small signal models of JFET & MOSFET, Biasing of JFET's & MOSFET's, Low frequency single stage CS and CD (source follower) JFET amplifiers, FET as voltage variable resistor and FET as active load.	8
V	SMALL SIGNAL AMPLIFIERS AT LOW FREQUENCY - Analysis of BJT and FET multistage amplifier, DC and RC coupled amplifiers. Frequency response of single and multistage amplifier, mid-band gain, gains at low and high frequency. Analysis of DC and differential amplifiers, Miller's Theorem, use of Miller and bootstrap configuration. Cascade and cascode configuration of multistage amplifiers (CE-CE, CE-CB, CS-CS and CS-CD), Darlington pair.	8
	TOTAL	40

TEXT BOOKs:

1. Integrated Electronics, Millman Halkias, T.M.H, (2001)

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Electronic devices & circuits theory, R.L. Boylestad, Louis Nashelsky , Pearson education	1978
2	Electronic devices & circuits, David Bell, Oxford Publications	2009
3	M Rashid – Microelectronic circuits : Analysis & Design, Cengage learning	1999
4	Millman, Electronics Devices and Circuits, TMH	2010
5	Electronic Devices,7e, Floyd, Pearson	2008
6	A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing	1991

3EC2A DATA STRUCTURES & ALGORITHMS

B.Tech. (EC) 3rd Sem.
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	DEFINITION & CHARACTERISTICS OF ALGORITHMS – Structures, Difficulties in estimating exact execution time of algorithms, Concept of complexity of program, Asymptotic notations: Big-Oh, theta, Omega-Definitions and examples, Determination of time and space complexity of simple algorithms without recursion, Representing a function in asymptotic notations viz $5n^2-6n=\theta(n^2)$ ARRAYS: Array as storage element, Row major & column major form of arrays, computation of address of elements of n dimensional array.	6
II	ARRAYS AS STORAGE ELEMENTS for representing polynomial of one or more degrees for addition & multiplication, Sparse matrices for transposing & multiplication, stack, queue, Dequeue, Circular queue for insertion and deletion with condition for over and underflow, Transposition of sparse matrices with algorithms of varying complexity (Includes algorithms for operations as mentioned). EVALUATION OF EXPRESSION - Concept of precedence and associativity in expressions, Difficulties in dealing with infix expressions, Resolving precedence of operators and association of operands, Postfix & prefix expressions, conversion of expression from one form to other form using stack (with & without parenthesis), Evaluation of expression in infix, postfix & prefix forms using stack. Recursion.	10
III	LINEAR LINKED LISTS - Singly, doubly and circularly connected linear linked lists- insertion, Deletion at/ from beginning and any point in ordered or unordered lists, Comparison of arrays and linked lists as data structures Linked implementation of stack, queue and de-queue, Algorithms for of insertion, deletion and traversal of stack, Queue, Dequeue implemented using linked structures. Polynomial representation using linked lists for addition, Concepts of Head Node in linked lists SEARCHING - Sequential and binary search	8
IV	NON-LINEAR STRUCTURES - Trees definition, Characteristics concept of child, Sibling, Parent child relationship etc, Binary tree: different types of binary trees based on distribution of nodes, Binary tree (threaded and unthreaded) as data structure, insertion, Deletion and traversal of binary trees, constructing binary tree from traversal results. Threaded binary Tree. Time complexity of insertion, deletion and traversal in threaded and ordinary binary trees. AVL tree: Concept of balanced trees, balance factor in AVL trees, insertion into and deletion from AVL tree, balancing AVL tree after insertion and deletion. Application of trees for representation of sets.	9
V	GRAPHS - Definition, Relation between tree & graph, directed and undirected graph, representation of graphs using adjacency matrix and list. Depth first and breadth first traversal of graphs, Finding connected components and spanning	7

	tree. Single source single destination shortest path algorithms SORTING - Insertion, quick, Heap, Topological and bubble sorting algorithms for different characteristics of input data. Comparison of sorting algorithms in term of time complexity. Note: 1. Algorithm for any operation mentioned with a data structure or required to implement the particular data structure is included in the curriculum.	
	TOTAL	40

Text Books:

1. Malik – Data structures using C++, Cengage Learning (2010)

References Books:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Drozdek – Data structures and algorithms in C++ , Cengage learning	2013
2	An introduction to data structures with applications By Jean-Paul Tremblay, P. G. Sorenson, TMH	1984
3	Data Structures in C/C++, Horowitz, Sawhney, Galgotia	2001
4	Gilberg & Forouzan – Data structures: A pseudocode approach with c, Cengage learning	2004
5	Data Structures in C/C++, Tanenbaum, Pearson	2014
6	Data Structures in C++, Weiss, Parson	1992

3EC3A DIGITAL ELECTRONICS

B.Tech. (EC) 3rd semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	NUMBER SYSTEMS, BASIC LOGIC GATES & BOOLEAN ALGEBRA - Binary Arithmetic & Radix representation of different numbers. Sign & magnitude representation, Fixed point representation, complement notation, various codes & arithmetic in different codes & their inter conversion. Features of logic algebra, postulates of Boolean algebra, Theorems of Boolean algebra. Boolean function. Derived logic gates: Exclusive-OR, NAND, NOR gates, their block diagrams and truth tables. Logic diagrams from Boolean expressions and vice-versa, Converting logic diagrams to universal logic. Positive, Negative and mixed logic, Logic gate conversion.	8
II	DIGITAL LOGIC GATE CHARACTERISTICS - TTL logic gate characteristics. Theory & operation of TTL NAND gate circuitry. Open collector TTL. Three state output logic. TTL subfamilies. MOS & CMOS logic families, Realization of logic gates in RTL, DTL, ECL, C-MOS & MOSFET, Interfacing logic families to one another.	6
III	MINIMIZATION TECHNIQUES - Minterm, Maxterm, Karnaugh Map, K-map upto 4 variables, Simplification of logic functions with K-map, conversion of truth tables in POS and SOP form. Incomplete specified functions, Variable mapping. Quinn-Mc Klusky minimization techniques.	10
IV	COMBINATIONAL SYSTEMS - Combinational logic circuit design, half and full adder, subtractor. Binary serial and parallel adders. BCD adder. Binary multiplier. Decoder: Binary to Gray decoder, BCD to decimal, BCD to 7-segment decoder. Multiplexer, Demultiplexer, Encoder. Octal to binary, BCD to excess-3 encoder. Diode switching matrix. Design of logic circuits by multiplexers, encoders, decoders and demultiplexers.	8
V	SEQUENTIAL SYSTEMS - Latches, Flip-flops, R-S, D, J-K, Master Slave flip flops. Conversions of flip-flops, Counters: Synchronous & Asynchronous ripple and decade counters, Modulus counter, Skipping state counter, Counter design, State diagrams and state reduction techniques, Ring counter, Counter applications, Registers: Buffer register, Shift register.	8
	TOTAL	40

TEXT BOOKs:

1. Digital integrated electronics, By Herbert Taub, Donald L. Schilling, TMH (2004)
2. Digital Logic and Computer Design By M. Morris Mano, Pearson(1979)

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Ghoshal – Digital Electronics, Cengage Learning	2012
2	Roth – Fundamentals of Logic design, Cengage learning	2014
3	Pulse and digital Switching waveforms By Millman Taub, TMH	1984
4	Fundamentals of Digital circuits, A. Anand kumar, PHI	2009
5	Leach, Digital Principles and Applications, TMH	1995
7	Digital Electronics: Principles and Integrated Circuits, Maini, Wiley	2007

3EC4A CIRCUIT ANALYSIS & SYNTHESIS

B.Tech. (EC) 3rd sem.
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	NETWORK THEOREMS AND ELEMENTS - Thevenin's, Norton's, Reciprocity, Superposition, Compensation, Miller's, Tellegen's and maximum power transfer theorems. Networks with dependent sources. Inductively coupled circuits – mutual inductance, coefficient of coupling and mutual inductance between portions of same circuits and between parallel branches. Transformer equivalent, inductively and conductively coupled circuits.	8
II	TRANSIENTS ANALYSIS - Impulse, Step, Ramp and sinusoidal response analysis of first order and second order circuits. Time domain & transform domain (frequency, Laplace) analysis. Initial and final value theorems. Complex periodic waves and their analysis by Fourier analysis. Different kind of symmetry. Power in a circuit.	7
III	NETWORK FUNCTIONS - Terminals and terminal pairs, Driving point impedance transfer functions, Poles and zeros, Restrictions on pole and zero location in s-plane. Time domain behavior from pole and zero plot, Procedure for finding network functions for general two terminal pair networks, Stability & causality, Hurwitz polynomial, positive real function.	9
IV	TWO PORT NETWORKS - Two Port General Networks: Two port parameters (impedance, admittance, hybrid, ABCD and S parameters) and their inter relations. Equivalence of two ports. Transformer equivalent, interconnection of two port networks. The ladder network, image impedance, image transfer function, application to L-C network, attenuation and phase shift in symmetrical T and pi networks.	6
V	NETWORK SYNTHESIS - The four-reactance function forms, specification for reactance function. Foster form of reactance networks. Cauer form of reactance networks Synthesis of R-L and R-C and L-C networks in Foster and Cauer forms.	10
	TOTAL	40

TEXT BOOKs:

1. Network Analysis & Synthesis, Kuo, Wiley (2006)

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Circuits And Networks: Analysis And Synthesis, Sudhakar, TMH	2006
2	Sivanagaraju – Electrical circuit analysis, Cengage learning	2009
3	Robbins – Circuit analysis : Theory and Practice, Cengage Learning	2012
4	Electrical Networks, Singh, TMH	2009
5	Electric Circuits, Nilsson, Pearson	2009
6	Linear Circuits Analysis, Decarlo, Oxford	2007
7	Basic Engineering Circuit Analysis, Irwin, Wiley	2010
8	Network Theory: Analysis And Synthesis, Smarjit Ghosh, PHI	2005
9	Electric Circuit Analysis, Xavier, S.P. Eugene, New Age	2007

3EC5A ELECTROMAGNETIC PROPERTIES OF MATERIALS**B.Tech. (EC) 3rd Sem.****Max. Marks: 100****3L+0T****Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	DIELECTRICS MATERIALS - Introduction, Polarization, Polarizability, Different types of polarization, Electronic, ionic, Orientation and space polarization, frequency and temperature dependence of different polarization, Dielectric loss and loss tangent, energy store and loss in dynamic polarization, Phenomenon of spontaneous polarization and ferro-electricity, Ferroelectric hysteresis loop, Piezoelectricity, piezoelectric materials: Quartz, Rochelle salt and PZT, Applications of dielectrics.	7
II	MAGNETIC MATERIALS - Introduction, magnetization, theory of Dia, Para, Ferro- Ferrimagnetism and antiferromagnetism, Weiss field and magnetic domains, BH hysteresis loop, soft and hard magnetic materials and their applications, magnetic energy. Magnetostriction, giant magnetostriction resistor (GMR) and engineering applications of it. Magnetic spin, new electronic devices based on magnetic spin	8
III	SEMI CONDUCTOR MATERIALS - Introduction, Energy band gap structures of semiconductors, Classifications of semiconductors, Degenerate and non-degenerate semiconductors, Direct and indirect band gap semiconductors, Electronic properties of Silicon, Germanium, Compound Semiconductor, Gallium Arsenide, Gallium phosphide & Silicon carbide, Variation of semiconductor conductivity, resistance and bandgap with temperature and doping. Thermistors, Sensitors.	9
IV	CONDUCTIVE & SUPERCONDUCTIVE MATERIALS - Electrical properties of conductive and resistive materials. , Energy bandgap structures of metals, resistivity of conductors and multiphase solids, Matthiessen's rule, Important characteristics and electronic applications of specific conductor & resistance materials, Superconductor phenomenon, Type I and Type II superconductors. Theory of superconductors, High temperature superconductors and their applications.	8
V	NANOMATERIALS - Introduction, Change in band structure at nano-stage. Structure of Quantum dots (nano-dots) & Quantum wires, Fabrication & Characterization of nanomaterials, Structure of single wall and multi-wall carbon nanotube (CNT), Change in electrical, Electronic and optical properties at nano stage, Potential applications of nano materials.	8
	TOTAL	40

TEXT BOOKs:

1. Kasap, Principles of Electronic Materials and Devices, TMH (2005).
2. Robert M Rose, Lawrence A. Shepard and Jhon Wulff, The structure and peroperties of materials vol.4 (Electronic properties), Willey Eastern University press. (2011)

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Askeland – The science and engineering of materials, Cengage learning	2005
2	Electronic Materials and Processes, Kaul Bhan & Jain, Genius publications	2013
3	Allison, Principles of Electronic Materials and Devices, TMH	2005
4	Neamen, Semiconductor Physics and Devices, TMH	2009
5	Guozhong Cao, Ying Wang Nanostructures and Nanomaterials Synthesis, Properties and Applications, World Scientific Series in Nanoscience and Nanotechnology	2011
6	Dekker, Electrical properties of materials	1995

3EC6A ADVANCED ENGINEERING MATHEMATICS I

B.Tech. (EC) 3rd Sem.
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	LAPLACE TRANSFORM - Laplace transform with its simple properties, applications to the solution of ordinary and partial differential equations having constant co-efficients with special reference to the wave and diffusion equations.	6
II	FOURIER SERIES & Z TRANSFORM – Expansion of simple functions in fourier series. Half range series, Change of intervals, Harmonic analysis. Z TRANSFORM - Introduction, Properties, Inverse Z Transform.	9
III	FOURIER TRANSFORM - Complex form of Fourier Transform and its inverse, Fourier sine and cosine transform and their inversion. Applications of Fourier Transform to solution of partial differential equations having constant co-efficient with special reference to heat equation and wave equation.	8
IV	COMPLEX VARIABLES - Analytic functions, Cauchy-Riemann equations, Elementary conformal mapping with simple applications, Line integral in complex domain, Cauchy's theorem. Cauchy's integral formula.	9
V	COMPLEX VARIABLES -Taylor's series Laurent's series poles, Residues, Evaluation of simple definite real integrals using the theorem of residues. Simple contour integration.	8
TOTAL		

TEXT BOOKS

1. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley (2010)
2. Engineering Mathematics: A Foundation for Electronic, Electrical, Communications and Systems Engineers, 3/e Croft, Pearson (2009)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Datta – Mathematical methods of science and engineering, Cengage Learning	2006
2	O'neil – Advanced engineering mathematics, Cengage learning	2012
3	Engineering Mathematics, T Veerarajan, TMH	2005
4	Advance Engineering Mathematics, Potter, Oxford	2005
5	Mathematical Methods, Dutta, D., New Age	2006
6	Elementary Number Theory with applications: Thomas Koshy, 2 nd Ed., Elsevier.	2007
7	Engineering Mathematics III By Prof. K.C. Sarangi and others, Genius publications	2013
8	Engineering Mathematics, Babu Ram, Pearson	2009

3EC7A ELECTRONIC INSTRUMENTATION WORKSHOP

B.Tech. (EC) 3rd Sem.

Max. Marks: 75

2P

Exam: 3 H

S.No.	Contents
1	Identification, Study & Testing of various electronic components : (a) Resistances-Various types, Colour coding (b) Capacitors-Various types, Coding, (c) Inductors (d) Diodes (e) Transistors (f) SCRs (g) ICs (h) Photo diode (i) Photo transistor (j) LED (k) LDR (l) Potentiometers .
2	Study of symbols for various Electrical & Electronic Components, Devices, Circuit functions etc.
3	To study and perform experiment on CRO demonstration kit.
4	Soldering & Desoldering practice.
5	To Design & fabricate a PCB for a Regulated power supply. Assemble the Regulated power supply using PCB and test it.
6	To study and plot the characteristics of following Opto-Electronic devices –(a) LED (b) LDR (C) Photovoltaic cell (d) Opto-coupler (e) Photo diode (f) Photo transistor (g) Solar cell
7	To study the specifications and working of a Transistor radio (AM & FM) kit and perform measurements on it.
8	To study the specifications and working of a Public address System.
9	To prepare design layout of PCBs using software tools.
10	To fabricate PCB and testing of electronics circuit on PCB.
11	To design and test Switch Mode Power Supply using ICs
12	To study the specifications and working of a DVD Player.
13	To study the specifications and working of LCD TV.
14	To study the specifications and working of LED TV.

3EC8A COMPUTER PROGRAMMING LAB-I

B.Tech. (EC) 3rd Sem.

Max. Marks: 75

2P

Exam: 3 H

S.No.	Contents
1	Write a simple C program on a 32 bit compiler to understand the concept of array storage, size of a word. The program shall be written illustrating the concept of row major and column major storage. Find the address of element and verify it with the theoretical value. Program may be written for arrays upto 4-dimensions.
2	Simulate a stack, queue, circular queue and dequeue using a one dimensional array as storage element. The program should implement the basic addition, deletion and traversal operations.
3	Represent a 2-variable polynomial using array. Use this representation to implement addition of polynomials.
4	Represent a sparse matrix using array. Implement addition and transposition operations using the representation.
5	Implement singly, doubly and circularly connected linked lists illustrating operations like addition at different locations, deletion from specified locations and traversal.
6	Repeat exercises 2, 3 & 4 with linked structures.
7	Implementation of binary tree with operations like addition, deletion, traversal.
8	Depth first and breadth first traversal of graphs represented using adjacency matrix and list.
9	Implementation of binary search in arrays and on linked Binary Search Tree.
10	Implementation of insertion, quick, heap, topological and bubble sorting algorithms.

3EC9A ELECTRONIC DEVICE LAB**B.Tech. (EC) 3rd Sem.****Max. Marks: 75****2P****Exam: 3 H**

S.No.	Contents
1	Study the following devices: (a) Analog & digital multimeters (b) Function/ Signal generators (c) Regulated d. c. power supplies (constant voltage and constant current operations) (d) Study of analog CRO, measurement of time period, amplitude, frequency & phase angle using Lissajous figures.
2	Plot V-I characteristic of P-N junction diode & calculate cut-in voltage, reverse Saturation current and static & dynamic resistances.
3	Plot V-I characteristic of zener diode and study of zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.
4	Plot frequency response curve for single stage amplifier and to determine gain bandwidth product
5	Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of I_{dss} & V_p
6	Application of Diode as clipper & clamper
7	Plot gain- frequency characteristic of two stage RC coupled amplifier & calculate its bandwidth and compare it with theoretical value.
8	Plot gain- frequency characteristic of emitter follower & find out its input and output resistances.
9	Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h-parameters
10	Study half wave rectifier and effect of filters on wave. Also calculate theoretical & practical ripple factor.
11	Study bridge rectifier and measure the effect of filter network on D.C. voltage output & ripple factor.

3EC10A DIGITAL ELECTRONICS LAB

B.Tech. (EC) 3th Sem.

Max. Marks: 75

2P

Exam: 3 H

S.No.	Contents
1	To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR. Also to verify the truth table of Ex-OR, Ex-NOR (For 2, 3, & 4 inputs using gates with 2, 3, & 4 inputs).
2	To verify the truth table of OR, AND, NOR, Ex-OR, Ex-NOR realized using NAND & NOR gates.
3	To realize an SOP and POS expression.
4	To realize Half adder/ Subtractor & Full Adder/ Subtractor using NAND & NOR gates and to verify their truth tables
5	To realize a 4-bit ripple adder/ Subtractor using basic Half adder/ Subtractor & basic Full Adder/ Subtractor.
6	To verify the truth table of 4-to-1 multiplexer and 1-to-4 demultiplexer. Realize the multiplexer using basic gates only. Also to construct and 8-to-1 multiplexer and 1-to-8 demultiplexer using blocks of 4-to-1 multiplexer and 1-to-4 demultiplexer
7	Design & Realize a combinational circuit that will accept a 2421 BCD code and drive a TIL -312 seven-segment display
8	Using basic logic gates, realize the R-S, J-K and D-flip flops with and without clock signal and verify their truth table.
9	Construct a divide by 2, 4 & 8 asynchronous counter. Construct a 4-bit binary counter and ring counter for a particular output pattern using D flip flop.
10	Perform input/output operations on parallel in/Parallel out and Serial in/Serial out registers using clock. Also exercise loading only one of multiple values into the register using multiplexer. Note: As far as possible, the experiments shall be performed on bread board. However experiment Nos. 1-4 are to be performed on bread board only

3EC11A BUSINESS ENTREPRENEURSHIP**B.Tech. (EC) 3th Sem.****Max. Marks: 50****2 P****Exams: 3 H**

S.No.	Contents
1	INTRODUCTION TO ENTREPRENEURSHIP - Concept and need, Entrepreneurship and innovation, Entrepreneurship and economic growth.
2	ENTREPRENEURIAL COMPETENCIES - Leadership, Decision making, Motivation, Risk taking.
3	BUSINESS ENTERPRISE PLANNING - Identification of business opportunity, Idea generation, Demand estimation, Preparation of project report, Feasibility analysis.
4	INTELLECTUAL PROPERTY RIGHTS, PATENTS, TAXATION - Central excise & Sales tax, VAT.
5	GOVERNMENT POLICIES - for Entrepreneurs, Entrepreneurial career opportunities for Engineers, case studies.

TEXT BOOKS:

1. Rajeev Roy – Entrepreneurship Oxford Uni.. (2009)

REFERENCES BOOKS:

1. Bouchoux – Intellectual property: trademarks, copyrights, patents and trade secrets, Cengage learning. (2008)
2. Daft – Leadership, Cengage learning. (2014)
3. Kuratko/Rao – Entrepreneurship : A South asian perspective, Cengage learning. (2012)

4EC1A ANALOG ELECTRONICS

B.Tech. (EC) 4th semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	FEEDBACK AMPLIFIERS - Classification, Feedback concept, Feedback Topologies, Transfer gain with feedback, General characteristics of negative feedback amplifiers. Analysis of voltage-series, voltage-shunt, current-series and current-shunt feedback amplifier. Stability criterion. Compensation techniques, miller compensation.	9
II	OSCILLATORS & Multivibrators - Classification. Criterion for oscillation. Tuned collector, Hartley, Colpitts, RC Phase shift, Wien bridge and crystal oscillators, Astable, monostable and bistable multivibrators. Schmitt trigger. Blocking oscillators.	7
III	HIGH FREQUENCY AMPLIFIERS - Hybrid Pi model, Conductances and capacitances of hybrid Pi model, high frequency analysis of CE amplifier, gain bandwidth product, unity gain frequency f_T , Emitter follower at high frequencies.	8
IV	TUNED AMPLIFIER - Band Pass Amplifier, Parallel resonant Circuits, Band Width of Parallel resonant circuit. Analysis of Single Tuned Amplifier, Primary & Secondary Tuned Amplifier with BJT & FET, Double Tuned Transformer Coupled Amplifier. Stagger Tuned Amplifier. Pulse Response of such Amplifier, class C tuned amplifiers, Shunt Peaked Circuits for Increased Bandwidth.	7
V	POWER AMPLIFIERS - Classification, Power transistors & power MOSFET (DMOS, VMOS). Output power, power dissipation and efficiency analysis of Class A, class B, class AB, class C, class D and class E amplifiers as output stages. Pushpull amplifiers with and without transformers, Complementary symmetry & quasi complimentary symmetry amplifiers	9
	TOTAL	40

TEXT BOOK

1. Millman, Integrated Electronics, TMH.(1972)
2. A. S. Sedra, Kenneth C. Smith, Microelectronic Circuits, Oxford University Press.(2007)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	M. H. Rashid, Microelectronic Circuits Analysis and Design, Cengage Learning	2010
2	Electronic Devices and Circuits–II, R.Tiwari, Genius publications	2013
3	Salivahnan, Electronics Devices and Circuits, TMH.	1998
4	Fundamentals of Analog Circuits 2e, Floyd, Pearson	2012
5	David A. BELL, Electronic Devices and Circuits, Oxford University Press.	2009

4EC2A RANDOM VARIABLES & STOCHASTIC PROCESSES

B.Tech. (EC) 4th semester
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	PROBABILITY - Introduction, definitions, conditional probability, combined experiments.	7
II	RANDOM VARIABLES - Introduction, Distribution and density functions, Discrete and continuous random variables, (Gaussian), Exponential, Rayleigh, Uniform, Bernoulli, Binominal, Poisson, discrete Uniform and conditional distributions. Functions of one random variable: distribution, mean, variance, moments and characteristics functions.	8
III	MULTIPLE RANDOM VARIABLES - distributions, Pn function of two random variables, Two functions of two random variables, Joint moments, Joint characteristics functions, Conditional distributions, conditional expected values, statistical independence. Multiple random variables: multiple functions of multiple random variables, jointly Gaussian random variables, sums of random variable, Central limit theorem.	9
IV	STOCHASTIC PROCESSES - Definitions, Random process concept, Statistics of stochastic processes: mean, autocorrelation, strict and wide sense stationary, random processes and Linear Systems.	7
V	STOCHASTIC PROCESSES IN FREQUENCY DOMAIN - Power spectrum of stochastic processes, Transmission over LTI systems, Gaussian and White processes, Properties of power spectral density.	9
	TOTAL	40

TEXT BOOK

1. Probability, Random Variables And Stochastic Processes, Papoulis, TMH (2002)
2. Stochastic Processes, 2ed, Ross, Wiley.(1996)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Devore – Probability and statistics for engineering and sciences, Cengage learning	2011
2	Mendenhall – Introduction to probability and statistics, Cengage learning	2012
3	Probability, Random Variables And Random Signal Principles, Peebles, TMH	2002
4	Probability Theory and Stochastic Processes for Engineers, Bhat, Pearson	2011
5	Probability and Random Processes with Application to Signal Processing, 3/e, Stark, Pearson	2002
6	Random Variables & Stochastic Processes, Gaur and Srivastava, Genius publications	2003
7	Random Processes: Filtering, Estimation and Detection, Ludeman, Wiley	2002
8	An Introduction to Probability Theory & Its App., Feller, Wiley	1969

4EC3A ELECTRONIC MEASUREMENT & INSTRUMENTATION

B.Tech. (EC) 4th Sem.
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	THEORY OF ERRORS - Accuracy & precision, Repeatability, Limits of errors, Systematic & random errors, Modeling of errors, Probable error & standard deviation, Gaussian error analysis, Combination of errors.	7
II	ELECTRONIC INSTRUMENTS - Electronic Voltmeter, Electronic Multimeters, Digital Voltmeter, and Component Measuring Instruments: Q meter, Vector Impedance meter, RF Power & Voltage Measurements, Introduction to shielding & grounding.	9
III	OSCILLOSCOPES - CRT Construction, Basic CRO circuits, CRO Probes, Techniques of Measurement of frequency, Phase Angle and Time Delay, Multibeam, multi trace, storage & sampling Oscilloscopes.	6
IV	SIGNAL GENERATION AND SIGNAL ANALYSIS - Sine wave generators, Frequency synthesized signal generators, Sweep frequency generators. Signal Analysis - Measurement Technique, Wave Analyzers, and Frequency - selective wave analyser, Heterodyne wave analyser, Harmonic distortion analyser, and Spectrum analyser.	8
V	TRANSDUCERS - Classification, Selection Criteria, Characteristics, Construction, Working Principles and Application of following Transducers:- RTD, Thermocouples, Thermistors, LVDT, Strain Gauges, Bourdon Tubes, Seismic Accelerometers, Tachogenerators, Load Cell, Piezoelectric Transducers, Ultrasonic Flow Meters.	10
	TOTAL	40

TEXT BOOK

1. Electronic Instrument and Measurment, Bell, Oxford .(2007)
2. Electronic Measurements & Instrumentation, Bernard Oliver, TMH.(1971)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Electronic Instrumentation, H S Kalsi, TMH	2012
2	Instrumentation Measurement & Analysis, B.C.Nakra,K.K. Chaudhry, TMH	2004
3	Electronic Measurements and Instrumentation, Gupta & Soni, Genius pub.	2014
4	Electronic Measurements & Instrumentation, Bernard Oliver, John Cage, TMH	1971
5	Electronic Measurements and Instrumentation, Lal Kishore, Pearson	2010
6	Elements of Electronic Instrumentation And Measurement, Carr, Pearson	1996
7	Instrumentation for Engineering Measurements, 2ed, Dally, Wiley	1993
8	Introduction To Measurements and Instrumetation, Arun K. Ghosh, PHI	2012

4EC4A ELECTROMAGNETIC FIELD THEORY

B.Tech. (EC) 4th Sem.
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	INTRODUCTION - Vector Algebra, different Coordinate system, Relation in rectangular, cylindrical, spherical and general curvilinear coordinates system. Line, Surface and volume integral, Concept and physical interpretation of gradient, Divergence and curl. Divergence, Stoke's and Green's theorems.	6
II	ELECTROSTATICS - Electric field intensity & flux density (D). Electric field due to various charge configurations. Gauss's law, divergence of electric flux and Maxwell's first equation, The potential functions and gradient of electric potential. Maxwell curl equation for static electric field. Poisson's and Laplace's equation and their solution. Divergence of current density (J) and Continuity equation for current. Duality of J and D, Capacitance and electrostatics energy. Field determination by method of images, Boundary conditions, Field mapping and concept of field cells.	9
III	MAGNETOSTATICS - Bio-Savart's law, Ampere's circuital law Magnetic field intensity H, flux density B & magnetization M, their interrelation. Curl of H. Magnetic scalar and vector potential, Faraday's Law, self & mutual inductance, Energy stored in magnetic field, Boundary conditions, Analogy between electric and magnetic field, Field mapping and concept of field cells.	9
IV	TIME VARYING FIELDS - Displacement currents, displacement vector and equation of continuity. Maxwell's equations, Uniform plane wave in free space, dielectrics and conductors, Depth of penetration-skin effect, Sinusoidal time variations, Reflection & Refraction of Uniform Plane Wave, standing wave ratio. Pointing vector and power considerations.	9
V	RADIATION, EMI AND EMC - Retarded Potentials and concepts of radiation, Radiation from a small current element. Radiation Resistance: Introduction to Electromagnetic Interference and Electromagnetic compatibility, EMI error in equipments, EMI standard, EMI coupling modes, Methods of eliminating interference, shielding, grounding, conducted EMI, EMI testing: emission testing, susceptibility testing.	7
	TOTAL	40

TEXT BOOKs:

1. Sadiku, Electromagnetic Field Theory, Oxford .(2000)
2. Mahapatra, Principles of Electromagnetics, TMH.(2011)

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Kshetrimayum – Electromagnetic field theory, Cengage learning	2012
2	Hayt, Engineering Electromagnetics, TMH	2007
3	Jordan Balmain, Electromagnetic Field Theory and Radiations, PHI	1968
4	Kaduskar ,Principles of Electromagnetics, Wiley	2010
5	Reitz ,Foundations of Electromagnetic Theory, Pearson	2009
6	Seavganokar, Electromagnetic Waves, TMH	2005
7	Rao, Electromagnetic Field Theory and Transmission Lines, Wiley	2012
8	David K. Chang, Electromagnetic Field Theory, Pearson	1999

4EC5A OPTIMIZATION TECHNIQUES

B.Tech. (EC) 4th semester
3L+1T

Max. Marks: 100

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	INTRODUCTION - Historical development, engineering application of optimization, Formulation of design problems as a mathematical programming problem, Classification of optimization problems	8
II	LINEAR PROGRAMMING - Simplex methods, Revised simplex method, Duality in linear programming, post optimality analysis.	8
III	APPLICATIONS OF LINEAR PROGRAMMING - Transportation and assignment problems	6
IV	NON-LINEAR PROGRAMMING - Unconstrained optimization techniques, Direct search methods, Descent methods, Constrained optimization, Direct and Indirect methods.	10
V	DYNAMIC PROGRAMMING - Introduction, multi-decision processes, computational procedure	8
	TOTAL	40

TEXT BOOK

1. Albright - Data analysis, optimization and simulation modeling, Cengage learning .(2011)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Hiller and Lieberman, Introduction to Operation Research (Seventh Edition),TMH	2010
2	Prasad – Operations Research, Cengage learning	2011
3	Ravindren Philips and Solberg, Operation Research Principles and Practice (Second Edition), Wiley	2007
4	Anderson – An introduction to management science, quantitative approaches to decision making, Cengage learning	2012

4EC6A ADVANCED ENGINEERING MATHEMATICS-II**B.Tech. (EC) 4th semester**
3L+1T**Max. Marks: 100**
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	NUMERICAL ANALYSIS- Finite differences – Forward, Backward and Central differences. Newton's forward and backward differences, interpolation formulae. Stirling's formula, Lagrange's interpolation formula.	6
II	NUMERICAL ANALYSIS- Integration-Trapezoidal rule, Simpson's one third and three-eighth rules. Numerical solution of ordinary differential equations of first order - Picard's method, Euler's and modified Euler's methods, Milne's method and Runge-Kutta fourth order method, Differentiation.	8
III	SPECIAL FUNCTIONS – Bessel's functions of first and second kind, simple recurrence relations, orthogonal property of Bessel's, Transformation, Generating functions, Legendre's function of first kind. Simple recurrence relations, Orthogonal property, Generating function.	9
IV	STATISTICS AND PROBABILITY - Elementary theory of probability, Baye's IV theorem with simple applications, Expected value, theoretical probability distributions-Binomial, Poisson and Normal distributions. Lines of regression, co-relation and rank correlation.	9
V	CALCULUS OF VARIATIONS - Functional, strong and weak variations simple variation problems, the Euler's equation.	8
	TOTAL	40

TEXT BOOK

1. Advanced Engg. Mathematics, Irvin Kreyszig, Wiley .(2007)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Datta – Mathematical methods of science & engineering, Cengage learning	2012
2	O’neil – Advanced Engineering mathematics, Cengage learning	2007
3	Applied Statics & Probability, Montgomery, Wiley	2013
4	Engineering Mathematics, T Veerarajan, TMH	2011
5	Mathematical Techniques, Jordan, Oxford	2002
6	Engineering Mathematics IV, K.C. Sarangi and others, Genius publications	2011
7	Advance Engineering Mathematics, Potter, Oxford	2005
8	Advanced Engineering Mathematics, 2/e, Greenberg	1998

4EC7A COMPUTER PROGRAMMING LAB-II**B.Tech. (EC) 4th Sem.****Max. Marks: 100****2P****Exam: 3 H**

S.No.	Contents
Programs in C++	
1	Write a program to perform the complex arithmetic.
2	Write a program to perform the rational number arithmetic.
3	Write a program to perform the matrix operations. (Transpose, addition, subtraction, multiplication, test if a matrix is symmetric/ lower triangular/ upper triangular)
4	Implement Morse code to text conversion and vice-versa.
5	To calculate Greatest Common Divisor of given numbers.
6	To implement tower of Hanoi problem.
Program in Java	
7	To implement spell checker using dictionary.
8	To implement a color selector from a given set of colors.
9	To implement a shape selector from a given set of shapes.
10	To implement a calculator with its functionality.
11	By mapping keys to pens of different colors, implement turtle graphics.
12	To implement a graph and display BFS/DFS order of nodes.

4EC8A ANALOG ELECTRONICS LAB

B.Tech. (EC) 4th Sem.

Max. Marks: 100

2P

Exam: 3 H

S.No.	Contents
1	Plot gain-frequency characteristics of BJT amplifier with and without feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1kHz with and without negative feedback.
2	Study of series and shunt voltage regulators and measurement of line regulation and ripple factor.
3	Plot and study the characteristics of small signal amplifier using FET.
4	Study of push pull amplifier. Measure variation of output power & distortion with load.
5	Study Wein bridge oscillator and observe the effect of variation in R oscillator frequency
6	Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.
7	Study the following oscillators and observe the effect of variation of C on oscillator frequency: (a) Hartley (b) Colpitts
8	Design Fabrication and Testing of k-derived filters (LP/HP).
9	Study of a Digital Storage CRO and store a transient on it.
10	To plot the characteristics of UJT and UJT as relaxation.
11	To plot the characteristics of MOSFET and CMOS.

4EC9A MEASUREMENT & INSTRUMENTATION LAB**B.Tech. (EC) 4th Sem.****Max. Marks: 100****2P****Exam: 3 H**

S.No.	Contents
1	Measure earth resistance using fall of potential method.
2	Plot V-I characteristics & measure open circuit voltage & short circuit current of a solar panel
3	Measure unknown inductance capacitance resistance using following bridges (a) Anderson Bridge (b) Maxwell Bridge
4	To measure unknown frequency & capacitance using Wein's bridge.
5	Measurement of the distance with the help of ultrasonic transmitter & receiver.
6	Measurement of displacement with the help of LVDT.
7	Draw the characteristics of the following temperature transducers (a) RTD (Pt-100) (b) Thermistors.
8	Draw the characteristics between temperature & voltage of a K type thermocouple.
9	Calibrate an ammeter using D.C. slide wire potentiometer.
10	Measurement of strain/ force with the help of strain gauge load cell.
11	Study the working of Q-meter and measure Q of coils.
12	Calibrate a single-phase energy meter (Analog and Digital) by phantom loading at different power factor by: (i) Phase shifting transformer (ii) Auto transformer .

4EC10A HUMANITIES & SOCIAL SCIENCES**B.Tech. (EC) 4th Sem.****Max Marks: 50****2P****Exam: 3 H**

S.No.	Contents
1	India- Brief History of Indian Constitution- Framing, Features, Fundamental Rights, Duties.
2	Society- Social groups- Concept & Types, Socialization- Concept & Theory, Social Control- Concept, Social Problem in Contemporary India, Status & Role.
3	Microeconomics- Demand, Supply and Their elasticity's, Cardinal and Ordinal approach to consumption, Consumer Surplus, Laws of returns, Returns to scale, cost analysis
4	Macroeconomics- National Income, Money & Banking, Monetary & Fiscal policies, Unemployment, Inflation, Characteristics of Indian Economy.
5	Introduction to Industrial Psychology - Definitions & Scope Major influences on industrial Psychology- Scientific management and human relations schools Hawthorne Experiments. Individual in Workplace: Motivation and Job satisfaction, Stress management, Organizational culture, Leadership & group dynamics.

Textbook:

1. Schiller," Essential of Economics" Mc-Grew Hill, 2013
2. Miner J.B. Industrial/Organizational Psychology. N Y : McGraw Hill.(1992)

References Books:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Kaur – Micro ECON, Cengage learning	2012
2	McEachern/Indra – Macro ECON, Cengage Learning	2012
3	Lipsay "Economics" Oxford Press	2010

5EC1A SIGNALS AND SYSTEMS

B. Tech. (EC) 5th Sem.

Max. Marks: 100

3L + 1T

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction: Continuous time and discrete time signals and systems, Properties of systems.	3
	Linear time invariant systems- continuous time and discrete time. Properties of LTI systems and their block diagrams.	5
	Convolution, Discrete time systems described by difference equations.	1
II	Fourier series representation of signals: Fourier series representation of continuous periodic signal & its properties.	3
	Fourier series representation of Discrete periodic signal & its properties.	3
	Continuous time filters & Discrete time filters described by Diff. equation.	2
III	Fourier transform: The continuous time Fourier transform for periodic and non-periodic signals, Properties of CTFT.	4
	Discrete time Fourier transform for periodic and non-periodic signals Properties of DTFT.	4
IV	Z-transform & laplace transform: The region of convergence for the Z-transform. The Inverse Z-transform. Two dimensional Z transform.	3
	Properties of Z transform.	1
	Laplace transform: Properties of Laplace Transform,	2
	Application of Laplace transform to system analysis.	2
V	SAMPLING: Mathematical theory of sampling. Sampling theorem. Ideal & Real sampling.	2
	Interpolation technique for the reconstruction of a signal from its samples. Aliasing.	2
	Sampling in freq. domain. Sampling of discrete time signals.	3
	TOTAL	40

TEXT BOOKS

1. Signals And Systems, Oppenheim, Willsky, Nawab, PHI.(1992)
2. Signals And Systems M J Roberts, Mc-Graw Hill.(2004)

REFERENCE BOOKS

S.No.	Name of Authors /Books /Publisher	Publication year
1	Principles Of Linear Systems And Signals, 2e (Intl. Version), Lathi 2nd, Oxford	2002
2	Signal & Systems 3e, Chen 3rd, Oxford	2004
3	Fundamentals Of Signals And Systems, Wiley	2009
4	Signals And Systems, P Rao, Mc-Graw Hill	2011
5	Signals And Systems: A Simplified Approach, Ganesh Rao, 4e, Pearson	2012
6	Signals And Systems: Continuous And Discrete, Roger E Ziemer, 4e, PHI	1998
7	Signals And Systems, Ravi Kumar, PHI	2009
8	Signals & Systems, Iyer, Cengage Learning	2009

5EC2A LINEAR INTEGRATED CIRCUITS

B.Tech. (EC) 5th Sem.

Max. Marks: 100

3L+0T

Exam Hours: 3

Unit	Contents	Contact Hours
I	OPERATIONAL AMPLIFIERS: Basic differential amplifier analysis, Basic structure and principle of operation, Single ended and double ended configurations, calculation of differential gain, common mode gain, Op-amp configurations with feedback, Op-amp parameters, Inverting and Non-Inverting configuration, Comparators, Adder.	08
II	OPERATIONAL AMPLIFIER APPLICATIONS: Integrator, Differentiator, Voltage to frequency & Frequency to voltage converters. Oscillators: Phase shift, Wien bridge, Quadrature, precision rectifier, half and full wave rectifiers, square wave, triangular wave, sawtooth oscillators. Voltage controlled oscillators.	08
III	ACTIVE FILTERS: Low pass, high pass, band pass and band reject filters, All pass filter, Switched capacitor filter, Butterworth filter design, Chebyshev Filter design.	08
IV	LINEAR ICs: Four quadrant multiplier & its applications, Basic blocks of linear IC voltage regulators, Three terminal voltage regulators, Positive and negative voltage regulators, A/D and D/A converters, analog switches, The 555 timer as astable and monostable multivibrators. Zero crossing detector, Schmitt trigger and its applications.	08
V	Non- linear Applications of OP-AMP: log and antilog amplifiers, and multipliers. Solution of differential equation and analog computer PHASE-LOCKED LOOPS: Operating Principles of PLL, Linear Model of PLL, Lock range, Capture range, Applications of PLL as FM detector, FSK demodulator, AM detector, frequency translator, phase shifter, tracking filter, signal synchronizer and frequency synthesizer, Building blocks of PLL, LM 565 PLL.	08
TOTAL		40

TEXT BOOKS

S.No.	Name of Authors /Books /Publisher	Publication Year
1	OP-AMP and linear integrated circuits 2nd edition, PLHI by Ramakant A. Gayakwad.	1992
2	Design with operation amplifiers and Analog Integrated circuits by Sergei Franco.	2007
3	Integrated Electronics: Analog and Digital circuits & system by Millman & Halkias.	1972
4	Linear Integrated Circuits by D.R.Chaudhary (WEL).	2007

Reference Books:

1. Operational amplifier with linear integrated circuits, 4th edition, W.D. Stanley, Pearson.(2002)
2. Op Amps and Linear Integrated Circuits: Concepts and Applications, Fiore, Cengage learning (2010)

5EC3A TELECOMMUNICATION ENGINEERING

B.Tech. (EC) 5th Sem.

Max. Marks: 100

3L+0T

Exam Hours: 3

Unit	Contents	Contact Hours
I	TRANSMISSION LINE: Types of transmission lines, general transmission line equation, line constant, equivalent circuits, infinite line, and reflection on a line, SWR of line with different type of terminations. Distortion less and dissipation less lines, Coaxial cables, Transmission lines at audio and radio frequencies, Losses in transmission line, Characteristics of quarter wave, half wave and lines of other lengths.	08
II	TRANSMISSION LINE APPLICATIONS: Smith chart and its application. Transmission line applications, Impedance matching Network. Single & double Stub matching. Measurement of parameters of transmission line, measurement of attenuation, insertion loss, reflection coefficient and standing wave ratio.	08
III	ATTENUATORS & FILTERS: Elements of telephone transmission networks, symmetrical and Asymmetrical two port networks. Different Attenuators, π -section & T-section attenuators, stub matching, Transmission equalizers Filters, constant K-section, Ladder type, π -section, T-section filter, m-derived filter sections, Lattice filter section.	08
IV	TELEPHONY: Voice transmission, Two wire/ Four wire transmission, Multi-channel systems: Frequency division & time division multiplexing, Echo suppressors & cancellers, cross talk. Telephone set, Touch tone dial types, Numbering Concept for Telephony, Essentials of Traffic Engineering, Telephone Traffic Measurements, Subscriber loop Design.	08
V	Switching and Signaling for Analog and Digital Telephone Networks: Introduction to switching Concepts, De-generation, Availability and Grading, Principle of Electronic Exchange, EPABX and SPC Digital telephone Exchange, Facsimile services. Approaches to PCM Switching: Multistage switches, Time Switch, Space Switch, STS and TST Switches, Concept of Supervisory and AC signaling.	08
TOTAL		40

TEXT BOOKs:

1. Telecommunication System Engineering, Roger L. Freeman, Wiley (2004)
2. Telecommunication Switching Systems & Networks, Thiagrajan Vishwanathan, PHI(1994)

REFERENCE BOOKs:

S.No.	Name of Authors /Books /Publisher	Publication Year
1.	Introduction to Telecommunications, Gokhale ,Cengage learning	2011
2.	Telecommunication, W.Fraser., PHI	1970
3.	Digital Telephony, Bellamy, Wiley.	2000
4.	Schaum's Outline of Theory and Problems of Transmission Lines,TMH.	2007
5.	Transmission Lines and Networks, Umesh Sinha, Satya Prakashan.	2010
6.	E.Keiser&E.Strange, Digital Telephony and Network Integration, (2/e), Van Nostrand,.	1995
7.	Principles of Telephony, N.N. Biswas, Sangam Books Limited.	1993
8.	Transmission Lines and Networks, Umesh Sinha, Satya Prakashan	
9.	Telecommunications Switching, Traffic and Networks, J.E. Flood, Pearson	

5EC4A ANALOG COMMUNICATION

B.Tech. (EC) 5th Sem.

Max. Marks: 100

3L+1T

Exam: 3 Hours

Unit	Contents	Contact Hours
I	NOISE EFFECTS IN COMMUNICATION SYSTEMS: Representation of Band Limited and Band Pass Process, Noise Sources and Classification, Resistor noise, Networks with reactive elements, Noise temperature, Noise bandwidth, effective input noise temperature, Noise figure. Noise figure & equivalent noise temperature in cascaded circuits. Narrow band Noise Representation.	08
II	AMPLITUDE MODULATION: Frequency translation, Single Tone Modulation, Recovery of base band signal, Spectrum & power relations in AM systems. Methods of Modulation & Demodulation of AM-DSB, DSB-SC and SSB signals. AM Broadcast Transmitters & Receivers, Single Sideband Transmission and Reception, Super heterodyne receivers, Vestigial Sideband Modulation.	09
III	FREQUENCY MODULATION: Phase & freq. modulation & their relationship, Spectrum & band width of a Sinusoidal modulated FM signal, Phasor diagram, Narrow band & wide band FM. Generation & demodulation of FM signals. Effect of Channel Non-Linearity, Comparison of AM, FM & PM, Threshold in FM, PLL demodulator. FM Broadcasting transmitters & Receivers.	08
IV	NOISE IN AM AND FM: Noise in CW modulation systems, SNR calculations for synchronous detection of DSB and SSB and envelope detection of AM, SNR calculations for angle modulation system, Pre-emphasis and de-emphasis, Threshold effect, Noise in Communication subsystems - Internal and external noise.	08
V	PULSE ANALOG MODULATION: Practical aspects of sampling: Natural and flat top sampling. Reconstruction, PAM, PWM, PPM modulation and demodulation methods, Noise Performance of Pulse Analog Modulation Systems.	07
TOTAL		40

TEXT BOOKs:

1. Analog Communications Systems, P RamaKrishna Rao, Mc Graw Hill (2008)
2. Communications Systems, 5ed-, Haykins, Wiley (2009)

REFERENCE BOOKs:

S.No.	Name of Authors /Books /Publisher	Year of Publication
1	Principles of Communication Systems, Herbert Taub, Donald Schilling, Goutam Saha, TMH	2009
2	Analog and Digital Communication, Schum Series, TMH	2006
3	Digital & Analog Communication Systems, Leon W. Couch, Pearson	2013
4	Analog & Digital Communication Systems, Singal, TMH	2001
5	An Introduction To Analog & Digital Communications, Haykins, Wiley	2009
6	Electronic Communication Systems-, Kennedy Devis, TMH	1999
7	Digital And Analog Communication Systems, Shanmugam, Wiley	1994
8	Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education	2002
9	Electronic Communication Systems, Blake, Cengage learning	2006

5EC5A MICROWAVE ENGINEERING – I**B.Tech. (EC) 5th semester
3L+0T****Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	MICROWAVE TRANSMISSION LINES: Introduction of Microwaves and their applications. Rectangular Waveguides: TE and TM wave solutions, Field patterns, Wave impedance and Power flow.	5
	PLANAR TRANSMISSION LINES: Stripline and microstrip lines – Dominant mode of propagation, Field patterns, Characteristic impedance, Basic design formulas and characteristics. Parallel coupled striplines and microstrip lines- Even- and odd- mode excitations. Slot lines and Coplanar lines. Advantages over waveguides.	5
II	MICROWAVE NETWORK ANALYSIS: Impedance and Admittance matrices, Scattering matrix, Parameters of reciprocal and Loss less networks, ABCD Matrix, Scattering matrices of typical two- port, three-port and four-port networks, Conversion between two- port network matrices.	8
	MICROWAVE PASSIVE COMPONENTS: Waveguide Components: <i>E</i> - plane and <i>H</i> - plane Tees, Magic Tee, Shorting plunger, Directional couplers, and Attenuator.	4
III	Stripline and Microstrip line Components: Open and shorted ends. Half wave resonator, Lumped elements (inductors, capacitors and resistors) in microstrip. Ring resonator, 3-dB branchline coupler, backward wave coupler, Wilkinson power dividers and rat- race hybrid ring. Low pass and band pass filters.	5
IV	MICROWAVE MEASUREMENTS: Detection of microwaves, Microwave power measurement, Impedance measurement, Measurement of reflection loss (VSWR), and transmission loss in components. Passive and active circuit measurement & characterization using network analyser, spectrum analyser and noise figuremeter.	6
V	MICROWAVE INTEGRATED CIRCUIT TECHNOLOGY: Substrates for Microwave Integrated Circuits (MICs) and their properties. Hybrid technology – Photolithographic process, deposited and discrete lumped components. Microwave Monolithic Integrated Circuit (MMIC) technology- Substrates, MMIC process, comparison with hybrid integrated circuit technology (MIC technology).	7
	TOTAL	40

TEXT BOOKS

1. A. Das and S. Das, Microwave Engineering, Tata McGraw-Hill, 2000.
2. D. M. Pozar, *Microwave Engineering*, John Wiley & Sons, 1998. (Use the latest version)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	B. Bhat and S. K. Koul, Stripline-like Transmission Lines for Microwave Integrated Circuits, Wiley Eastern Ltd.,	1989
2	T. C. Edwards, Foundations for Microstrip Circuit Design, John Wiley & Sons.,	1981
3	K. C. Gupta, R. Garg, I.Bahl and P. Bhartia, Microstrip Lines and Slotlines, Second Edition, Artech House	1996
4	K.C Gupta, Microwaves, Wiley Eastern Ltd.	1979
5	P.A. Rizzi, Microwave Engineering- Passive Circuits, Prentice Hall,.	1988
6	Robert E. Collin, Foundations for microwave engineering 2ed	2012
7	Microwave Engineering , Raghuvanshi,Cengage learning	

SEC6.1A BIOMEDICAL INSTRUMENTATION

B.Tech. (EC) 5th Sem
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	HUMAN BODY SUBSYSTEMS- Brief description of neural, muscular, cardiovascular and respiratory systems; their electrical, mechanical and chemical activities.	3
	TRANSDUCERS AND ELECTRODES- Principles and classification of transducers for Bio-medical applications, Electrode theory, different types of electrodes, Selection criteria for transducers and electrodes.	3
II	BIOPOTENTIALS- Electrical activity of excitable cells, ENG, EMG, ECG, ERG, ECG. Neuron potential.	2
	CARDIOVASCULAR SYSTEM MEASUREMENTS- Measurement of blood pressure, blood flow, cardiac output, cardiac rate, heart sounds, Electrocardiograph, phonocardiograph, Plethysmograph, Echocardiograph.	5
III	INSTRUMENTATION FOR CLINICAL LABORATORY- Measurement of pH value of blood, ESR measurement, hemoglobin measurement, O ₂ and CO ₂ concentration in blood, GSR measurement. Spectrophotometry, chromatography, Hematology,	4
	MEDICAL IMAGING: Diagnostic X-rays, CAT, MRI, thermography, ultrasonography, medical use of isotopes, endoscopy.	4
IV	PATIENT CARE, BIOTELEMETRY AND SAFETY MEASURES Elements of Intensive care monitoring basic hospital systems and components, physiological effects of electric current shock hazards from electrical equipment, safety measures, Standards & practices. Biomedical Telemetry: Introduction, block diagram and description of single channel/multi channel telemetry systems.	7
	THERAPEUTIC AND PROSTHETIC DEVICES - Introduction to cardiac pacemakers, defibrillators, ventilators, muscle stimulators, diathermy, heart lung machine, Hemodialysis, Applications of Laser.	5
V	APPLICATIONS OF BIOPOTENTIALS: Electrocardiographic diagnostic criteria for Identification of cardiac disorders, Electrocardiographic pattern of ischemia, Atrial abnormalities, Ventricular enlargement, Abnormal ECG patterns, Clinical applications of EEG, EMG, ERG	4
	COMPUTER APPLICATIONS: data acquisition and processing, remote data recording and management. Real time computer applications	3
	TOTAL	40

TEXT BOOKs:

1. L. Cromwell, F. J. Weibell, and L. A. Pfeiffer, Biomedical Instrumentation and Measurements, Pearson Education, Delhi, (1990)
2. J. J. Carr and J. M. Brown, Introduction to Biomedical Equipment Technology, 4th ed., Pearson Education, Delhi, (2001)

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Biomedical Instrumentation Systems , Chatterjee, Cengage learning	2011
2	Aston, “Principles of Biomedical Instrumentation and measurements”, McGraw Hill publishing Co,	1990
3	L.A. Geddes and L.E. Baker, Principles of Applied Biomedical Instrumentation , John Wiley & Sons, Inc,	1989
4	Richard Aston, Principles of Biomedical Instrumentation and Measurement , Merrill Publishing Company,.	1990
5	Jacobson B. and Webster J.G., Medical Clinical Engineers , Prentice Hall Inc.,.	1979
6	J. G. Webster, Medical Instrumentation Application and Design, 3rd ed., John Wiley & Sons, N.Y.,	1998
7	R. S. Khandpur, Handbook of Biomedical Instrumentation, 2nd ed., Tata McGraw Hill,	2003
8	R. Anandanatarajan, “Biomedical Instrumentation”, PHI Learning,	2009

SEC6.2A ADVANCED DATA STRUCTURES AND ALGORITHMS**B.Tech. (EC) 5th Sem.
3L+0T****Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	Basic Concepts of OOPs – Templates Function and class templates – Algorithms: performance analysis: time complexity and space complexity–	6
	ADT – List (Singly– Doubly and Circular) Implementation – Array – Pointer – Cursor Implementation	
II	Stacks and Queues – ADT– Implementation and Applications – Trees – General– Binary – Binary Search – Expression Search – AVL – Introduction to Red Black trees and Splay tree – B Trees – Implementations – Tree Traversals	6
III	Set – Implementation – Basic Operations on Set – Priority Queue – Implementation – Graphs – Directed Graphs – Shortest Path Problem – Undirected Graph – Spanning Trees – Graph Traversals: hash table representation: hash functions: collision resolution: separate chaining: open addressing: linear probing: quadratic probing: double hashing: rehashing	10
IV	Issues – Managing Equal Sized Blocks – Garbage Collection Algorithms for Equal Sized Blocks – Storage Allocation for Objects with Mixed Sizes – Buddy Systems – Storage Compaction	8
V	Searching Techniques – Sorting – Internal Sorting – Bubble Sort – Insertion Sort – Quick Sort – Heap Sort – Bin Sort – Radix Sort – External Sorting – Merge Sort – Multiway Merge Sort – Polyphase Sorting – Design Techniques – Divide and Conquer – Dynamic Programming – Greedy Algorithm – Backtracking – Local Search Algorithms	10
	TOTAL	40

TEXT BOOKS

1. Tanenbaum A.S, Langram Y, Augestien M.J., Data Structures using C & C++, Prentice Hall of India, (2002).
2. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd. (2005)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Mark Allen Weiss:Data Structures and Algorithm Analysis in C++,Pearson Education	2002
2	Aho Hopcroft Ullman, —Data Structures and Algorithms, Pearson Education,	2002
3	Horowitz Sahni, Rajasekaran, —Computer Algorithms, Galgotia,.	2000
4	Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and Mount, Wiley student edition, John Wiley and Sons.	1989
5	Data Structure and Algorithm in C++ , Drozdek, Cengage learning	1990
6	Data Structures: A Pseudocode Approach with C, Gilberg,Cengage learning	1996

SEC6.3A COMPUTER ORIENTED NUMERICAL & STATISTICAL METHODS**B.Tech. (EC) 5th Sem.
3L+0T****Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	SOLUTION OF LINEAR EQUATIONS- Cramer's Rule, Gauss Elimination, Gauss Jordan Elimination and Gauss Seidal Iterative Methods and their Computer Programming in C. Matrix Inversion by Gauss Elimination, Computer Programs for Matrix Inversion.	8
II	SOLUTION OF NON-LINEAR EQUATIONS- Interval Bisection Method, Secant Method, Regula- Falsi Method, Curve Fitting, Method of Least Squares and their Computer Programming in C	7
III	SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS- Solution of Partial Differential Equations with Special Reference to Heat Equation, Laplace Equation and Wave Equation Milne's and their Computer Programming in C. Curve Fitting Methods – Method of Least Squares, Fitting a Straight Line, Parabola..	9
IV	STOCHASTIC PROCESSES - Definitions, Random Process Concept, Statistics of Stochastic Processes: Mean, Autocorrelation, Autocovariance. Stationary Processes, Strict and Wide Sense Stationary, Random Processes and Linear Systems.	9
V	STOCHASTIC PROCESSES IN FREQUENCY DOMAIN - Power Spectrum of Stochastic Processes, Transmission over LTI systems, Gaussian and White Processes, Properties of Power Spectral Density	7
	TOTAL	40

TEXT BOOKs:

1. Numerical methods for Scientific and Engineering Computation by M.K.Jain, S.R.K.Iyengar, R.K. Jain. (2003)
2. Computer based numerical algorithms by E.V. Krishnamoorthy.(2004)

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Introduction to Numerical Analysis by E. Atkinson	1984
2	Peebles, P. Probability, random variables and random signal principles. Mc Graw Hill.	2007
3	Computer Oriented Numerical & Statistical Methods by Dr. Gokhroo & Others	2012
4	Elementary Numerical Analysis by Samuel D.Conte and Cart de Boor, McGraw Hill International Edition.	19100
5	Numerical methods for Science and Engineering, PHI by R.G.Stanton	1963
6	Papoulis, A. Probability, random variables and stochastic processes. Mc Graw Hill (international Students' edition), Singapore.	2012
7	Childers, D. G. Probability and random processes using MATLAB. Mc Graw Hill,	1997
8	Smith, G. D. Numerical Solution of PDE, Oxford Uni. Press	2002
9	Numerical Analysis, Burden, Cengage learning	2004
10	Numerical Mathematics and Computing , Cheney , Cengage learning	2005

5EC7A ELECTRONIC ENGINEERING DESIGN LAB

B.Tech. (EC) 5th Sem.

Max. Marks: 75

2P

Exam: 3 H

S.No.	Contents
To design the following circuits, assemble these on bread board and test them.	
Simulation of these circuits with the help of appropriate software.	
1	Op-Amp characteristics and get data for input bias current measure the output-offset voltage and reduce it to zero and calculate slew rate.
2	Op-Amp in inverting and non-inverting modes.
3	Op-Amp as scalar, summer and voltage follower.
4	Op-Amp as differentiator and integrator.
5	Design LPF and HPF using Op-Amp 741
6	Design Band Pass and Band reject Active filters using Op-Amp 741.
7	Design Oscillators using Op-Amp (i) RC phase shift (ii) Hartley (iii) Colpitts
8	Design (i) Astable (ii) Monostable multivibrators using IC-555 timer
9	Design Triangular & square wave generator using 555 timer.
10	Design Amplifier (for given gain) using Bipolar Junction Transistor.

5EC8A MICROWAVE ENGINEERING LAB

B.Tech. (EC) 5th Sem.

Max. Marks: 75

2P

Exam: 3 H

S.No.	Contents
1.	Study of various microwave components and instruments like frequency meter, attenuator, detector and VSWR meter. (a) Measurement of guide wavelength and frequency using a X-band slotted line setup. (b) Measurement of low and high VSWR using a X-band slotted line setup.
2.	Measurement of SWR and shift in the standing wave minimum with unknown load, and calculation of unknown load impedance using Smith chart.
3.	(a) Draw the V-I characteristics of a Gunn diode, and determine the output power and frequency as a function of voltage (b) Study the square wave modulation of microwave signal using PIN diode modulator.
4.	Measurement of resonance characteristics of a microstrip ring resonator using power meter and Determination of the substrate dielectric constant.
5.	(a) To study the coupling characteristics of (i) a microstrip 3dB branchline coupler, and (ii) a stripline backward wave coupler as a function of frequency. Compare the bandwidth in the two cases. (b) Measure the microwave input, direct, coupled and isolated powers of a backward wave stripline coupler at the centre frequency using a power meter. From the measurements calculate the coupling, isolation and directivity of the coupler.
6.	Measure the power division and isolation characteristics of a microstrip 3dB power divider.
7.	Study of rat race hybrid ring (equivalent of waveguide Magic-Tee) in microstrip
8.	(a) Study of low pass and band pass microstrip filters (b) Measurement of gain versus frequency of a microwave amplifier using power meter.

5EC9A COMMUNICATION LAB – I

B.Tech. (EC) 5th Sem.
2P

Max. Marks: 75
Exam: 3H

S.No.	Contents
1.	To generate the different type of waveforms using fundamental frequency and its harmonics and also analysis these waveforms.
2.	Perform the experiment of the amplitude modulation and calculate the modulation index. Also study the DSB, DSB-SC, SSB modulation & demodulation and also observe the effect of AGC.
3.	To Study the properties of Super Heterodyne receiver in AM transmitting & receiving. Sensitivity, selectivity through experimental setup.
4.	To perform the different type of FM modulation & demodulation schemes and study the effect of Amplitude limiter in FM demodulator.
5.	To find the characteristics impedance, input impedance, losses, standing waves, phase shifting in transmission line.
6.	To perform the PAM (natural, flat top, sample & hold sampling), PWM, PPM Modulation & demodulation techniques.
7.	To perform the experiment of and observe the effect of change in type of modulating signal as sine , square, arbitrary and change in frequency of sampling signal in PAM, PWM, PPM modulation and demodulation.
8.	To Study & observation of the four channel analog TDM using DSB-SC through experimental setup.
9.	To Study& observation of the FDM through experimental setup.
10.	To perform the experiment of the various sampling (natural, flat top & sample & hold) of analog signal of type sine, square & arbitrary.

5EC10A SIGNAL PROCESSING LAB

B.Tech. (EC) 5th Sem.

Max. Marks: 75

2P

Exam: 3 H

S.No.	Contents
1	Simulation in MATLAB Environment: Generation of continuous and discrete elementary signals (periodic and non-periodic) using mathematical expression.
2	Generation of Continuous and Discrete Unit Step Signal.
3	Generation of Exponential and Ramp signals in Continuous & Discrete domain.
4	Continuous and discrete time Convolution (using basic definition).
5	Adding and subtracting two given signals. (Continuous as well as Discrete signals)
6	To generate uniform random numbers between (0, 1).
7	To generate a random binary wave.
8	To generate random sequences with arbitrary distributions, means and variances for following : (a) Rayleigh distribution (b) Normal distributions: $N(0,1)$. (c) Gaussian distributions: $N(m_x, \sigma_x^2)$
9	To plot the probability density functions. Find mean and variance for the above distributions

5EC11A PROFESSIONAL ETHICS AND DISASTER MANAGEMENT

B.Tech. (EC) 5th Sem.

2P

Max. Marks:50

Exam: 3 H

S.No.	CONTENTS
1.	Issues on ethics and values: Moral and ethical values, classification of values , value system, deterioration of social values, social norms & social control.
2.	Profession , professionalism &ethics: Professional responsibilities, competencies and expectations .Role of a professional , person, professional accountability and professional ethics .
3.	Ethics in engineering and disaster management: Engineering professionals , role of engineers ,technology & society ,engineering as social experimentation , engineering ethics.
4.	Types of disasters: Environmental, economic & social disasters ; causes , impact and prevention , Case studies.
5.	Thoughts of ethics

TEXT BOOKS:

1. Engineering Ethics: Concepts & Cases by Harris, Cengage Learning (2013)

6EC1A MICROWAVE ENGINEERING – II

B.Tech. (EC) 6th semester

3L+1T

Max. Marks: 100

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	IMPEDANCE TRANSFORMATION AND MATCHING: Lumped elements for MICs and MMICs- printed inductors, capacitors and resonant elements. The Smith chart- combined impedance-admittance chart. Impedance matching with lumped elements (L networks) and Smith chart solutions. Single stub tuning in microstrip circuits using shunt stub. Single section quarter-wave transformer.	8
II	MICROWAVE DIODES AND DIODE CIRCUITS: <i>Detector Diodes</i> – Silicon crystal diode and Schottky diode. V-I characteristic of detector diode, basic operation of detection and mixing, single diode mixer circuit. <i>PIN diode</i> - Equivalent circuit and characteristics of PIN diode, single-pole PIN diode switches and single bit phase shifters. <i>Varactor diode</i> - Device characteristics and circuit applications. <i>Gunn diode</i> - Gunn effect, principle of operation and characteristics, typical oscillator circuit using Gunn diode. <i>IMPATT diode</i> - Characteristics, negative resistance, power output and efficiency.	9
III	MICROWAVE TRANSISTORS AND CIRCUITS: <i>Bipolar Junction Transistors (BJTs)</i> – Geometry of silicon bipolar transistor, DC biasing, microwave equivalent circuit and characteristics. <i>Microwave Field Effect Transistors (FETs)</i> - Physical structure and principle of operation of JFET, MOSFET and MESFET, characteristics, comparison of FET devices and circuit applications. Single stage FET amplifier – Block schematic of a single stage FET amplifier circuit, Stability considerations, analysis and derivation of expression for transducer gain with unilateral transistor, design criteria for maximum gain.	8
IV	<i>Klystrons</i> - Limitations of conventional vacuum tubes. Reflex klystron – Basic schematic, mechanism of operation, modes of oscillation and modulation. Velocity modulation and electron bunching (analytical treatment), <i>Magnetrons</i> - Types of magnetron. Basic structure of magnetron, analysis, resonant modes in magnetron, operation, mechanism of oscillations, practical consideration of cavity magnetron. Introduction to coaxial, frequency angle and voltage tunable magnetrons.	8

V	<i>Two cavity klystron amplifier</i> - Basic schematic and mechanism of operation.	7
	<i>Travelling Wave Tube Amplifier</i> - Basic schematic of helix type TWT tube. Introduction to CW power pulsed dual mode TWT. TWT amplifier operational characteristics. Applications of TWT. Crossed- field amplifier.	
	TOTAL	40

TEXT BOOK:

1. A. Das and S. Das, Microwave Engineering, Tata McGraw-Hill, (2000).
2. S.Y.Liao, Microwave devices and circuits, Prentice Hall, 2nd Edition (1985).

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	B. Bhat and S. K. Koul, Stripline-like Transmission Lines for Microwave Integrated Circuits, Wiley Eastern Ltd.,	1989
2	T. C. Edwards, Foundations for Microstrip Circuit Design, John Wiley & Sons.,	1981
3	K. C. Gupta, R. Garg, I. Bahl and P. Bhartia, Microstrip Lines and Slotlines, Second Edition, Artech House	1996
4	K.C Gupta, Microwaves, Wiley Eastern Ltd.	1979
5	P.A. Rizzi, Microwave Engineering- Passive Circuits, Prentice Hall.,	1988
6	D. M. Pozar, Microwave Engineering, John Wiley & Sons., (Use the latest version)	1998
7	Dennis Roddy, Microwave Technology, Prentice-Hall,	1986
8	Roy Mitra, Microwave semiconductor devices, PHI,	2004
9.	Robert E. Collin, Foundations for microwave engineering 2ed	2012
10	Microwave and Radar Engineering, G.S.B. Rao, Pearson	2013
11.	Microwave Engineering, Raghuvanshi, cengage learning	2013

6EC2A MICROPROCESSORS

B.Tech. (EC) 6th Sem.

Max. Marks: 100

3L+0T

Exam Hours: 3

Unit	Contents	Contact Hours
1	INTRODUCTION: The 8085 architecture, memory, I/O Devices, Logic devices for interfacing, Memory, Interfacing, addressing modes, Instructions, programming techniques.	8
2	INTRODUCTION TO 8085 INSTRUCTIONS: Looping, counting and Indexing, Data Transfer and Arithmetic instructions, Counters and Time Displays, stacks & subroutines, conditional call and return instructions.	8
3	Code Conversion, BCD Arithmetic and 16 Bit Data Operations additional data transfer & 16 bit arithmetic Instructions, arithmetic operations related to memory counter and time delays.	8
4	Interrupts: The 8085 Interrupt, vectored interrupts, additional I/O concepts and processes, serial I/O & data communication.	8
5	General purpose programming peripheral devices: 8255 Programmable peripheral interface, Interfacing keyboard and Seven Segment display. The 8254 programmable Interval timer, the 8259 programmable Interrupt controller. 8257 DMA controller.	8
	TOTAL	40

TEXT BOOKS:

1. Microprocessors Architecture, Programming & Application, Ramesh S. Gaonkar, (2000)
2. A Textbook of Microprocessors and Microcontrollers, R.S. Kaler I.K International Publishing House Pvt. Ltd.

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1.	Introduction to Microprocessors, A.P. Mathur, Mc Graw Hill	2002

6EC3A INDUSTRIAL ELECTRONICS

B.Tech. (EC) 6th Sem.

Max. Marks: 100

3L+0T

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	SEMICONDUCTOR POWER DEVICES - Basic characteristics & working of Power Diodes, Diac, SCR, Triac, Power Transistor, MOSFETs, IGBT, and GTO	7
II	RECTIFIERS & INVERTERS - Working principles of single and three phase bridge rectifiers, Voltage and current source inverters	8
III	POWER SUPPLIES: Principle of operation of choppers. Step up, Step down and reversible choppers. High frequency electronic ballast, Switch Mode Power Supply: Fly back converter, forward/buck converter, Boost converter and buck-boost converter. Uninterruptible Power Supply.	10
IV	MOTOR CONTROL: Introduction to speed control of DC motors using phase controlled converters and choppers, Basic idea of speed control of three phase induction motors using voltage and frequency control methods.	8
V	Stepper Motors: Variable reluctance, Permanent magnet and hybrid stepper motors. Induction and dielectric heating control.	7
	TOTAL	40

TEXT BOOKs:

1. Power Electronics Principles & Applications, Joseph Vithayathil, TMH , (2010).
2. Power Eletronics, Ravish Singh, TMH, (2012).

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Industrial Electronics And Control, Ttti, TMH	2001
2	Power Electronics: Converters Applications., Mohan, Robbins, Wiley	1995
3	Power Electronics, Moorthi, Oxford	2005
4	Elements Of Power Electronics, Krein, Oxford	1998
5	Power Electronics, R.S.Murthy, Pearson	2012
6	Power Electronics: Circuits, Devices And Applications	2004

6EC4A DIGITAL COMMUNICATION

B.Tech. (EC) 6th sem.

Max. Marks: 100

3L+1T

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Digital Transmission Of Analog Signals: Uniform and Non-uniform quantization. PCM and delta modulation, Signal to quantization noise ratio in PCM and delta modulation. DPCM, ADM, T1 Carrier System, Error probability in PCM system.	8
II	Base Band Transmission: Line coding (RZ, NRZ): Polar, Bipolar, Manchester, AMI. Inter symbol interference, Pulse shaping, Nyquist criterion, Raised cosine spectrum. Optimum detection, Matched filter.	8
III	Digital Modulation Techniques: Geometric interpretation of signals and Orthogonalization. ASK, BPSK, BFSK, QPSK, M-ary PSK, MSK and GMSK modulation techniques and Coherent detection of these techniques. Signal constellation and calculation of error probabilities.	8
IV	Information Theory: Measure of Information, Average Information, Entropy, Information rate, Increase in Average information per bit by coding, Shannon's Theorem and Shannon's bound, Capacity of a Gaussian Channel, BW-S/N trade off,	8
V	Source & Error Control Coding: Coding and decoding of Information Source coding, Entropy coding, Hamming code, Single Parity- Bit Code, Linear Block code, Cyclic code & Convolutional code.	8
	TOTAL	40

TEXT BOOKs:

1. Digital Communications Systems, P RamaKrishna Rao, Mc Graw Hill
2. Digital Communications Systems, Simon Haykins, Wiley

REFERENCE BOOKs:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Digital Communications: Fundamentals and Applications, Bernard Sklar, Pearson Education	2002
2	Analog and Digital Communication, Schum Series, TMH	2006
3	Digital & Analog Communication Systems, Leon W. Couch, Pearson	2013
4	Analog & Digital Communication Systems, Singal, TMH	2012
5	An Introduction To Analog & Digital Communications, Haykins, Wiley	2010
6	Digital And Analog Communication Systems, Shanmugam, Wiley	2004
7	Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education	2008
8	Electronic Communication Systems-, Kennedy Devis, TMH	2013

6EC5A CONTROL SYSTEM

B.Tech. (EC) 6th Sem.
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	CONTROL SYSTEM AND THEIR REPRESENTATION: Terminology and basic structure of control system, Open loop and Closed loop systems, servomechanism, regulatory system, analogous systems. Physical Systems and their models, Electromechanical systems, electrical analogy of physical systems.	4
	Transfer function, Block diagram representation of physical systems, Block diagram algebra, Signal Flow graph and Mason's formula.	3
II	TIME RESPONSE: Types of test inputs, Response of first and second order system, Time domain specifications, Error coefficients, generalized error series	4
	STABILITY: Concepts of stability, location of roots in s-plane for stability, asymptotic stability and relative stability, Routh-Hurwitz stability criterion.	3
III	ROOT LOCUS: Root locus plot, Properties of Root loci and applications, Stability range from the loci. Determination of roots of the closed loop system, Effect of pole zero addition	4
	NYQUIST PLOTS: Polar plots, Nyquist plots and Nyquist stability criterion	4
IV	BODE PLOTS: Concepts of Gain margin and phase margin, Bode plots .	5
	Frequency-domain specifications	1
	M and N loci ,Nichols chart	2
V	CONTROLLERS: Introduction to PID and Lag-lead type Controllers	2
	STATE VARIABLE ANALYSIS: Concepts of state, state variable and state model. State variable models for LTI systems. Canonical representations, Transfer function to state-space and vice-versa. Solution to state equations. Concepts of controllability & observability.	6
	COMPENSATION DESIGN: compensation design using frequency domain techniques	2
	TOTAL	40

TEXT BOOKs: TEXT BOOK

1. Modern control Engineering, Ogata, Pearson.(2009)
2. Nise's Control System Engineering, Rajeev Gupta, Wiley (2011)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Control Systems: Principles & Design, M. Gopal, TMH	2002
2	Automatic Control System,B. C. Kuo,Wiley	2009
3	Singh & Janardhanan - Modern control engineering, Cengage learning	2010
4	Control Systems,Srivastava,TMH	2009
5	Systems and Control - Stanislawhizak, Oxford	2002
6	Control System Engineering,S. K. Bhattacharya,Pearson	2009
7	Control Systems: Theory And Applications,Ghosh,Pearson	2004
8	Manik – Control systems, Cengage learning	2012

6EC6.1A NEURAL NETWORKS

B.Tech. (EC) 6th Sem.

3L+0T

Max. Marks: 100

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	NEUROPHYSIOLOGY: Introduction: Elementary neurophysiology - From neurons to ANNs - Neuron model McCulloch-Pitts model, Hebbian Hypothesis; limitations of single-layered neural networks.	5
II	THE PERCEPTRON: The Perceptron and its learning law. Classification of linearly separable patterns.	2
	LINEAR NETWORKS: Adaline --- the adaptive linear element. Linear regression. The Wiener-Hopf equation. The Least-Mean-Square (Widrow-Hoff) learning algorithm. Method of steepest descent. Adaline as a linear adaptive filter. A sequential regression algorithm.	4
III	MULTI-LAYER FEEDFORWARD NEURAL NETWORKS: Multi-Layer Perceptrons. Supervised Learning. Approximation and interpolation of functions. Back-Propagation Learning law. Fast training algorithms. Applications of multilayer perceptrons: Image coding, Paint-quality inspection, Nttalk.	5
	SELF-ORGANISING SYSTEMS: Unsupervised Learning. Local learning laws. Generalised Hebbian Algorithm. The Oja's and Sanger's rules. Principal component analysis --- Karhunen-Loeve transform.	4
IV	COMPETITIVE LEARNING: MinNet and MaxNet networks. Clustering. Learning Vector Quantisation. Codebooks. Application in data compression.	4
	SELF-ORGANISING FEATURE MAPS: Kohonen networks.	
	RADIAL-BASIS FUNCTION NETWORKS: Radial-Basis function (RBF) networks and their application in function interpolation, approximation and modelling probability distributions. RECURRENT NETWORKS: Hopfield networks	5
V	APPLICATIONS OF NEURAL NETWORKS: Pattern classification, Associative memories, Optimization, Applications in Image Processing- Iris, finger print & face, Applications in decision making, TSP Problem.	6
	TOTAL	40

TEXT BOOKs:

1. Jacek M. Zurada, **Introduction to artificial neural systems**, Jaico Publ. House, (1994).
2. S.N. Sivanandam, S. Sumathi and S.N. Deepa, **Introduction to Neural Networks using MATLAB 6.0**, Tata McGraw-Hill, (2006).

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Artificial Neural Network,Robert Schalloff,TMH	1997
2	Fundamental Of Neural Network Architecture And Application,Laurene V. Fausett,Pearson	1993
3	Neural Network Algorithm And Programing Tech,James A Freeman,Pearson	1991
4	Neural N/W For Pattern Recognition,Cristopher, M.Bhishop,Oxford	1995
5	Fuzzy Neuro Approach To Agent Application,Lee ,Raymond S.T.,New Age	2008
6	Fuzzy Logic and Neural Networks: Basic Concept And Application,A Lavala, Chemakesava R.,New Age	2012
7	Neural Network Design w/CD, Hagan, Cengage Learning	2007

6EC6.2A PARALLEL COMPUTATION & ARCHITECTURE

B.Tech. (EC) 6th Sem.

Max. Marks: 100

3L+0T

Exam Hours: 3

Unit	Content	Hours
1	Overview Of Parallel Processing: Constraints of conventional architecture, Parallelism in uniprocessor system, Architectural Classification.	5
	Applications of parallel processing, Sorting networks, PRAM models, interconnection network, memory consistency models, shared memory multiprocessors	4
2	Hardware taxonomy: Flynn's classification, Handler's classification, Software taxonomy, Kung's taxonomy, SPMD,	5
	Basic Algorithms – Fast Fourier Transform, Linear System Solution etc.	3
3	Instruction level Parallelism and Thread Level Parallelism, Explicitly Parallel Instruction Computing (EPIC) Architecture,	3
	Principles of scalable performance: Performance Metrics and Measures, Speedup Performance Laws efficiency utilization, overheads	4
4	Vector and Array Processor Basic vector architecture, Issues in Vector Processing, Vector performance modeling, SIMD Computer Organization Masking and Data network mechanism.	4
	Inter PE Communication, Interconnection networks of SIMD, Static V s Dynamic network, cube hyper cube and Mesh Interconnection network, Parallel Algorithms For Array Processors.	5
5	Multiprocessor Architecture Loosely and Tightly coupled multiprocessors, Processor characteristics of multiprocessors,	4
	Inter Processor communication network, Time shared bus, Crossbar switch.	3

Text Books:

1. V.Rajaraman, L Sivaram Murthy, "Parallel Computers", PID. (2004)
2. William Stallings, "Computer Organization and Architecture, Designing for performancePrentice Hall, Sixth edition.(2007)

Reference Books:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Kai Hwang, Scalable Parallel Computing.	1998
2	Harrold Stone, High performance computer Architectures.	1992
3	Richard Y. Kain , Advanced Computer Architecture.	2000
4	Parallel Computing in C and OpenMPI , M. J. Quinn, McGraw-Hill	2004
5	Assembly Language and Computer Architure Using C++ and JAVA w/CD, Reis, Cengage Learning	2011

6EC6.3A OPTICAL FIBER COMMUNICATION

B.Tech. (EC) 6th sem.

Max. Marks: 100

3L+0T

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Optical Fiber Overview- Introduction, Ray theory, Optical fibers: multimode, single mode, step index, graded index, plastic & glass fibers.	3
	Transmission Characteristics of Optical Fibers - Introduction, Attenuation, Material absorption loss, Fiber bend loss, scattering, Dispersion (intermodal & intramodal), Dispersion Shifted Fibers, Dispersion Compensating Fiber. Manufacturing of Optical Fibers – preparation of optical fiber, Liquid phase techniques and vapor phase depositions techniques.	6
II	OPTICAL FIBER SOURCES- Laser- Emission and absorption of radiation, Einstein relation, Absorption of radiation, Population inversion, Optical feedback, Threshold condition. Population inversion and threshold, working of three levels & four level lasers. Basic idea of solid state, semiconductors, gas & liquid laser. Basic concept of Q-switching and mode locking.	5
	Light Emitting Diode - Structure, Material, Characteristics, Power & Efficiency.	2
III	Optical Detectors - Optical detection principles, quantum efficiency, Responsivity, PIN photo diode, Avalanche photo diodes, Noise in Detectors, Photo Diode Materials.	4
	Optical Connectors - Fiber Alignment, fiber splices, fiber connectors, expanded beam connectors, fiber couplers.	4
IV	Optical Fiber Measurements - Measurements of Fiber Attenuation, Dispersion, Refractive Index Profile, Cut off Wave Length, Numerical Aperture & Diameter.	5
	Optical Time Domain Reflectometry (OTDR) - Field measurement through optical time domain reflectometry, Laser based systems for measurement of distance, Velocity, Holography.	3
V	Optical Fiber Systems – Wavelength division multiplexing, DWDM, active and passive components, optical sensors, optical amplifiers.	5
	Optical Fiber Applications - public network applications, military, civil and industrial applications.	3
	TOTAL	40

TEXT Books:

1. J.M. Senior, Optical Fiber Communication: Principles and Practice, Pearson Education. (2013)
2. R.P. Khare, Fiber Optics & Optoelectronics, Oxford Publications. (2014)

REFERENCE Books:

SN	Name of Authors /Books /Publisher	Year of Publication
1	R.P. Khare, Fiber Optics & Optoelectronics, Oxford Publications.	2004
2	J.Gowar, Optical Communication Systems, PHI.	1999
3	A.Ghatak & K.Thygarajan, Introduction to Fiber Optics, Cambridge University Press.	2006
4	Joseph C Palais, Fiber Optics Communication, PHI.	2010
5	Harold Kolimbris, Fiber Optics Communication, Pearson Education.	2009
6	D. Anuradha, Optical Fiber and Laser, Principles and Applications, New Age.	2008

6EC7A COMMUNICATION LAB – II

B.Tech. (EC) 6th sem.
3P

Max. Marks: 75
Exam Hours: 3

S.No.	Contents
1	To identify & solve the aliasing problem and verify the Nyquist criteria through the experimental setup.
2	To perform the experiment of observe the transmission of four signals over a single channel using TDM-PAM method.
3	To study the 4 channel PCM multiplexing & de-multiplexing in telephony system and calculate line speed and baud rate through the experimental setup.
4	To study the PCM, DPCM modulation & demodulation and study the effect of channel like as attenuation, noise in between modulator & demodulator through the experimental setup.
5	To study the Delta, Adaptive delta & sigma delta modulation & demodulation and also study the effect of channel like as attenuation, noise in between modulator & demodulator through the experimental setup.
6	To perform the experiment of generation and study the various data formatting schemes (Uni-polar, Bi-polar, Manchester, AMI etc.)
7	To perform the experiment of generation and detection of ASK, FSK, BPSK, DBPSK signals with variable length data pattern
8	To perform the experiment of generation and detection of QPSK, OQPSK, DQPSK signals with variable length data pattern.
9	To study the working of MSK modulation and its demodulation through the experimental setup.
10	To study the working of cyclic code, block code error check methods in communication system through the experimental setup.
Simulation using any virtual Instrumentation Software:	
11	To carry out convolution in both continuous time and discrete time systems.
12	Companding and multiplexing of PCM signals.
13	Perform various keying Techniques: PSK, ASK, FSK & MSK.

6EC8A MICROPROCESSOR LAB**B.Tech. (EC) 6th sem.
2P****Max. Marks: 75
Exam: 3 H**

S.No.	Contents
	Following exercises are to be done in 8085 assembly language.
1	Arranging a set of data in Ascending order.
2	Arranging a set of data in Descending order.
3	Finding out number of Positive, Negative and Zeros from a Data Set.
4	Searching the Existence of a certain data in a given data.
5	BCD to Binary conversion.
6	Binary to BCD conversion
7	Design a Up/Down Counter
8	Multiply Two 8 Bit Numbers using Successive Addition and Shifting method.
9	Find Factorial of a number.
10	Solve the given Algebraic Equation
11	Generate a Software Delay.
12	Division of 8 bit Unsigned Numbers.
13	A program to display real time clock. Assume a periodic signal is interrupting RST 7.5 signal after every 0.5 seconds,
14	Generate a square wave and rectangular wave of given frequency at the Output pin of 8255 chip.

6EC9A RF SIMULATION LAB

B.Tech. (EC) 6th sem.
3P

Max. Marks: 75
Exam Hours: 3

S.No.	Contents
1	Study of field pattern of various modes inside a rectangular waveguide.
2	Study of field pattern of various modes inside a rectangular waveguide cavity.
3	Observe the transient phenomenon of terminated coaxial transmission lines in order to study their time domain behaviour.
4	Study the behavior of terminated coaxial transmission lines in frequency domain.
5	Introduction to Smith chart and its application for the unknown impedance measurement.
6	Study the behavior of impedance matching for passive networks (RL, RC, RLC, T- and Π -network) using Smith chart.
7	Find the change in characteristics impedance and reflection coefficients of the transmission line by changing the dielectric properties of materials embedded between two conductors.
8	Design and simulate the following <i>Planar Transmission Lines</i> : 1. Stripline and microstrip lines 2. Parallel coupled striplines and microstrip lines 3. Slot lines and Coplanar lines Determine their Field patterns and Characteristic impedance.
9	Design and simulate the following; 1. 3-dB branchline coupler, 2. backward wave coupler, 3. Wilkinson power dividers 4. rat- race hybrid ring. 5. Low pass filters 6. band pass filters.
10	Design RF amplifier using microwave BJT.
11	Design RF frequency doublers using microwave FET.

6EC10A INDUSTRIAL ELECTRONICS LAB

B.Tech. (EC) 6th Sem.
2P

Max. Marks: 75
Exam Hours: 3

S.No.	Contents
1.	Study the characteristics of SCR and observe the terminal configuration, Measure the breakdown voltage, latching and holding current. Plot V-I characteristics.
2.	Perform experiment on triggering circuits for SCR. i.e. R-triggering, R-C triggering and UJT triggering circuit.
3.	Study and test AC voltage regulators using triac, antiparallel thyristors and triac & diac.
4.	Study and obtain the waveforms for single-phase bridge converter.
5.	Perform experiment on single phase PWM inverter.
6.	Perform experiment on buck, boost and buck-boost regulators.
7.	Control speed of a dc motor using a chopper and plot armature voltage versus speed characteristic.
8.	Control speed of a single-phase induction motor using single phase AC voltage regulator.
9.	i) Study single-phase dual converter. ii) Study speed control of dc motor using single-phase dual converter.
10.	Study single-phase cycloconverter.
11.	Perform experiment on Motor control – open loop & closed loop.
12.	Design, observe and perform experiment on various type of pulse generation from DSP/ FPGA Platform. Perform experiment for PWM inverters and choppers.

6EC11A PERSONALITY DEVELOPMENT AND GENERAL APTITUDE

B.Tech. (EC) 6th sem.
2P

Max. Marks: 50
Exam Hours: 3

S.No.	CONTENTS
PURPOSE	
1. To make students appreciate the notion and components of personality, thereby to apply the acquired information to themselves and to march towards brilliance in their respective academic and professional careers. 2. To enable students to keep themselves abreast of general knowledge and current affairs. 3. To bring out creativity and other latent talents with right goal setting so that self- esteem gets enhanced. 4. To sharpen memory skills and other study skills vital for academic and professional excellence. 5. To give training for positive thinking to keep the students in a good stead at the time of crisis.	
1.	Introduction • Meaning of Personality • Determinants of Personality- biological, psychological and socio- cultural factors. • Misconceptions and clarifications • Need for personality development
2.	Self-Awareness and Self Motivation • Self analysis through SWOT and Johari window • Elements of motivation • Seven rules of motivation • Techniques and strategies for self motivation • Motivation checklist and Goal setting based on principle of SMART • Self motivation and life • Importance of self-esteem.
3.	Memory and study skills • Definition and importance of memory • Causes of forgetting • How to forget (thought stopping), how to remember (techniques for improving memory) • The technique of passing exams-management of examination fear.
4.	Power of positive thinking • Nurturing creativity, decision-making and problem solving. • Thinking power- seven steps for dealing with doubt • Traits of positive thinkers and high achievers

	• Goals and techniques for positive thinking • Enhancement of concentration through positive thinking • Practicing a positive life style.
5.	General Knowledge and Current Affairs • Regional, national and international events • Geographical, political and historical facts • Information on sports and other recreational activities • Basic knowledge with regard to health and health promotion
PRACTICAL TRAINING The course would include the following practical exercises. Ice-breaking. Brainstorming and simulation exercises. Thought stopping. Memory and study skills training	

TEXTBOOKS:

1. Hurlock, E.B, Personality Development, 28th Reprint. New Delhi: Tata Mc Graw Hill. (2006).
2. Mikew, Martin, schinzinger, Ethics in engineering, TMH. (2010)

REFERENCES BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Mile, D.J., Power of positive thinking. Delhi: Rohan Book Company.	2004
2	Pravesh Kumar, All about self- Motivation. New Delhi: Goodwill Publishing House.	2005
3	Dudley, G.A. ,Double your learning power. Delhi: Konark Press. Thomas Publishing Group Ltd.	2004
4	Lorayne, H. ,How to develop a super power memory. Delhi: Konark Press. Thomas Publishing Group Ltd	2004
5	Personal Development for Life and Work, Wallace, Cengage Learning	2013
6	Soft Skills for Everyone w/CD, Butterfield, Cengage Learning	2013

7EC1A ANTENNAS & WAVE PROPAGATION**B.Tech. (EC) 7th sem.
3L+0T****Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	ANTENNA FUNDAMENTALS – Review of Electromagnetic theory. Short elementary dipole and its fields. Basic antenna parameters - Radiation pattern, beamwidth, beam solid angle, directivity, efficiency, gain, radiation intensity, radiation resistance, input impedance and polarization. Receiving antenna- Reciprocity, effective length and aperture, antenna temperature.	8
II	ANTENNA ARRAYS – Point source, Array of two isotropic point sources. Uniform array of N point sources and array factor –Examples of 4 element broadside and endfire arrays. N-element linear array of elementary dipoles and principle of pattern multiplication. Two element array of elementary dipoles - Excitation with different relative phase shift and for different spacing.	7
III	DIFFERENT TYPES OF ANTENNAS – Thin linear antenna and thin half- wave dipole. V- and Rhombic antennas. Monopole antenna, Small loop antenna, Folded dipole and Yagi-Uda antenna. Broadband antennas – Broadband basics, log-periodic dipole array. Reflector antennas –Flat sheet, corner and parabolic reflector antennas. Slot, Horn and Lens antennas, Helical antennas. Microstrip patch antennas- Rectangular patch antenna, Two- element microstrip patch. <i>Antenna Measurements</i> - Antenna radiation pattern, gain, directivity and polarization. .	10
IV	GROUND WAVE PROPAGATION - Mechanism of radio wave propagation. Theory of ground reflection- Plane earth reflection, reflection factors for horizontal and vertical polarizations. Refraction and diffraction of radio waves. Space and surface waves. Tropospheric propagation, duct propagation and tropospheric scattering. .	7
V	IONOSPHERIC PROPAGATION: Various ionospheric layers, Electrical properties of the ionosphere and their effects on wave propagation. Critical frequency, virtual height, skip distance, maximum usable frequency. Multiple hop transmission. Effect of earth's magnetic field and Faraday rotation. Solar activity and meteorological conditions on wave propagation.	8
	TOTAL	40

TEXT BOOK

1. Sisir. Das and A. Das, Antenna and wave propagation, Tata McGraw-Hill Education Pvt. Ltd, (2013).
2. A.R. Harish and M. Sachidananda, Antennas and Wave Propagation, Oxford Univ. Press, Edition (2011).

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1.	J.D. Kraus, <i>Antennas</i> , Tata McGraw-Hill, 2 nd Edition,	1999
2.	E.C. Jordan and K.G. Balmain, <i>Electromagnetic Waves and Radiating Systems</i> , Prentice-Hall of India, 2 nd Edition,	1986
3.	T. Milligan, <i>Microstrip Antenna Design</i> , Wiley,	2005
4.	J.D. Kraus and R.J. Marhefka, <i>Antennas for All Applications</i> , Tata McGraw-Hill, Edition	2004
5.	R. Chatterjee, <i>Antenna Theory and Practice</i> , Wiley Eastern Ltd.,	1988
6.	Balanis Constantine A, <i>Antenna theory, Analysis and design</i> , 3rd edition, A John Wiley & Sons Inc. Publication	2005
7.	Collin R. E. And F. J. Zucker, <i>Antenna Theory: Part I</i> , McGraw-Hill, New York	1969
8.	Collin R. E. And F. J. Zucker, <i>Antenna Theory: Part II</i> , McGraw-Hill, New York	1969
9.	Ramesh Garg, P. Bhartia, Inder Bahl, and A Ittipiboon, <i>Microstrip Antenna Design Hand</i> , Artech House, Inc.	2001

7EC2A DIGITAL SIGNAL PROCESSING**B.Tech. (EC) 7th Sem.
3L+1T****Max. Marks: 100
Exam Hours: 3**

UNIT	CONTENTS	Contact Hours
I	SAMPLING - Discrete time processing of Continuous-time signals, continuous time processing of discrete-time signals,	5
	Changing the sampling rate using discrete-time processing.	2
II	TRANSFORM ANALYSIS OF LTI SYSTEMS - Introduction, The frequency response of LTI systems, System functions for systems characterized by LCCD (Linear Constant Coefficient Difference) equations,	4
	All-pass system, Minimum-Phase systems, Linear systems with linear phase.	3
III	STRUCTURES FOR DISCRETE-TIME SYSTEMS - Block diagram and signal flow graph representation of LCCD equations,	2
	Basic structures for IIR and FIR systems, Transposed forms.	5
IV	FILTER DESIGN TECHNIQUES - Introduction, Analog filter Design: Butterworth & Chebyshev,	3
	IIR filter design by impulse invariance & Bilinear transformation,	2
	Design of FIR filters by Windowing: Rectangular, Hanning, Hamming & Kaiser.	5
V	DFT, FFT - The Discrete Fourier transform (DFT), Properties of the DFT, Linear Convolution using DFT,	5
	Efficient computation of the DFT: Decimation-in-Time and Decimation-in frequency FFT Algorithms.	4
	Total	40

TEXT BOOKs:

1. Proakis, Manolakis, “Digital Signal Processing: Principals, Algorithms And Applications”, 4th ed., Pearson Education. (2006)
2. Oppenheim, Schafer, “Discrete Time Signal Processing”, 3rd ed. , PHI (2010)

REFERENCE BOOKs:

S.No.	Name of Authors/Book/Publisher	Publication Year
1.	Digital Signal Processing: A Modern Introduction, Ambardar, cengage learning	2011
2.	Introduction to Digital Signal Processing using MATLAB, Schilling	2011
3	Sanjit K Mitra, “Digital Signal Processing”, 4 th ed., TMH	2013
4	Tan, Jiang, “Digital Signal Processing: Fundamentals and Applications”, 2 nd ed., Elsevier	2008
5	Ifeachor, Jervis, “Digital Signal Processing”, 2 nd ed., Pearson Education	2009

7EC3A DIGITAL IMAGE PROCESSING

B.Tech. (EC) 7th Sem.

Max. Marks: 100

3L+1T

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	DIGITAL IMAGE FUNDAMENTALS: Image sensing and acquisition, Image sampling and quantization, Representing digital images, Spatial and gray-level resolution,	3
	Spatial operations, Vector & matrix operations, Zooming and Shrinking of digital images. RGB and HSI Color models	3
II	BASIC IMAGE OPERATIONS: Intensity transformation functions, Histogram equalization, Spatial filtering for image smoothing,	3
	Image sharpening by first and second order derivatives, Image smoothing and sharpening using frequency domain filters	5
III	IMAGE RESTORATION: Image restoration model, Noise Models, Spatial and frequency properties of noise, noise probability density functions,	3
	Noise only- spatial filter, Mean, order Statistic and adaptive filters, Concepts of inverse and Wiener filtering	5
IV	MORPHOLOGICAL IMAGE PROCESSING: Erosion and Dilation, Opening and closing,	3
	morphological algorithms for Boundary extraction, thinning, pruning, smoothing and thickening	5
V	IMAGE SEGMENTATION AND COMPRESSION: Edge based segmentation, Edge detection masks, Gradient operators,	3
	Thresholding, Region growing, Watershed transform,	3
	Fundamentals of image compression; Loss-less compression techniques; Lossy compression techniques, compression standards	4
	Total	40

TEXT BOOKs:

1. Gonzalez, Woods and Eddins, “Digital Image Processing”, 3rd ed. , Pearson Education (2010)
2. Anil K Jain, “Fundamentals of Digital Image Processing”, 4th ed., Prentice Hall (2010)

REFERENCE BOOKs:

SN	Name of Authors/Book/Publisher	Publication Year
1	Tamal Bose, “Digital Signal and Image Processing”, 3 rd ed. , John Wiley	2005
2	Sonaka,Hlavac and Boyle, “Image Processing, Analysis and Machine Vision”, 3 rd ed. , Cengage Learning	2013
3	Pratt, “Digital Image Processing”, 4 th ed. , John Wiley	2001
4.	Image Processing, Analysis, and Machine Vision, Sonka, cengage learning	2006

7EC4A WIRELESS COMMUNICATION

B.Tech. (EC) 7th sem.

Max. Marks: 100

3L+0T

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Spread Spectrum Modulation Techniques – Concept of spread spectrum, system processing gain, Spread Spectrum signals: Direct-sequence spread spectrum signals, Frequency-hopped spread spectrum signals, Code-division multiplexing, Spreading codes	8
II	Wireless Microwave Communication- Link Engineering, Frequency planning, Free space loss, Fresnel zone clearance, bending of radio beam, Effective earth radius, Fundamentals of fading, types and effects, Multipath channels; parameters, measurements, Building blocks of Transmitter & Receiver.	8
III	Multiple Access Techniques and Networks - FDMA, TDMA and CDMA with reference to mobile radio and satellite systems. TDMA based networks, OFDM and its characteristics, Packet radio multiple access techniques. CDMA based networks: Architecture, Air interface, Call processing, power control, Rake receiver concept and performance of CDMA system.	8
IV	Cellular Wireless Networks- , GSM: Introduction, overview of the GSM systems, GSM codec, channel coding and interleaving, radio like control. Cordless systems and WLL, Mobile IP, Wireless access protocol. Wireless LAN's: Technology, IEEE 1002.11 standards, Broadband Wireless 1002.16, Blue tooth, Wi-Fi, Wi-Max, Zigbee & RFID technology.	8
V	Satellite Communication - Elements of satellite communication: Frequency bands, Transmission and Multiple access. Satellite orbit and description- orbital period and velocity, effects of orbital inclination, Azimuth and elevation, Coverage angle and slant range, Satellite Link: basic link design and analysis, Geostationary orbit, Satellite subsystems. Earth Station antenna, high-power amplifier, low-noise amplifier, up converter, down converter, monitoring and control, reliability.	8
	TOTAL	40

TEXT Books:

1. William Stallings, Wireless Communication and Networks, Pearson Education (2013)
2. Rappaport, T.S., Wireless Communications, Pearson Education (2013)

REFERENCE Books:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Gottapu Sasibhushana Rao, Mobile Cellular Communications, Pearson Education	2013
2	Singal, T.L, Wireless Communication, Tata McGraw Hill	2011
3	Vijay Kr. Garg, Wireless Communications and Networking, Morgan Kaufmann, Elsevier	2013
4	Blake, Wireless Communication Technology, Cengage Learning	2013
5	W.C.Y. Lee , Mobile Cellular Telecommunications , Tata McGraw Hill	2011
6	Wireless Communications and Networking, Price, TMH	2014
7	Pratt, Bostain, Satellite Communications, Wiley India	2011
8	Mark Zhuang, Wireless Communications and Networking, Prentice Hall of India	2003
9	Simon Haykin, Modern Wireless Communications, Pearson Education	2005
10	Price, Fundamentals of Wireless Networking, Tata McGraw Hill	2012

7EC5A VLSI DESIGN

B.Tech. (EC) 7th Sem.

Max. Marks: 100

3L+0T

Exam: 3 H

Unit	Contents	Contact hours
I	INTRODUCTION TO MOSFET: - Basic MOS transistors, Enhancement Mode transistor action, Depletion Mode transistor action, NMOS and CMOS fabrication. Aspects of threshold voltage, threshold voltage with body effect. I_{ds} versus V_{ds} relationship, channel length modulation. Transistor Trans-conductance g_m . MOS transistor circuit Model, Model parameter (oxide and junction capacitor, channel resistance) variation with scaling and biasing. High order effects (i.e. subthreshold conduction, hot electron effect, narrow channel effect and punch through effect).	10
II	CMOS LOGIC CIRCUITS- nMOS inverter (resistive and active load), Pull up to Pull-down ratio for a NMOS Inverter and CMOS Inverter (B_n/B_p), , determination of inverter parameter (V_{IL} , V_{IH} V_{OL} V_{OH}) and Noise Margin. Speed and power dissipation analysis of CMOS inverter. Combinational Logic, NAND Gate, NOR gate, XOR gate, Compound Gates, 2 input CMOS Multiplexer, Memory latches and registers, Transmission Gate, estimation of Gate delays, Power dissipation and Transistor sizing.	8
III	Basic physical design of simple Gates and Layout issues. Layout issues for CMOS inverter, Layout for NAND, NOR and Complex Logic gates, Layout of TG, Layout optimization using Euler path. DRC rules for layout and issues of interconnects, Latch up problem.	8
IV	Dynamic CMOS circuits: Clocked CMOS (C^2 MOS) logic, DOMINO logic, NORA logic, NP(ZIPPER) logic, PE(pre-charge and Evaluation) Logic. Basic Memory circuits, SRAM and DRAM.	8
V	Physical Design: Introduction to ECAD tools for first and back end design of VLSI circuits. Custom /ASIC design, Design using FPGA and VHDL. VHDL Code for simple Logic gates, flip-flops, shift registers	6
	Total	40

Text Books:

1. **CMOS DIGITAL INTEGRATED CIRCUITS Analysis and Design.** SUNG-MO (STEVE) ANG, YUSUF LEBLEBIGI, McGraw Hill (2008)

Reference Books:

SN	Name of Authors/Book/Publisher	Publication Year
1	N.Weste and K. Eshraghian, Principles of CMOS VLSI, 2e, Pearson Education.	2011
2	VLSI Design , P P Sahu , , McGraw.	2013
3	VLSI Design, D.P. Das, Oxford.	2011
4	Chip Design for Submicron VLSI: CMOS Layout & Simulation, Uyemura, cengage learning	2009

7EC6.1A ADVANCED MICROPROCESSORS

B.Tech. (EC) 7th sem.
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	The 8086 Microprocessor Family: 8086 ARCHITECTURE- Hardware specifications, Pins and signals, Internal data operations and Registers, Minimum and maximum mode, System Bus Timing, Linking and execution of Programs,	8
II	Software & Instruction Set: Assembly language programming: addressing mode and instructions of 8086, Strings, Procedures and Macros, 8086 interrupts. Assembler Directives and operators.	8
III	Analog Interfacing: A/D and D/A converter interfacing, keyboard and display interfacing, RS 232 & IEEE 488 communication standards. An 8086 based Process Control Systems	8
IV	Digital Interfacing: Programmable parallel ports, Interfacing microprocessor to keyboard and alphanumeric displays, Memory interfacing and Decoding , DMA controller.	8
V	Multiprocessor Configurations: - Multiuser / Multi tasking operating system concepts, 8086 based Multiprocessor systems. Introduction and basic features of 286, 386, 486 & Pentium processors.	8
	TOTAL	40

TEXT BOOK

1. A Nagoor Kani “Microprocessors and Microcontrollers” Mc Graw Hill Education 2ed. (2012)
2. Douglas V. Hall “Microprocessors and Interfacing Programming and Hardware” Tata Mc Graw Hill.(2000)

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	A. Ray & K. Bhurchandi. “Advanced Microprocessors and Peripherals. Tata Mc Graw Hill,	2012
2	A Nagoor Kani “Microprocessors and Microcontrollers” Mc Graw Hill Education 2ed.	2012
3	Introduction to Microprocessors, A. P. Mathur Mc Graw Hill	2011
4	The Intel Family of Microprocessors: Hardware and Software Principles and Applications, Antonakos, cengage learning	2012
	The 8086 Microprocessor: Programming & Interfacing the PC, Ayala, cengage learning	2007

7EC6.2A ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

B.Tech. (EC) 7th Sem.

Max. Marks: 100

3L+0T

Exam: 3 Hours

Unit	Contents	Contact Hours
I	Introduction to Artificial Intelligence: Intelligent Agents, State Space Search, Uninformed Search, Informed Search, Two Players Games, Constraint Satisfaction Problems.	09
II	Knowledge Representation: Knowledge Representation And Logic, Interface in Propositional Logic, First Order Logic, Reasoning Using First Order Logic, Resolution in FOPL	05
III	KNOWLEDGE ORGANIZATION: Rule based System, Semantic Net, Reasoning in Semantic Net Frames, Planning	10
IV	KNOWLEDGE SYSTEMS: Rule Based Expert System, Reasoning with Uncertainty, Fuzzy Reasoning	07
V	KNOWLEDGE ACQUISITION: Introduction to Learning, Rule Induction and Decision Trees, Learning Using neural Networks, Probabilistic Learning Natural Language Processing	09
TOTAL		40

TEXT BOOK:

1. Elaine Rich and Kevin Knight, Artificial Intelligence 3/e, TMH (1991)
2. PADHY: ARTIFICIAL INTELLIGENCE & INTELLIGENT SYSTEMS, Oxford(2005)

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	James A Anderson, An introduction to Neural Networks. Bradford Books	1995
2	Dan. W Patterson, Artificial Intelligence and Expert Systems, PHI	1990
3	Kumar Satish, "Neural Networks" Tata Mc Graw Hill	2004
4	S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications" Prentice Hall of India.	2006
6	Siman Haykin, "Neural Networks" Prentice Hall of India	1990
7	Artificial Intelligence, Kaushik, cengage learning	1997

7EC4.3A VHDL

B.Tech. (EC) 7th Sem.

Max. Marks: 100

3L+0T

Exam: 3 Hours

Unit	Contents	Contact Hours
I	INTRODUCTION: VHDL/PLD Design Methodology, Advantages, Requirement Analysis and specification, VHDL description, Verification Using simulations, Functional Simulation, Logic Synthesis, Place and route and timing Simulation Fundamental & history of various hardware description language, VHDL for Synthesis V/s Simulation, Design flow of ASICs and standard logic circuits. Implementation Details for SPLDs, CPLDs and FPGAs	06
II	LANGUAGE FUNDAMENTALS: Entities, Architectures and coding Styles, Signals and Data types, Packages, Dataflow, Structural, Behavioral and RTL Style of Combinational design, Event- Driven Simulation: Simulation Approaches, Elaboration Signal Drivers Simulator Kernel process, Signals verses Variables.	07
III	COMBINATIONAL and SEQUENTIAL CIRCUITS BUILDING BLOCKS: Multiplexer, Synthesis using Shannon's expansions, Decoders, encoders, Code Converters, VHDL Code for Combinational Circuits. VHDL code for Flip-Flops, shift registers, Counters.	09
IV	SYNCHRONOUS/ ASYNCHRONOUS SEQUENTIAL CIRCUITS: Mealy & Moore type FSMs, VHDL Code for Mealy & Moore Machines, VHDL Codes for Serial Adder, Vending Machine.	09
V	DIGITAL SYSTEM DESIGN: Building Block circuits, Memory organization, SRAM, Design examples of divider, Multiplier, Shifting & Sorting Operations, Clock Synchronization, CPU organization and design concepts.	09
TOTAL		40

TEXT BOOK:

1. Digital Logic with VHDL Design, Brown, TMH.(2007)
2. VHDL for Engineers, Short, Pearson. (2011)

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	VHDL (Text BOOK Binding), Douglas L. Perry, TMH	2002
2	VHDL , A design oriented Approach, S S Limaye, TMH	2008
3	VHDL: Programming By Example, Douglas Perry, Oxford	2002
4	The Designer's Guide To VHDL, Peter J. Ashenden, Oxford	2010
5	Circuit Design With VHDL , By Volnei A Pedroni, PHI	2004
6	VHDL Bascis to programming, Gaganpreet Kaurt, Pearson	2013
7	Digital System Design Using VHDL, cengage learning	2008
8	HDL Programming Fundamentals VHDL & VERILOG. Botros. cengage learning	2002

7EC7A SIGNAL AND IMAGE PROCESSING LAB

B.Tech. (EC) 7th sem.
2P

Max. Marks: 100
Exam Hours: 3

S.No.	Contents
1	To simulate the transmitter and receiver for BPSK
2	To design and simulate FIR digital filter (LP/HP).
3	To design and simulate IIR digital filter (LP/HP).
4	Reading and displaying Gray/ Colour images of different formats
5	RGB/HSI conversions in an image, Image arithmetic operations.
6	Image Histogram and histogram equalization
7	Image filtering in Spatial and frequency domain
8	Morphological operations in analyzing image structures
9	Thresholding-based image segmentation
10	Study of image compression

7EC8A WIRELESS COMMUNICATION LAB

B.Tech. (EC) 7th Sem.

Max. Marks: 100

3P

Exam: 3 Hours

S.No.	Contents
1	Measurement of antenna input characteristics: Measure the input return loss versus frequency in the operating band for (i) Half wave dipole (printed dipole/strip dipole), (ii) Folded dipole and (ii) Log-periodic antenna.
2	Measurement of radiation characteristics of a (i) Half wave dipole (printed dipole/strip dipole), and (ii) Printed Yagi antenna -. Measure radiation patterns in the two principal planes and plot on polar chart. Determine beam width, directivity and antenna efficiency.
3	Measurement of antenna gain using absolute gain and relative gain measurements: • Measure gain of Bi-quad antenna using absolute gain measurements. • Measure gain of log-periodic antenna and printed slot antenna using relative gain measurements.
4	Circular polarization measurements on helical antenna.
5	Antenna array theory demonstration using single EM coupled rectangular patch, 2x1 EM coupled and 2x2 EM coupled rectangular patch antennas.
6	Communication link budget calculations- Friis formula and demonstration with transmit and receive antenna setup.
7	Radar Trainer: Working of Doppler radar, velocity of moving object, time and frequency measurement and other applications.
8	To perform Modulation, Demodulation and BER measurement using CDMA – DSSS Trainer.
9	To establish analog/digital communication link and transmit & receive three signals (audio, video, tone) simultaneously using Satellite Communication Trainer.
10	To study GPS Receiver, establishing link between GPS satellite & GPS trainer and measure of latitude & longitude

8EC1A IC TECHNOLOGY**B.Tech. (EC) 8th Sem.****Max. Marks: 100****3L+0T****Exam: 3 H**

Unit	Contents	Contact hours
I	INTRODUCTION TO IC TECHNOLOGY- Semiconductor Substrate- Crystal defects, Electronic Grade Silicon, Czochralski Growth, Float Zone Growth, Characterization & evaluation of Crystals; Wafer Preparation- Silicon Shaping, Etching and Polishing, Chemical cleaning.	8
II	DIFFUSION & OXIDATION - Ficks diffusion Equation in One Dimension, Atomic model, Analytic Solution of Ficks Law, correction to simple theory, Diffusion in SiO ₂ . Ion Implantation and Ion Implantation Systems. Oxidation Growth mechanism and Deal-Grove Model of oxidation, Linear and Parabolic Rate co-efficient, Structure of SiO ₂ , Oxidation techniques and system, Oxide properties.	9
III	CHEMICAL VAPOUR DEPOSITION AND EPITAXIAL LAYER GROWTH- CVD for deposition of dielectric and polysilicon thick Layer – a simple CVD system, Chemical equilibrium and the law of mass action, Introduction to atmospheric CVD of dielectric, low pressure CVD of dielectric and semiconductor. Epitaxy-Vapour Phase Expitaxy, Defects in Epitaxial growth, Metal Organic Chemical Vapor Deposition, Molecular beam epitaxy.	9
IV	PATTERN TRANSFER & ETCHING - Introduction to photo/optical lithography, Contact/ proximity printers Projection printers, Mask generation, photo resists. Dry & Wet etching, methods for anisotropic etching, Plasma etching, Reaction ion etching (RIE).	8
V	VLSI PROCESS INTEGRATION- Junction and Oxide Isolation, LOCOS methods, Trench Isolation, SOI; Metallization, Planarization. Fundamental consideration for IC Processing, NMOS IC Technology, CMOS IC Technology, Bipolar IC Technology. Fault diagnosis and characterization techniques.	6
	Total	40

Text Books:

1. S.M. Sze (Ed), VLSI Technology, 2nd Edition, McGraw Hill (1988).

Reference Books:

S.No.	Name of Book/publication/Authors	Publication Year
1	S.K. Ghandhi, VLSI Fabrication Principles, John Wiley Inc., New York,	1983
2	IC Technology, Gouranga Bose, McGraw Hill	2013
3	C.Y. Chang and S.M.Sze (Ed),ULSI Technology, McGraw Hill Companies Inc	1996

8EC2A RADAR & TV ENGINEERING

B.Tech. (EC) 8th Sem.
3L+1T

Max. Marks: 100
Exam Hours: 3

Unit	Contents	Contact hours
I	RADAR - Radar Block diagram, frequencies and applications. Radar range equation. Continuous wave (CW) & FM radar; Moving target indicator (MTI): Delay line cancellers, blind velocity Pulse Doppler Radar. Tracking radar sequential lobbing, Conical scan and monopulse radar, Types of display, Radar receivers, Noise figure. NAVIGATIONAL AIDS - Principle of operation of Radar direction finder & range system. LORAN system, DME, TACAN, Aircraft landing systems.	10
II	T.V. systems. Block diagram of T.V. transmitters. Principles of Monochrome and colour T.V.system (PAL, SECAM, NTSC). Theory of scanning standards, Composite video signal analysis. T.V Cameras : Image orthicon, plumbicon, vidicon and CCD camera tubes. Types of Analog Monochrome and colour picture tubes,	8
III	Processing and transmission of TV signals: Modulation of video and sound signals, Vestigial side band transmission, Compatibility of colour and monochrome frequency interleaving & transmission of colour signals, Picture, sound and colour sub carriers. Encoding picture information. Generation of colour, colour difference and Chrominance signal modulation.TV transmission & reception antennas.	8
IV	Basic circuits of TV RECEIVER: Functional block diagram of T.V. receiver, R.F. Tuner, I.F. amplifier, Video detector, video amplifier, AGC, Synch. Separation, Sync. Processing and AFC. Deflection oscillators, vertical & horizontal deflection and sound system circuits. EHT generation. Common faults and their diagnosis. Basic idea of HDTV, DBS-TV and 3D-TV.	8
V	MODERN TV SYSTEM: Digital transmission and reception of TV signals, DISHTV, DTH and cable TV, transmission of TV signals through Satellite and Transponders, working principles of HDTV, DBS-TV, IPTV and 3D-TV. Modern TV receiver with LCD, LED and Plasma displays.	6
	Total	40

Text Books:

1. Monochrome and colour Television , R R Gulathi, Wiley Eastern Ltd. (2007).
2. Introduction to Radar System, 3rd, M I Skolink, MGH. (2003).

Reference Book:

S.No.	Name of Book/Publication/writer	Publication Year
1.	Television Engineering and Video System, R G Gupta, MGH	2005
2.	Television and Video Engineering , A M Dhake, MGH	1995
3.	Nathanson, F.E., " <i>Radar Design Principles</i> ", McGraw-Hill Inc.,	1991
4.	Principles, Technology, Applications, Prentice Hall	1993
5.	D.K.Barton, Modern radar systems analysis, Artech House,	1988
6.	Microwave and radar engineering, G.S.B. Rao, Pearson P.	2013

8EC3A MEMS AND NANOTECHNOLOGY

B.Tech. (EC) 8th sem.
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction to Nanoelectronics: Top Down and Bottom UP Approach, Nanotechnology Potentials, Idea of band structure – Metals, Insulators and Semiconductors. Effect of crystal size on density of states and band gap, Electronic structure of nanoparticles. Nanostructured crystals, Size and dimensionality effects – Single electron tunneling – Applications – Superconductivity, Graphenes and CNT.	08
II	Nano Fabrication and Patterning Techniques: Si processing methods, Cleaning/etching, Oxidation, Gettering, doping, Epitaxy. CVD & MOCVD, Physical Vapor Deposition (PVD), Liquid Phase Techniques, Self assembly and catalysis. Etching: Wet and Dry, Nanolithography, Nanoimprinting, X-Ray Lithography(XRL), Particle beam lithography(e-beam, FIB, shadow mask evaporation),	09
III	General Characterization Techniques: X- Ray Diffraction studies – Bragg's law – particle size – Scherrer's equation, Infrared Spectroscopy of Semiconductors, Raman Spectroscopy, Dynamic Light Scattering (DLS), NMR Spectroscopy, ESR Spectroscopy. photo electron spectroscopy(XPS)-SEM,TEM,STM, Atomic force microscopy(AFM).	09
IV	Electrical, Magnetic, Mechanical and Optical Properties and Applications : Electronic and electrical properties -One dimensional systems-Metallic nanowires, Quantum dots -Two dimensional systems - Quantum wells. Magnetic properties -Transport in a magnetic field. Mechanical properties, Optical properties, Evolving interfaces of Nano in NanoBiology, Nano Sensors and Nanomedicines	07
V	MEMS and Microsystems: Evolution of Micro Fabrication – Micro Systems and Microelectronics. Application of MEMS in Various Fields. Introduction – Substrate and Wafer, Active Substrate Material. Silicon as a substrate material, MEMS packaging. Case study on pressure sensor with packaging.	07
	TOTAL	40

TEXT BOOKs

1. Nano Essentials, T Pradeep, Mc Graw Hill, (2008).
2. Nanotechnology-Enabled Sensors, Kourosh Kalantar-zadehand Benjamin Fry, Springer, (2007).

REFERENCE BOOKs

SN	Name of Authors /Books /Publisher	Year of Publication
1	Fundamental of Nanoelectronics, George W. Hanson, Pearson	2009
2	Principal of Nanotechnology, G. A. Mansoori, Wiley	2005
3	Mems and Micro Systems, Mahalik, TMH	2007
4	MEMS, Gabriel, Wiley	2006
5	MEMS, A.R. Jha, CRC	2008
6	Nano Fabrication, CRC	2012
7	MEMS & Microsystems, Design and Manufacture, Tai-Ran HSU, TMH	2013

8EC4.1A COMPUTER NETWORKS

B.Tech. (EC) 8th Sem.
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Queuing Theory - Pure birth, Pure death & Birth-death processes,	2
	Mathematical models for M/M/1, M/M/ ∞ , M/M/m, M/M/1/K and M/M/m/m queues. Little's formula.	5
II	Physical and Data link layer – OSI model & TCP/IP reference models, Line coding schemes, Packet & Circuit switching, Virtual circuit network,	3
	Framing, Simplex protocol, Simplex stop & wait protocol, Sliding window protocol, Go back N protocol, selective repeat,	3
	HDLC, PPP	2
III	MAC Sublayer - Static & dynamic channel allocation, Multiple Access Protocols: ALOHA, slotted ALOHA, CSMA, Token Bus, Token Ring, FDDI	4
	IEEE standards 1002.3 & 1002.5, Virtual circuit network: frame relay & ATM frame and protocol architecture,	3
	Network connection devices: Hubs, Bridges, switches, Routers and Gateways	2
IV	Network Layer - IPv4 & IPv6 addressing and datagram, Internetworking, Non-adaptive & Adaptive routing algorithms,	4
	Distance vector routing and Link state routing algorithms, OSPF and BGP	4
V	Transport and Application Layer - Client server paradigm, TCP frame format, Data traffic descriptors, QoS, Congestion and its control algorithms,	4
	Improving QoS by different queuing schemes, leaky bucket and token bucket implementation, Domain name, DNS in the internet, SMTP, FTP, WWW, HTTP	4
	Total	40

Text Book:

1. Forouzan, “Data Communications and Networks”, 5th ed., Mcgraw-Hill, (2006).

REFERENCE BOOKS:

SN	Name of Authors/Book/Publisher	Publication Year
1	Tanenbaum, “Computer Network”, 5 th ed., Pearson Education	2012
2	Leon Garcia, Widjaja, “Communication Networks”, 2 nd ed., Mcgraw-Hill	2003
3	Stallings, “Data and Computer Communications”, 10 th ed., Pearson Education	2013
4	Bertsekas, Gallager, “Data Networks”, 2 nd ed., PHI	1992
5	Computer Networks, Dave, cengage learning	2003
6	Fundamentals of Networking and Data Communications, White, cengage learning	2013

8EC4.2A OPERATING SYSTEMS

B.Tech. (EC) 8th Sem.

Max. Marks: 100

3L+0T

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	INTRODUCTION – History, Operating system services, types, responsibilities, generations, LINUX, WINDOWS.	6
II	PROCESS MANAGEMENT - Operations on process, Process state, Scheduling, Criteria, scheduling algorithms, Evaluation, Synchronization, Semaphores, Monitors.	8
III	MEMORY MANAGEMENT - Swapping, Continuous memory allocation, Paging, Pure paging, Demand paging, Page-replacement algorithms, thrashing, Example-Pentium, Disk Scheduling.	10
IV	INFORMATION MANAGEMENT - File and directory concept, Access methods, Protection, Free space management, Efficiency and performance, Access matrix, Capability-based systems, Program-threats, User authentication, Firewall.	10
V	DEAD LOCKS - System model, Dead lock characterization, Deadlock prevention, Avoidance, Detection, Recovery, Classic problems of synchronization.	6
	TOTAL	40

TEXT BOOKs:

1. Operating Systems, Dhamdhere, TMH, (2006).
2. Operating System:, Crowley, TMH, (1996).

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	Modern Operating Systems, Andrew S Tanenbaum, PHI	2008
2	Operating Systems:, Pal Chaudhury, PHI	2009
3	Operating System Principles, Peter B. Galvin, Greg Gagne, John Wiley & Sons	2002
4	Operating Systems, Gary Nutt, Pearson	2003
5	Operating Systems: Internals And Design Principles, William Stallings, Pearson	2012
6	Understanding Operating System , Flynn, cengage learning	2009
7	Operating Systems: Principles, Design and Applications , cengage learning	2002

8EC4.3A MICROCONTROLLERS & EMBEDDED SYSTEMS

B.Tech. (EC) 8th sem.
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	THE 8051 MICROCONTROLLER: Introduction, The 8051 microcontroller hardware, I/O pins, Ports, External memory, Counters and Timers, Serial data.	8
II	8051 ASSEMBLY LANGUAGE PROGRAMMING: Addressing modes, External data moves, Stack, Push and Pop opcodes, Logical operations, Byte level and bit level logical operations. Arithmetic operations, Jump and call instructions, Interrupts & returns.	8
III	REAL TIME CONTROL: Interrupts, Multiple sources of interrupts, Non maskable sources of interrupts, Interrupt structure in 8051, Timers, Free running counter & Real Time control .	8
IV	SYSTEM DESIGN: Serial I/O interface, Parallel I/O ports interface, Digital and Analog interfacing methods, LED array, keyboard, Printer, Flash memory interfacing.	8
V	INTRODUCTION TO EMBEDDED SYSTEM: Application of Microcontrollers in interfacing, MCU based measuring instruments. Real Time Operating System for System Design, Multitasking System, Task Definition in a Multitasking System, Round Robin Scheduling, Full Preemptive Scheduling, Basic study and Features of Commercial RTOS : WINCE and Embedded Linux.	8
	TOTAL	40

TEXT BOOKs:

1. Kenneth J.Ayala, "The 8051 Micro controller", Penram Interfacing Publishing, 1996.
2. Rajkamal, "Embedded Systems" TMH

REFERENCE BOOKS:

SN	Name of Authors /Books /Publisher	Year of Publication
1	A Textbook of Microprocessors and Microcontrollers, R. Thegarajan, Scitech Publishers	2002
2	The 8051 Microcontroller and Embedded Systems, Using Assembly and C, K Ayala & D. Gadre, Cengage Learning	2004
3	The 8051 Microcontrollers & Embedded Systems,Mazidi, ,PHI	2004
4	The 8051 Microcontroller, Ayala, cengage learning	2009
5	The 8051 Microcontroller & Embedded Systems using Assembly and C, Ayala /Gadre cengage learning	2005
6	A Textbook of Microprocessors and Microcontrollers, R.S. Kaler I. K. International Publishing House Pvt. Ltd.	2009
7	Embedded Systems & Robots: Projects Using the 8051 Microcontroller , cengage learning	
8	Embedded System Design Using C8051 , Huang , cengage learning	
9	Embedded Microcomputer System Real Time Interfacing, Valvano , cengage learning	

8EC5A RF FABRICATION LAB**B.Tech. (EC) 8th sem.
3P****Max. Marks: 100
Exam Hours: 3**

S.No.	Contents
1.	Design and fabricate the following <i>Planar Transmission Lines</i>: • Stripline and microstrip lines • Parallel coupled striplines and microstrip lines • Slot lines and Coplanar lines Measure their S-parameters and Characteristic impedance.
2	Design and Fabricate the following; • 3-dB branchline coupler, • backward wave coupler, • Wilkinson power dividers • Low pass filters • band pass filters. Measure their S-parameters & frequency responses.
3	Design, fabrication, and measurement of RF amplifier using microwave BJT.

8EC6 INDUSTRIAL ECONOMICS & MANAGEMENT

B.Tech. (EC) 8th sem.

Max. Marks:50

2P

Exam Hours:3

S.No.	CONTENTS
1.	Framework of industrial economics – organizational forms and alternative motives of the firm, industrial efficiency, theory of profitability, market structure, principles of costing.
2.	Approaches to industrial location analysis, Productivity analysis, Input-Output analysis, Concentration of economic power. New Industrial Policy – Critical analysis, Role of technology and entrepreneurship in industrial development.
3.	Industrial project appraisal- classification of industries, industrial legislations in India, recent trends in MNCs, LPG, FDI & joint ventures, methods of project evaluation-NPV, CBA, IRR, break-even analysis.
4.	Management – Principles of management, functions of management- planning, organizing, staffing, directing, controlling, co-ordinating, decision making
5.	Emerging issues – Total quality management, JIT, quality circle, KANBAN, benchmarking, six sigma, quality management, ISO 9000, ISO 14000, Customer relationship management (CRM).

TEXT BOOKS:

1. Subburay, Total quality management, TMH. (2011)
2. Barthwal R.R- industrial economics . wiley eastern limited

Reference Books:

1. Tirole Jean – the theory of industrial organization . MIT PRESS
2. Ahluwalia I.J – industrial growth in india . Oxford university press
3. Divine P.J and R.M Jones et Al- an introduction In industrial economics .George allen &Unwin limited London.
4. Peter F. drucker – principles and practice of management . Prentice hall ltd .

8EC7A VLSI DESIGN & OPTICAL FIBER LAB**B.Tech. (EC) 8th sem.
3P****Max. Marks: 100****Exam Hours: 3**

S.No.	Contents
PART-I: Design and simulation of following VLSI circuits using EDA Tools (Software) Schematic design and make Device Level Layout of following circuits.	
1.	Design 2-input NAND, NOR and XOR using CMOS logic. Obtain its static and dynamic analysis for speed and power dissipation.
2.	Design 2X1 and 4X1 Multiplexer using Transmission Gate (TG). Obtain its static and dynamic analysis for speed and power dissipation.
3.	Design a SR-latch and D-latch using CMOS. Obtain its static and dynamic analysis for speed and power dissipation.
4.	Design a SRAM and DRAM Memory Cell. Obtain its static and dynamic analysis for speed and power dissipation.
PART-II Design and simulation of following VLSI circuits using VHDL and then burn/implement the circuits on FPGA kit for real input.	
5.	Design a 4- bit parallel Adder. Obtain its number of gates, area, and speed and power dissipation.
6.	Design a 4- bit Serial in-serial out shift register. Obtain its number of gates, area, and speed and power dissipation.
7.	Design a 4 bit binary synchronous counter. Obtain its number of gates, area, and speed and power dissipation.
PART-III. To perform following experiments based on Fiber Optic Trainer.	
8.	To set up Fiber Optic Analog link.
9.	To set up fiber Optic Digital link.
10.	Measurement of Propagation loss and numerical aperture.
11.	Characterization (VI Characteristics) of laser diode and light emitting diode.

Scheme and Syllabus
Rajasthan Technical University, Kota
B. Tech. in Civil Engineering
(Session 2017-18)

BRANCH CODE	Civil Engineering	CE					
		Hrs. / Week					
SEMESTER III	Title	L	T	P	IA	Exam	Total
3CE1A	Strength of Materials-I	3	1	0	20	80	100
3CE2A	Civil Engineering Materials	3		0	20	80	100
3CE3A	Engineering Geology	3		0	20	80	100
3CE4A	Construction Technology	3		0	20	80	100
3CE5A	Fluid Mechanics	3	1	0	20	80	100
3CE6A	Advanced Engineering Mathematics	3	1	0	20	80	100
	Total	18	3				600
3CE7A	Civil Engineering Materials Lab	0	0	2	45	30	75
3CE8A	Engineering Geology Lab	0	0	2	30	20	50
3CE9A	Building Drawing-I	0	0	3	45	30	75
3CE10A	Fluid Mechanics Lab	0	0	2	45	30	75
3CE11A	Professional Ethics & Disaster Management	0	0	2	45	30	75
3CEDC	Discipline & Extra Curricular Activity			11			50
	Total						400
	Grand Total	18	3	11			1000

BRANCH CODE	Civil Engineering	CE					
		Hrs. / Week					
SEMESTER - IV	Title	L	T	P	IA	Exam	Total
4CE1A	Strength of Materials-II	3	1	0	20	80	100
4CE2A	Concrete Technology	3		0	20	80	100
4CE3A	Hydraulics & Hydraulic Machines	3	1	0	20	80	100
4CE4A	Surveying-I	3		0	20	80	100
4CE5A	Building Planning	3		0	20	80	100
4CE6A	Quantity Surveying & Valuation	3		0	20	80	100
	Total						600
4CE7A	Concrete Technology Lab		0	3	45	30	75
4CE8A	Hydraulics & Hydraulic Machines Lab		0	2	45	30	75
4CE9A	Surveying Lab-I		0	3	45	30	75
4CE10A	Building Drawing-II		0	3	45	30	75
4CE11A	Material Testing Lab		0	2	30	20	50
4CEDC	Discipline & Extra Curricular Activity						50
	Total						400
	Grand Total	18	2	13			1000

BRANCH CODE	Civil Engineering	CE					
		Hrs. / Week					
SEMESTER - V	Title	L	T	P	IA	Exam	Total
5CE1A	Theory of Structures-I	3	1	0	20	80	100
5CE2A	Environmental Engineering-I	3		0	20	80	100
5CE3A	Geotechnical Engineering-I	3	1	0	20	80	100
5CE4A	Surveying-II	3		0	20	80	100
5CE5A	Building Design	3		0	20	80	100
5CE6.1A	Ground Improvement Techniques	3		0	20	80	100
5CE6.2A	Advanced Concrete Technology						
5CE6.3A	Solid Waste Management						
	Total	18	2				600
5CE7A	Environmental Engineering Lab-I	0	0	2	45	30	75
5CE8A	Geotechnical Engineering Lab-I	0	0	2	45	30	75
5CE9A	Surveying Lab-II	0	0	3	45	30	75
5CE10A	Computer Aided Building Design	0	0	3	45	30	75
5CE11A	Structural Engineering Lab	0	0	2	30	20	50
5CEDC	Discipline & Extra Curricular Activity						50
	Total						400
	Grand Total	18	2	12			1000

BRANCH CODE	Civil Engineering	CE					
		Hrs. / Week					
SEMESTER - VI	Title	L	T	P	IA	Exam	Total
6CE1A	Theory of Structures-II	3	1	0	20	80	100
6CE2A	Geotechnical Engineering-II	3	1	0	20	80	100
6CE3A	Environmental Engineering-II	3		0	20	80	100
6CE4A	Design of Concrete Structures-I	3		0	20	80	100
6CE5A	Transportation Engineering-I	3	1	0	20	80	100
6CE6.1A	Remote Sensing & GIS	3		0	20	80	100
6CE6.2A	Rock Mechanics						
6CE6.3A	Repair & Rehabilitation of Structures						
	Total	18	3				600
6CE7A	Geotechnical Engineering Lab-II	0	0	2	45	30	75
6CE8A	Environmental Engineering Lab-II	0	0	2	45	30	75
6CE9A	Concrete Structures Design-I	0	0	3	60	40	100
6CE10A	Road Material Testing Lab	0	0	2	60	40	100
6CEDC	Discipline & Extra Curricular Activity						50
	Total						400
	Grand Total	18	3	9			1000

BRANCH CODE	Civil Engineering	CE					
		Hrs. / Week					
SEMESTER - VII	Title	L	T	P	IA	Exam	Total
7CE1A	Water Resource Engineering-I	3		0	20	80	100
7CE2A	Design of Steel Structures-I	3		0	20	80	100
7CE3A	Design of Concrete Structures-II	3		0	20	80	100
7CE4A	Transportation Engineering-II	3		0	20	80	100
7CE5A	Application of Numerical Methods in Civil Engineering	3		0	20	80	100
7CE6.1A	Advance Transportation Engineering	3		0	20	80	100
7CE6.2A	Design of Prestress Concrete Structures						
7CE6.3A	Rural Water Supply & Sanitation						
	Total	18					600
7CE7A	Design of Water Resource Structures-I			2	30	20	50
7CE8A	Steel Structures Design-I	0	0	3	30	20	50
7CE9A	Concrete Structures Design-II			3	30	20	50
7CE10A	Application of Numerical Methods in Civil Engineering Lab	0	0	3	30	20	50
7CETR	Practical Training & Industrial Visit			2		100	100
7CEPR	Project-I			2	50		50
7CEDC	Discipline & Extra Curricular Activity						50
	Total						400
	Grand Total	18	0	15			1000

BRANCH CODE	Civil Engineering	CE					
		Hrs. / Week					
SEMESTER - VIII	1	L	T	P	IA	Exam	Total
8CE1A	Water Resource Engineering-II	3		0	20	80	100
8CE2A	Design of Steel Structures-II	3		0	20	80	100
8CE3A	Project Planning & Construction Management	3		0	20	80	100
8CE4.1A	Bridge Engineering	3		0	20	80	100
8CE4.2A	Advance Foundation Engineering						
8CE4.3A	Earthquake Resistant Construction & Design						
	Total	12					400
8CE5A	Design of Water Resource Structures-II	0	0	3	30	20	50
8CE6A	Professional Practice & Estimating	0	0	3	30	20	50
8CE7A	Steel Structures Design-II			3	30	20	50
8CE8A	Design of Foundations			2	30	20	50
8CE9A	Structural Analysis by Matrix Methods	0	0	2	30	20	50
8CESM	Seminar	0	0	2	60	40	100
8CEPR	Project-II	0	0	2	120	80	200
8CEDC	Discipline & Extra Curricular Activity						50
	Total						600
	Grand Total	12	0	17			1000

3CE1A: STRENGTH OF MATERIALS– I (L-3, T-1)

B.Tech. (Civil) 3rd semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
	Introduction to objective, scope and outcome of the subject.	1
I	Simple Stresses and Strains: Concept of stress and strain in three dimensions and generalized Hooke's law; Young's modulus; Tension test of mild steel and other materials: true and apparent stress, ultimate strength, yield stress and permissible stress;	4
I	Stresses in prismatic & non prismatic members and in composite members; Thermal stresses; Shear stress, Shear strain, Modulus of rigidity, Complementary shear stress; Poisson's ratio, Volumetric strain, Bulk modulus, relation between elastic constants; Stresses in composite members, Compatibility condition	5
II	Compound Stress: Two dimensional stress system: stress resultant, principal planes and principal stresses, state of pure shear maximum shear stress, Mohr's circle & it's application. Moment of Inertia: Polar and product moment of inertia, Principal axes and principal moment of inertia	7
III	Columns: Short and long columns, slenderness ratio, crushing and buckling of column, short column subjected to axial and eccentric loads; Euler's theory and its limitation, concept of effective length of columns; Rankine & Secant formulae.	5
III	Membrane Analysis: Stress and strain in thin cylindrical & spherical shells under internal pressures.	2
IV	Bending of Beams: Types of supports, support reactions, determinate and indeterminate structures, static stability of plane structures.	3
IV	Bending moment, Shear force and Axial thrust diagrams for statically determinate beams subjected to various types of loads and moments, Point of Contra-flexure, relation between load, SF and BM	5
V	Theory of simple bending: Distribution of bending and shear stresses for simple and composite sections	8
	TOTAL	40

Text Book: 1. Mechanics of Structures Vol. I & II by S.B Junarkar, Charotar Publishing House, Anand.

2. Strength of Materials & Mechanics of Structures: Vol. I, II by Dr. B.C. Punmia Laxmi Publications (p) Ltd.

REFERENCE BOOKS

1. Strength of Material by Singer and Pytel, Harper Collins Publishers.
2. Elements of Strength of Materials by Timoshenko & Young, Mc Graw Hill Book Co.
3. Mechanics of Structures by Timoshenko & Gere, CBS Publishers and Distributors.

3CE2A: CIVIL ENGINEERING MATERIALS (L-3)

B.Tech. (Civil) 3rd semester
3L

Max. Marks: 80
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction to objective, scope and outcome of the subject. Stones: Source and types of stones, various standard test on building stones including compressive strength, water absorption, durability, impact value, tensile strength. Identification, Selection criteria and uses of common building stones. Dressing of stones.	8
II	Clay Products : Manufacturing of Bricks. Types and properties of bricks and their determination as per IS code such as water absorption, compressive strength, effloresces, dimension and tolerance test. Types of Tiles, Standard tests for tiles as per IS code such as water absorption, tolerance, impact value, glazing. Fly Ash: Properties, classification, use of fly-ash in manufacturing of bricks & cement.	8
III	Cement & Lime : Raw materials, chemical composition and manufacturing process of cement. Basic compounds (Bouge's compounds) of cement and their role, types of cement. Setting and hardening of cement, physical properties of cement, Various standard tests on Portland cements, as per IS code including consistency, setting time, fineness, soundness and strength.	5
	Lime: Classification as per IS, Manufacturing process, properties, standard tests of lime. Use of lime in construction. Gypsum, properties and use, Plaster of Paris.	3
IV	Mortar and Plaster: types of sand, bulking of sand, tests for sand, classification, mortar preparation methods: Functions and tests & their uses in various types pointing & plastering.	3
	Timber & Steel: Definitions of related terms, classifications and properties, defects in wood, conversion of wood, seasoning, preservation, fire proofing, Ply woods, fiber boards,. Steel: properties, types mild steel and HYSD steel and their use, common tests on steel various types of paints and Varnishes; white wash and distempers and their application. .	5
V	Environmental friendly Building material: Concept of embodied energy of materials, energy used in transportation and construction process. Natural material like bamboo, rammed earth, stones, stabilized blocks; supplementary cementitious materials like blast furnace slag, silica fume, rice husk ash,; building materials from agro and industrial wastes.	5
	Miscellaneous: Properties, types and uses of glass, aluminum, Asbestos, G.I., plastics in construction.	3
	TOTAL	40

Text Book: 1. Building Materials by Prabin singh; S.K.Kataria & Sons., 2012
2012

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	“Affordable Housing” by B.N. Moolchandani, Published by Indian Building Congress, Delhi.	2014
2	Building Materials:Products, Properties and Systems by Ghambir,Tata Mc Graw Hill, Delhi	2010
3	Construction Materials: Their nature & Behaviour by J.M. Illston; E& FN Spon	2003
4	Building Materials by S. Duggal; New Age International Publishers.	2006
5	Materials for Civil and Construction Engineers, by Michale, S .Mamlouk and Jhon P.Zaniewski, Pearson Noida.	2011

3CE3A: ENGINEERING GEOLOGY (L-3)

B.Tech. (Civil) 3rd semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
	Introduction to objective, scope and outcome of the subject.	1
I	General Geology: Branches and Scope of Geology, Internal Structure of the Earth, Types of Weathering & Geological work of natural agencies like River & Wind. Geological Time Scale. Physical Properties of Minerals.	8
II	Petrology: Formation, Texture, Structure and Classification of Igneous, Sedimentary and Metamorphic Rocks. Engineering Properties of Rocks for Building & Road Material. Laboratory and Field & in-situ Test for Site Construction.	8
III	Structural Geology: Causes, Terminology, Classification, Recognition, Effects and Engineering consideration of Fold, Fault, Joints and Unconformities. Dip & Strike Problems.	7
IV	Engineering Geology: Geophysical methods as applied to Civil Engineering for Subsurface Analysis (Electrical and Seismic methods). Terminology, Types and Geological consideration for site selection of Dam & Tunnel.	8
V	Remote Sensing & GIS: Remote Sensing & GIS System, Nature of Electromagnetic Radiation, Electromagnetic Spectrum, Energy Interactions with Earth's Surface Materials, Remote Sensing Platforms & Sensor's Characteristics. Application, Advantages and Limitations of Remote Sensing and GIS in Various fields of Civil Engineering.	8
	TOTAL	40

1. **Text Book:** Parbin Singh-A Text Book of Engineering & General Geology- S.K.Kataria & sons

REFERENCE BOOKS

1. S.K.Garg- Physical & Engineering Geology- Khanna Publishers
2. N Chenna Kesavulu- A Text book of Engineering Geology- Macmillan India Ltd.
3. M.T.Maruthesha Reddy- A Text book of Applied Engineering Geology- New Age International Publisher
4. Remote Sensing and GIS: B.Bhatta- Oxford Publishers.

3CE4A: CONSTRUCTION TECHNOLOGY (L – 3)

B.Tech. (Civil) 3rd semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction to objective, scope and outcome of the subject. Building Requirements & Construction System: Building components, their functions and requirements, types of construction, load bearing construction and framed structure construction. Lift slab construction. Prefabricated/precast construction; advantages & disadvantage of prefabrication.	2
	Temporary structures: Types & methods of shoring, underpinning and scaffolding.	1
	Foundation & Site Preparation: Purpose, types of foundation, depth of foundation, Sequence of construction activity and co-ordination, site clearance, marking, foundation plan,	2
	Brick and Stone Masonry : Basic principle of sound masonry work, different types of bonds, relative merits merit and demerits of English, single Flemish and double Flemish bond. Comparison between stone and brick masonry. General principles, classification of stone masonry	4
II	Damp Proofing: Causes of dampness, effects of dampness methods and material for damp proofing DPC treatment in buildings, methods and materials for anti termite treatment. Joints : Requirements, types and material used, construction details. Grouting of Joints of Precast reinforced Concrete Structures.	3
	Arches and Lintels : Terms used, types of arches and their construction detail, types of lintels and constructions. thin precast RCC lintels in Brick walls. Partition Wall : Types, purpose and use of partition wall.	3
	Stairs : Terms used, requirements of good staircase, classification, construction details and suitability of different types of stairs, lifts and lamps.	3
	Fabrication and Erection Work : Fabrication of Structural steel at slopes and sites, Handling and transportation of units to be erected, Erection of Fabricated steel structures, Prefabricated/precast construction; relative advantages & disadvantage and various precast units & Erection of Precast reinforced Concrete Structures.	2
III	Ground & Upper floors : Floor components and their junctions, selection of flooring and floor types, construction details of ground and upper floors, merits and demerits	3
	Roof and Roof Covering : Purposes, classification of roofs, terms used, types of pitched roofs, trussed roofs specially king port, queen port, steel roof trusses, details of steel roof trusses, method of construction, roof covering materials for pitched roofs. Thin R.C. ribbed slab for floors & roofs. Precast R.C. plank flooring/roofing.	3
IV	Advance Construction Equipments Different types of construction equipments viz. Earth moving equipments & their outputs, Dewatering equipments, Pumping equipments, Grouting equipments, Pile Driving equipments, Compaction equipments,	7

	Concreting equipments.	
V	Equipment Management in Construction Projects Forecasting equipment requirements, Output and capacity of equipments, Selection of equipments, Spare-parts management, Owning Costs-investment costs, depreciation, major repair cost, Operation Cost & Its types. Investment Cost, Cost of Repairs, Overheads Cost accounting, Break-even point theory, Replacement of equipment. Maintenance management-types of maintenance, breakdown maintenance, preventive maintenance & its functions.	7
	TOTAL	42

Text Book: . 1. *Construction Equipments & Management* by R.L. Purifoy, Tata Mc Graw Hill.

REFERENCE BOOKS

1. "Affordable Housing", Published by Indian Building Congress, Delhi. 2014
2. *Construction Technology* by Subir K. Sarkar & Subhajit Saraswati, Oxford University Press
3. *Building Construction* by Bindra & Arora; Dahnpat Rai & Sons.
4. *Construction Equipments* by Mahesh Verma, Metropolitan Book Co.
5. *Construction Equipments and its Management* by S.C.Sharma, Prentice Hall of India (PHI).

3CE5A: FLUID MECHANICS (L-3, T-1)

B.Tech. (Civil) 3rd semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
	Introduction to objective, scope and outcome of the subject.	1
I	Fluids: Definition, Ideal fluids, real fluids, Newtonian and non-Newtonian fluids.	2
	Properties of Fluids: Units of measurement, Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity.	4
II	Hydrostatics : Pressure at a point in a static fluid; pressure variation in an incompressible static fluid; atmospheric pressure, Gauge pressure, vacuum pressure, absolute pressure, Manometers Bourdon pressure gauge.	4
	Buoyancy: Forces acting on immersed plane surface. Centre of pressure, forces on curved surfaces. Conditions of equilibrium for floating bodies, meta-centre and met centric height experimental and analytical determination of met centric height.	4
III	Equilibrium of Fluid particles and flow: Fluid mass subjected to horizontal and vertical acceleration and uniform rotation.	2
	Hydro-kinematics : Types of Flows : Steady and unsteady, uniform and non-uniform, stream lines, path lines, stream tubes, principles of conservation of mass, equation of continuity, acceleration of fluid particles local and connective, Rotational and irrotational motions, free and forced vortex, circulation and voracity velocity potential and stream function, elementary treatment of flow net. Euler's equations of motion and integration of Euler's equations, Bernoulli's equation for incompressible Fluids, assumptions in Bernoulli's equation, Energy correction factor.	7
	Applications of Bernoulli's equation: Pitot tube, Venturimeter, orifice meter, orifices & mouth pieces, time of emptying of tanks by orifices, sharp edged rectangular, triangular and trapezoidal notches, Francis formula. Velocity of approach. End contractions Cippoletti Weir, time of emptying reservoirs by weirs.	4
IV	Momentum Equation and its Application: Development of momentum equation by control volume concept, Momentum correction factor, applications – Borda's mouth pieces, sudden enlargement of flow, pressure on flat plates, Nozzles.	4
V	Flow Through Pipes: Laminar flow, Reynolds experiment, transition from laminar to turbulent flow. Turbulent Flow : Laws of fluid friction, friction factor Moodys diagram, loss of head due to friction and other causes. Hydraulic gradient, total energy line Chezy's, Darcy's and Manning's formula, flow through parallel pipes and pipes in series, flow through branched pipes. Flow along a bypass. Power transmission through pipe, condition for maximum	8

	power. Elementary water hammer concept.	
	TOTAL	40

Text Book: 1. Fluid Mechanics by Modi & Seth, Standard Publishers, Delhi.

REFERENCE BOOKS

- 1-Fluid Mechanics by Dr. K.R. Arora, Standard Publishers and Distributors, Delhi.
- 2- Fluid Mechanics by Dr. R.K. Bansal, Laxmi Publication (P) Ltd.
- 3.Fluid Mechanics by H.M.Raghunath, CBS Publishers and Distributors.
4. Fluid Mechanics & Machinery by C.S.P.Ojha, R.Berndtsson and P.N.Chandramauli, Oxford Publishers, Delhi.

3CE6A: ADVANCED ENGINEERING MATHEMATICS (L-3, T-1)

B.Tech. (Civil) 3rd semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Fourier Series & Z Transform – Expansion of simple functions in fourier series. Half range series, Change of intervals, Harmonic analysis. Introduction, Properties, Inverse Z Transform.	7
II	Laplace Transform - Laplace transform with its simple properties. Unit step function, Dirac delta function their Laplace transforms, Inverse Laplace, transform – convolution theorem, applications to the solution of ordinary and partial differential equations having constant coefficients with special reference to wave and diffusion equations.	8
III	Fourier Transform - Complex form of Fourier Transform and its inverse, Fourier sine and cosine transform and their inversion. Applications of Fourier Transform to solution of partial differential equations having constant coefficient with special reference to heat equation and wave equation.	8
IV	Numerical Analysis: Difference operation Forward backward and central, shift and average operators and relation between them. Newton's forward and backward differences interpolation formulae. Sterling's formulae, Lagrange's interpolation formula. Numerical differentiation and integration. Trapezoidal rule, Simpson's one third and one eighth rule.	9
V	Numerical integration: Numerical integration of ordinary differential equations of first order, Picards method, Euler's method & Modified Euler's Method, Mille's method and Ranga Kutta fourth order method.	8
	TOTAL	40

REFERENCE BOOKS

1.Engineering Maths Vol-I by Chandrika Prasad, Standard Publishers and Distributers.

Vol-II by Chandrika Prasad, Standard Publishers and Distributers.

2.Higher Engineering Maths by Gaur & Kaul, Jaipur Publishing House.

Typical list of Experiments for III Semester Labs

3CE7A: CIVIL ENGINEERING MATERIAL LAB (P-2)

1. Identification of Materials by Visual Inspection
2. To determine Normal Consistency, Initial & Final setting time, Specific Gravity, fineness & compressive strength of Cement (IS: 269-1967)
3. To Study the Utilization of Fly Ash
4. To Study the Procedure for Testing of Stone
5. To Study the Fiber Reinforced Concrete
6. To Study the Properties and Use Of Different Glasses
7. To Study the Different Aluminum and Steel Sections
8. To Study the Manufacture and Use of Concrete Hollow Blocks
9. To Determine Compressive and Tensile Strength of Timber Parallel and Perpendicular to Grain
10. To Study the Properties and Uses of Kota Stone
11. To determine the Water Absorption and Tolerance Limit of Bricks

3CE8A: ENGINEERING GEOLOGY LAB (P-2)

1. Physical Properties of Minerals
2. Physical Properties of Rocks
3. Identification of Minerals in Hand Specimen
4. Identification of Rocks in Hand Specimen
5. Identification of Geological features through wooden Models
 - a) Structural Geological Diagrams
 - b) Petrological Diagrams
 - c) Engineering Geological Diagrams
6. Interpretation of Geological Map (10 Nos.)
7. Dip & Strike Problems (8 Nos.)

3CE9A: BUILDING DRAWING- I (P-3)

Building Components –

1. Drawing of walls
 - i. Brick and Stone masonry
 - ii. Partition wall, cavity wall and cross section of external wall
2. Pointing, Arches, Lintels and Floors
3. Doors and Windows
4. Stairs, Cross section of Dog legged stairs
5. Roofs: Flat and Inclined (Steel)

6. Foundations for Masonry Structures and Framed Structures, Provision of Damp Proof Course

Building Planning –

1. Development of Front Elevation and Sectional Elevation from a given plan
2. Development of Plan, Front Elevation and Sectional Elevation from line diagram

3CE10A: FLUID MECHANICS LAB. (P-2)

1. To verify the Bernoulli's theorem.
2. To calibrate the Venturimeter.
3. To calibrate the Orificemeter.
4. To determine Metacentric Height.
5. To determine C_c , C_v , C_d of an orifice.
6. To determine C_d of a mouthpiece.
7. To determine C_d of a V-notch.
8. To determine viscosity of a given fluid.
9. Bye Pass.

3CE1A1: MORAL VALUES, PROFESSIONAL ETHICS AND DISASTER MANAGEMENT (P-3) Common to all Branches

4CE1A : STRENGTH OF MATERIALS–II (L-3 T-1)

B.Tech. (Civil) 4th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
	Introduction to objective, scope and outcome of the subject	1
I	Deflection of Beams: Differential relation between load, shear force, bending moment, slope deflection.	3
	Slope & deflection in determinate beams using double integration method, Macaulay's method, area moment method and conjugate beam method.	4
II	Analysis of prop cantilever structures, Analysis of Indeterminate Structure using Area moment method, Conjugate beam method Combined direct and bending stress, middle third rule, core of a section, gravity retaining wall	8
III	Fixed Beams & Continuous Beams: Analysis of fixed beams & continuous beams by three moments Theorem and Area moment method.	7
IV	Torsion: Elementary concepts of torsion, shear stress in solid and hollow circular shafts, angle of twist, power transmitted by a shaft, combined bending and torsion;	4
	Springs: Stiffness of springs, springs in series and parallel, laminated plate springs, leaf spring, close coiled helical springs, open coiled springs.	4
V	Vibrations: Elementary concepts of structural vibration, Mathematical models, basic elements of vibratory system. Degree of freedom. Equivalent Spring stiffness of springs in parallel and in series.	3
	Simple Harmonic Motion: vector representation, characteristic, addition of harmonic motions, Angular oscillation.	2
	Undamped free vibration of SDOF system: Newton's law of motion, D'Alembert's principle, deriving equation of motions, solution of differential equation of motion, frequency & period of vibration, amplitude of motion; Introduction to damped and forced vibration.	4
	TOTAL	40

Text Book: 1. Strength of Materials & Mechanics of Structures: Vol. I by Dr. B.C. Punmia Laxmi Publications (P) Ltd.

REFERENCE BOOKS

- 1.Strength of Material by Singer and Pytel, Harper Collins Publishers.
- 2.Elements of Strength of Materials by Timoshenko & Young, Mc Graw Hill Book Co.
- 3.Mechanics of Structures by Timoshenko & Gere, CBS Publishers and Distributors.
- 4.Mechanics of Structures Vol. I & II by S.B Junarkar, Charotar Publishing House.

4CE2A: CONCRETE TECHNOLOGY (L-3)

B.Tech. (Civil) 4th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
	Introduction to objective, scope and outcome of the subject	1
I	Ingredients of concrete: Cement: hydration of cement and its basic compounds, structure of hydrated cement, C-S-H gel, heat of hydration, gel-space ratio and its significance. Aggregates: types, physical properties and standard methods for their determination.	3
	Concrete : Grade of concrete, proportioning of ingredients, water content and its quality for concrete, water/cement ratio and its role, Properties of fresh concrete including workability, air content, Flow ability, Segregation, Bleeding and Viscosity etc. - Factors affecting, methods of determination.	4
II	Properties of hardened concrete such as strengths, permeability, creep, shrinkage, factors influencing, Standard tests on fresh and hardened concrete as per IS code. Aggregate- cement interface, maturity concept.	4
	NDT: Introduction and their importance. Application & use of Rebound Hammer, Ultra-sonic pulse velocity meter, Rebar & Cover meter, half cell potential meter, corrosion resistivity meter, core sampling.	4
III	Concrete Handling in Field: Batching, mixing, placing and transportation of concrete, equipments for material handling, various methods their suitability and precautions. Compaction of concrete: methods & equipments. Curing of concrete: various methods their suitability. Durability of concrete.	7
IV	Concrete mix design (ACI, IS method), quality control for concrete.	3
	Admixture in concrete: Chemical and mineral admixtures, their types and uses: water reducers, accelerator, retarders, water-proofing plasticizers, super plasticizers, air-entraining agents. Use of fly ash and silica fume in concrete, their properties and effect.	6
V	Form work: Requirements, their types and code guidelines for the design. Typical formworks and shuttering/centering for Columns, beams, slabs, walls, arches and staircase. Slip and moving formwork.	4
	Special types of concrete: Introduction to high strength concrete, high performance concrete, sulphate resisting concrete, under water concreting, self compacting concrete, pumpable concrete: their salient properties and application.	4
	TOTAL	40

Text Book:

1. Concrete Technology by Neville & Brooks, Pearson Education.

REFERENCE BOOKS

1. Concrete: Microstructure, Properties & Materials by Mehta P.K, Tata Mc Graw Hill.
2. Concrete Technology by M.S.Shetty, S.Chand & Co.

3. Concrete materials by Popovics, Standard Publishers.
4. Chemistry of Cement and Concrete by Peter C.Hewlett, Elsevier Butterworth Heinemann.

4CE3A: HYDRAULICS AND HYDRAULIC MACHINES (L – 3)

B.Tech. (Civil) 4th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction to scope, objective and outcome of subject	1
I	Dimensional Analysis & Models: Dynamical Similarity and Dimensional Homogeneity Model experiment, geometric, Kinematic and Dynamic similarity. Reynold's, froudes, Weber's, Euler and Mach numbers. Distorted river models and undistorted models, proper choice of scale ratios. Scale effect.	3
	Principle of dimensional analysis Rayleigh method, Buckingham theorem, applications of dimensional analysis to pipe Friction problems, resistance to motion of partially and fully submerged bodies and other simple problems. Ship model experiments.	4
II	Laminar Flow: Relation between shear & pressure gradient. Flow between plates & pipes. Equations for velocity distribution, pressure difference.	3
	Turbulent Flow in pipes: Theories of Turbulence, Nikuradse's Experiments. Hydro dynamically smooth & rough boundaries. Laminar, Sub layer, Equations of velocity distribution and friction coefficient. Stanton Diagram, Moody's diagram.	5
III	Flow through channels: Uniform, Non-Uniform and variable flow. Resistance equations of Chezy, Mannring and Bazin. Section factor for uniform flow. Most Efficient rectangular, triangular and trapezoidal sections.	3
	Equations of gradually varied flow in Prismatic channels. Limitation of its applicability and assumption made in its derivation. Specific energy of flow. Critical depth in prismatic channels. Alternate depths. Rapid, critical and sub critical Flow Mild, steep and Critical Slopes. Classification of surface curves in prismatic channels and elementary computation	5
IV	Rapidly varied flow: Hydraulic jump or standing wave in rectangular channels. Conjugate or sequent depths Losses in jump, location of jump. Broad crested weirs for channel flow: Measurement, velocity distribution in open channels, parshall flume.	5
	Impact of free Jets: Impact of a jet on a flat or a curved vane, moving and stationary vane, flow over radial vanes.	3
V	Centrifugal pumps and turbines: Volute and whirlpool chambers, Loses of head due to variation of discharge Manometric and Hydraulic efficiencies, Description of single and multistage pumps. Specific speed, characteristic curves. Model Test. Reaction and Impulse turbines, specific speed, Mixed flow turbines. Pelton wheel turbine, Francis turbine, propeller turbine and	8

	Kaplan turbine Efficiency, Characteristics of turbines. Basic principles of governing of turbines, Draft-tube, Selection of turbines, model tests.	
	TOTAL	40

Text Book:

1.Fluid Mechanics & Hydraulics by Dr. K.R, Arora, Standard Publishers & Distributers, Delhi.

REFERENCE BOOKS

1. Fluid Mechanics & Hydraulics by John F.Douglas & Lynne B. Jack, Prentice Hall Inc.
- 2.Fluid Mechanics & Hydraulics by Dr. R.K. Bansal, Laxmi Publications (P) Ltd.
- 3.Fluid Mechanics & Hydraulics by Modi & Seth, Standard Publishers & Distributers, Delhi.
4. Fluid Mechanics & Machinery by C.S.P.Ojha, R.Berndtsson and P.N.Chandramauli, Oxford Publishers, Delhi.

4CE4A: SURVEYING – I (L-3)

B.Tech. (Civil) 4th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
	Introduction to scope, objective and outcome of subject	1
I	Introduction: Importance of surveying to engineers, Plane and geodetic surveying, methods of location of points, principle of surveying from whole to part, conventional signs.	3
	Measurement of Distances: Different types of chains, tapes and their uses. Sources of error and precautions, corrections to tape measurements. Field problems in distance measurement. Advance techniques of distance measurements.	4
II	Measurement of Angles & Direction: Different types of direction measuring instruments and their uses. Reference meridians, Bearing and azimuths, magnetic declination and its variation. Use and adjustment of surveyors and prismatic compass.	4
	Vernier and micro-optic theodolite, temporary and permanent adjustment of vernier theodolite. Measurement of horizontal and vertical angle by different methods. Application of theodolite in field problems.	4
III	Traversing: Different methods of traversing; chain traverse, chain & compass traverse, transit-tape traverse. Methods of computations and adjustment of traverse; transit rule, Bowditch rule, graphical method, axis method. Gales traverse table.	8
IV	Leveling: Definitions of various terms in leveling. Different types of leveling, sources of errors in leveling curvature and refraction corrections. Temporary and permanent adjustment of dumpy and tilting levels. Computation and adjustment of levels. Profile leveling; L-Section and cross-sections.	8
	Plane Table Surveying: Elements of plane table survey working operations, methods of plane table survey; intersection, traversing and resection, two	4

	point and three point problems.	
V	Contouring: Characteristics of contours, contour interval, contour gradient, Methods of locating contours, uses of contour maps.	4
	TOTAL	40

Text Book:

1. Surveying Volume I by Dr. B.C. Punamia Laxmi Publications (P) Ltd.

REFERENCE BOOKS

1. Plane Surveying by Dr. A.M. Chandra, New Age International.
- 3- Surveying Volume –I & II by Dr. K.R. Arora Standard Book House Delhi
- 4- Surveying & Leveling by Subramanian Oxford University Press.
5. Surveying Vol.1 by S.K. Duggal Tata Mc Graw Hill, Delhi.

4CE5A: BUILDING PLANNING (L-3)

B.Tech. (Civil) 4th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
	Introduction to scope, objective and outcome of subject	1
I	Introduction: Types of buildings, Classification of buildings by occupancy, Multi storey building, criteria for location and site selection, site plan and its detail.	3
	Sun Consideration : Different methods of drawing sun chart, sun shading devices, design of louvers, energy conservation in buildings, passive solar cooling and heating of buildings.	4
II	Climatic and comfort Consideration: Elements of climate, global climate, climatic zones of India, comfort conditions, bi climatic chart, climate modulating devices.	3
	Orientation: Meaning, factors affecting orientation, orientation criteria for tropical climate.	2
	Building Bye Laws and NBC Regulations: Objective of by-laws, Regulation regarding; means of access, lines of building frontages, covered area, floor area ratio, open spaces around buildings, height & sizes of rooms, plinth regulation and sanitation provisions.	4
III	Principles of Planning: Different factors affecting planning viz-aspect, prospect, furniture requirement, roominess, grouping, circulation, elegance, privacy etc.	5
	Vastu Shastra In Modern Building planning: Factors considered in Vastu, site selection, orientation, planning and design of residential buildings, office	2

	buildings.	
IV	Functional design and Accommodation requirements of (A) Residential Buildings: Anthrometry, activities and their spatial requirements; Area planning, living area, sleeping area, service area; Bubble diagram showing sequence of arrangement of area, plan, elevation, sectional elevation.	4
	(B) Non Residential Buildings: viz-school buildings, rest house, primary health centers, post office, bank, College library, cinema theatres etc.	4
V	Services in Buildings (A) Lighting and ventilation, doors and windows, lifts. (B) Acoustics, sound insulation and noise control. (C) Fire fighting provisions.	8
	TOTAL	40

REFERENCE BOOKS

- 1- Manual of Tropical Housing and Buildings by Koenigs Berger Orient and Longman.
- 2- Building Drawing by M.G.Shah, C.M. Kala, S.Y.Patki , Tata Mc Graw Hills.
- 3.SP.41 (S&T)- Handbook on functional Requirements of Buildings Part-I
4. National Building Code, BIS.
5. Architecture Drafting and Design by Donald E. Helper, & Paul I Wallach.
6. Time Saver Standards for Housing and Residential Development by DE Chiara, Tata Mc Graw Hill, Delhi.

4CE6A: QUANTITY SURVEYING & VALUATION (L- 3)

B.Tech. (Civil) 4th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
	Introduction to scope, objective and outcome of subject	1
I	Introduction: Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.	8
II	Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labor requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.)	8

III	Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts, Services for building such as water supply, drainage and electrification.	10
IV	Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building.	5
V	Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.	8
	TOTAL	40

Text Book:

1- Estimating & costing by B.N.Dutta, UBS Publishers & Distributers.

REFERENCE BOOKS

1. 2- Estimating Costing Specification & Valuation in Civil Engg. M .Chakroborty, Bhakti Vedanta, Book Trust, delhi.
2. 3.Quantity Surveying and Valuation by S.C. Rangawala , Charotar Publishing House.

Typical List of Experiments for Labs of IV Semester

4CE7A: CONCRETE TECHNOLOGY LAB. (P-3)

1. To determine the fineness of Cement by sieving through a 90 micron I.S. Sieve.
2. To determine the flexural strength of Concrete.
3. To determine Soundness of cement by Le-chatelier apparatus.
4. To determine the specific gravity of fine aggregate (sand) by Pycnometer.
5. To determine the bulking of fine aggregate and to draw curve between water content and bulking.
6. To determine the fineness modulus of coarse aggregates and fine aggregates by sieve analysis.
7. To determine the workability of given concrete mix by slump test.
8. To determine the workability of given fresh concrete mix by compaction factor test.
9. To determine the optimum dose of super plastisizers by Flow table test.
10. To design concrete mix of M-20 grade without admixture in accordance with I S recommendations.
11. To design concrete mix of M-40 grade with admixture in accordance with I S recommendations.
12. To determine the Elastic Modulus of Concrete.
13. To determine the Permeability of Concrete.
14. NDT

4CE8A: HYDRAULICS LAB. (P-2)

1. To determine the minor losses.
2. To determine the friction factor.
3. To determine C_d of Broad crested weir.
4. To verify the momentum equation.
5. To determine the discharge of venturimeter.
6. To determine Manning's & Chezy's coefficient of roughness for the bed of a given flume.
7. To plot characteristics curve of hydraulic jump.
8. To plot characteristics curve of Pelton Wheel.
9. To plot characteristics curve of Centrifugal Pump.

4CE9A: SURVEYING LAB. I (P-3)

1. Ranging and Fixing of Survey Station.
2. Plotting Building Block by offset with the help of cross staff.
3. To determine the magnetic bearing of a line
 - a. Using surveyor's compass
 - b. Using prismatic compass
4. Measurement and adjustment of included angles of traverse using prismatic compass.
5. To determine the reduced levels using Tilting Level/Automatic Level.
6. To determine the reduced levels in closed circuit using Dumpy Level.
7. To carry out profile leveling and plot longitudinal and cross sections for road.

8. To carryout temporary adjustment of Theodolite & Measurement of horizontal angle.
 - a. By method of repetition.
 - b. By method of Reiteration.
10. To determine the tachometric constant.
11. To determine the horizontal and vertical distance by tachometric survey.
12. To study the various minor instruments.

4CE10A: BUILDING DRAWING- II (P-3)

1- To plan and draw working drawing of a Residential building with following detail.

- (a) Site plan
 - (b) Foundation plan
 - (c) Plan
 - (d) Two sectional elevations
 - (e) Front elevation
 - (f) Furniture plan
 - (g) Water supply and sanitary plan
 - (h) Electric fitting plan
- 2- To design and draw a Primary Health Center
- 3- To design and draw a Primary School
- 4- To design and draw a Rest House
- 5- To design and draw a Post Office
- 6- To design and draw a Bank
- 7- To design and draw a College Library
- 8- To design and draw a Cinema Theatre

4CE11A: MATERIAL TESTING LAB. (P-2)

1. Tensile Strength Test – Mild Steel and HYSD bar
2. Compressive Strength Test – Mild Steel and Cast Iron
3. Compressive Strength Test – Cement Cubes and Concrete Cubes
4. Compressive Strength Test – Bricks
5. Compressive Strength Test – Wooden Blocks
6. Hardness Test – Rockwell Hardness and Brinell Hardness
7. Impact Test – Izod and Charpy
8. Modulus of Rupture of Wooden Beam
9. Fatigue Test
10. Spring Test
11. Torsion Test

5CE1A THEORY OF STRUCTURES –I (L-3, T-1)

B.Tech. (Civil) 5th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
	Introduction to scope, objective and outcome of subject.	1
I	Introduction to Indeterminate structures, Degrees of freedom per node, Static and Kinematic indeterminacy (i.e. for beams, frames & portal with & without sway etc.), Releases in structures, Maxwell's reciprocal theorem and Betti's theorem, Analysis of Statically Indeterminate Structures using Slope-deflection method.	8
II	Analysis of structures using Moment-distribution method applied to continuous beams and portal frames with and without inclined members	7
III	Unit load method & their applications: deflection of determinate beams and frames, analysis of determinate and redundant frames up to two degree of redundancy, lack of fit in redundant frames.	4
	Introduction to Energy Methods: Strain energy for gradually applied, suddenly applied and impact loads, Strain energy due to axial loads, bending, shear and torsion; Castiglione's theorems & their applications in analysis of determinate and redundant frames up to two degree of redundancy and trussed beams; Stresses due to temperature & lack of fit in redundant frames; deflection of determinate beams, frames using energy methods	6
IV	Column Analogy method for indeterminate structures, determination of carry over factor for non-prismatic section. Kani's Method: Analysis of beams and frames with & without sway by Kani's method.	7
V	Approximate methods for lateral loads: Analysis of multistory frames by portal method, cantilever method & factor method. Analysis of determinate space trusses by tension coefficient method.	7
	TOTAL	40

Text Book:

1.Strength of Materials & Mechanics of Structures: Vol. I by Dr. B.C. Punmia Laxmi Publications (P) Ltd.

REFERENCE BOOKS

1. Advanced Structural Analysis by Dr. A.K. Jain, Nem Cahnd and Brothers, Roorkee.
- 2- Mechanics of Structures by Timoshenko & Young, Mc Graw Hill Book Co.
- 3- Mechanics of Structures Vol.-I by Junarkar & Shah, Charotar Publishing House.
- 4- Theory of Structures by Jangid & Negi, Tata Mc Graw Hill.
- 5- Structural Analysis by Ghali & Neville, E&FN,Spon.
- 6.Structural Analysis by Hibbler R.C., Pearsons

5CE2A: ENVIRONMENTAL ENGINEERING-I (L- 3)

B.Tech. (Civil) 5th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
	Introduction to scope, objective and outcome of subject.	1
I	General: Environment and its components, Importance of water, Role of an Environmental Engineer, Historical overview.	2
	Water Demand: Design flow, design periods, design population, factors affecting water consumption, variation in water demand, design capacities for various water supply components.	5
II	Source of water and collection works: Alternative sources i.e. rain, surface and ground water, Assessment of yield and development of the source.	4
	Quality of water: The hydrological cycle and water quality, physical, chemical and biological water quality parameters, water quality requirements, Indian Standards.	4
III	Transmission of water: Hydraulics of conduits, selection of pipe materials, pipe joints, pumps, pumps station.	3
	Preliminary Treatment of Water: Historical overview of water treatment, water treatment processes (theory and application): aeration, solids separation, settling operations, coagulation, softening,	5
IV	Advanced Treatment of Water: filtration, disinfection, other treatment processes, dissolved solids removal, treatment plant design, preparation of hydraulic profiles.	8
V	Distribution of water: Method of distributing water, distribution reservoirs, distribution system, distribution system components, capacity and pressure requirements, design of distribution systems, hydraulic analysis of distribution systems, pumping required for water supply system.	5
	Plumbing of Building for water supply: Service connections, fixture units, simultaneous flow, design of plumbing system.	3
	TOTAL	40

Text Book:

1- Water Supply by S.K. Garg, Khanna Publishing Co.

REFERENCE BOOKS

1. Environmental Engineering by Peavy, H.S., Rowe D.R. and Tchobanoglous, Mc Graw Hill, Book Company.
2. 3Manual of Water Supply and Water Treatment, Ministry of Urban Development, Govt.of India.

5CE3A: GEOTECHNICAL ENGINEERING – I (L-3, T-1)

B.Tech. (Civil) 5th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
	Introduction to scope, objective and outcome of subject.	1
I	Soil and soil-mass constituents, water content, specific gravity, void ratio, porosity, degree of saturation, air void and air content, unit weights, density index etc. Inter-relationships of the above. Determination of index properties of soil: water content, specific gravity, particle size distribution, sieve and sedimentation analysis, consistency limits, void ratio and density index. Classification of soil for general engineering purposes: particle size, textural, H.R.B. Unified and I.S. Classification systems.	8
II	Clay mineralogy: Soil structure; single grained, honeycombed, flocculent, and dispersed, structure of composite soils, clay structure; basic structure, mineral structures, structures of Illite Montmorillonite and kaolinite and their characteristics.	4
	Soil water absorbed, capillary and free water, Darcy's law of permeability of soil and its determination in laboratory. Field pumping out tests, factors affecting permeability, permeability of stratified soil masses.	4
III	Stresses in soil mass: total, effective and neutral pressure, calculation of stresses, influence of water table on effective stress, quicksand phenomenon	3
	Seepage and Seepage Pressure, Laplace's equation for seepage. Flow net and its construction. Uplift pressure, piping, principle of drainage by electro Osmosis, phreatic line, Flow net through earth dam.	5
IV	Mohr's circle of stress, shearing strength of soil, parameters of shear strength, Coulomb's failure envelope, determination of shear parameters by Direct Shear Box. Triaxial and unconfined compression test apparatuses. Typical stress-strain curves for soils. Typical failure envelopes for cohesion less soils and normally consolidated clay soils.	8
V	Principles of soil compaction, laboratory compaction tests; Proctor's test Modified Proctor tests, Measurement of field compaction, field methods of compaction and its control, dry and wet of optimum, factors affecting compaction, compaction equipments. Soil stabilization, Mechanical Stabilization. Stabilization with cement, lime and bitumen.	8
	TOTAL	40

Text Book:

1- Basic and applied Civil Mechanics by Rajan & Rao, New Age International Publishers.

REFERENCE BOOKS

- 2- Soil Mechanics & Foundation Engineering by Arora K.R, Standard Publishers and Distributors, Delhi.
- 3- Soil Engineering in Theory & Practice by Alam Singh, CBS Publishers and Distributors, Delhi.

3. Geotechnical Engineering—Principles and Practices, Coduto PHI Publisheres.
4. Principles of Geotechnical Engineering by Braja M. Das, CENAGE Learning New Delhi.

5CE4A : SURVEYING – II (L-3)

B.Tech. (Civil) 5th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
	Introduction to scope, objective and outcome of subject.	1
I	Trigonometric Leveling: Trigonometric leveling, Objects accessible and non accessible, Determination of levels object- when two instrument positions in same and different vertical planes.	3
	Curvature, Refraction and Axis Signal corrections, Determination of difference in elevations of points by trigonometric leveling by single observation method (angle of elevation, angle of depression), reciprocal method.	4
II	Curve Surveying: Elements of circular (Simple, compound and reverse) curves, transition curves, degrees of curve, Linear and angular Methods of setting out circular and transition curves.	8
III	Triangulation: Merits and demerits of traversing, triangulation and trilateration. Grades of triangulation, Strength of figure, field procedure of triangulation. Reconnaissance and selection of triangulation stations.	8
	Indivisibility of stations and calculation of the heights of towers. Equipment needed for base line measurement, corrections to base line. Satellite station and base line extension.	
IV	Errors in Surveying: Classification of errors in surveying. The probability curve, its equation and properties, theory of least squares, weight, most probable value, probable errors, standard errors. Normal equation correlates.	4
	Adjustment of Triangulation Figures: Adjustment of levels. Adjustment of triangulations figures, Braced quadrilateral Triangle with central, station. Approximate and method of least squares for figure adjustment, Trilateration.	4
V	Field Astronomy: Definitions of terminology used in Astronomy, Co-ordinate Systems. Relationships between different Co-ordinate systems. Astronomical Triangle, Napier's Rule. Different methods of determination of Azimuth. Electronic distance measurement and use of Total station.	8
	TOTAL	40

Text Book: 1-Surveying – Vol. I & II by K.R. Arora Satandard Book House, Delhi.

REFERENCE BOOKS

1. Surveying Vol. 2 & 3 by B C Punmia Laxmi Publications, Delhi.
2. Advance Surveying by Sathees Kumar, R.Sathis Kumar , N. Madhu, Pearson Education
3. Plane and Geodetic Surveying Vol.I &II, BY David Clark, CBS Publishers and Distributers.
4. Surveying Vol.2 by S.K.Duggal, Tata Mc Graw Hill, Delhi.
5. Advance Surveying by A.M.Chandra, New Age International, Delhi.

5CE5A : BUILDING DESIGN (L -3)

B.Tech. (Civil) 5th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
	Introduction to scope, objective and outcome of subject.	1
I	Design Loads: Design loads for different types of buildings. (IS-875 part 1 & 2). Load distribution & concept of load flow to different structural components.	3
	Structural Systems: Assumption of integrity aspect ratios & over turning resistance, strength & stiffness of buildings, symmetry and Asymmetry in building forms, Vertical and lateral load resting elements, shear walls, framed tubes and various multistory configurations.	4
II	Lateral loads: Wind loads & calculation of wind load on structures (IS: 875-Part 3).	8
III	Lateral loads: Earthquake loads & calculations of earthquake loads on buildings masonry & framed structures. (IS: 1893 – Part 1).	8
IV	Masonry and Framed Buildings: Design of masonry buildings and framed buildings, Earthquake resistant construction of buildings, and various provisions as per IS codes; IS-4326, IS-13827, IS-13828, IS-13920, IS-13935.	8
V	Mass Housing: Prefabricated construction for mass housing.	8
	Special Roofs: Introduction to folded plates, cylindrical shells, north-light shell roofs, grid and ribbed floors.	
	TOTAL	40

REFERENCE BOOKS

IS : 875, Part I, II & III

IS : 1893

IS : 4326

IS : 13920

5CE6.1A : GROUND IMPROVEMENT TECHNIQUES (L-3)

B.Tech. (Civil) 5th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
	Introduction to scope, objective and outcome of subject.	1
I	Introduction: Formation of soil, major soil types, collapsible soil, expansive soil, reclaimed soil, sanitary land fill, ground improvements; objective, potential.	4
	General principles of compaction: Mechanics, field procedure, quality control in field.	3
II	Ground Improvement in Granular soil: In-place densification by (a) Vibro floatation (b) Compaction piles in sand(c) Vibro compaction piles (d)Dynamic compaction (e) Blasting	8
III	Ground improvement in cohesive soil: Preloading with or without vertical drains. Compressibility vertical and radial consolidation, Rate of consolidation, Preloading methods. Types of drains, Design of vertical drains, Construction techniques.	5
	Stone column: Function, Design principles, load carrying capacity, construction techniques, settlement of stone column foundation.	3
IV	Ground Improvement by Grouting & Soil Reinforcement: Grouting in soil: Types of grout, desirable characteristics, Grouting pressure, Grouting methods.	4
	Soil Reinforcement – Mechanism, Types of reinforcing elements, Reinforcement- Soil interaction, Reinforced soil application beneath roads, foundation and retaining walls.	4
V	Soil Stabilization: Lime Stabilization – Base Exchange mechanism, Pozzolonic reaction, lime-soil interaction, lime columns, Design of foundation on lime column. Cement stabilization -Mechanism, amount, Age and curing. Fly ash-Lime stabilization Soil bitumen stabilization	8
	TOTAL	40

Text Book:

1- Ground Improvement Techniques by Purushottam Raj, Tata Mc Graw Hills, Delhi.

REFERENCE BOOKS

1. Text book of Geostatic Engineering by Gulhati & Dutta, Tata Mc Graw Hills, Delhi.
2. Principles of Foundation Engg by B.M. Das, Thomson, Books/Cole.
3. Foundation Design Manual By N.V Nayak, Dhanpat Rai and Sons.
4. Soil Engineering in Theory and Practice Vol. III by Alam Singh CBS Publishers

5CE6.2A: ADVANCED CONCRETE TECHNOLOGY (L- 3)

B.Tech. (Civil) 5th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
	Introduction to scope, objective and outcome of subject.	1
	Concrete Production: Difference in mix proportioning for vibrator compacted concrete, pumpable and roller compacted concrete. Considerations in a plant operations in ready mixed concrete (RMC). Different types of mixers, transportation systems and pumps in RMC	4
I	Rheology of Concrete: Flow ability, Segregation, Bleeding and Viscosity etc. - Factors affecting, related standards including slump flow test, v funnel test, U box test, J Ring test, Stability test, L Box test, rheometer test etc.	3
II	Mineral and Chemical admixtures in Concrete: Chemical: Applications of accelerators, importance of chloride free admixtures, Typical dosages and applications, Case studies of use in tunnels. Application of Retarders, particularly in RMC applications. High range water reducing admixtures: Naphthalene and melamine based, PCE based. Principle of working. Application procedure, Shelf life, Outline of different commercial types available in Indian market (more than 10).	4
	Mineral : Flyash : Basic properties, IS 3812 specifications for use in cement and concrete. Properties of typical flyashes available in the country. Graded flyash, Pozzocrete and its applications.	2
	Ground Granulated Blast Furnace Slag (GGBFS): Basic properties, Indian standards, Applications. Ultra fine powders: Micro Silica, Metakaolin, Limestone, Calcium carbonate powders etc: Basic properties, role in cement concrete and applications.	3
III	Strength of Concrete: Strength- porosity relationship, factors affecting compressive strength, behaviour of concrete under uniaxial, biaxial and triaxial stress states, Split Tensile strength and modulus of rupture -test methods and empirical formulae for their estimation as per ACI manual of concrete practice and Indian standards.	4
	Elasticity, Creep and Shrinkage of Concrete: Elastic behaviour, Method of determination of Elastic modulus, factors affecting modulus of elasticity, early volume change in concrete due to plastic shrinkage, autogeneous shrinkage and drying shrinkage- factors affecting them, typical values and their methods of determination. Creep of concrete- specific creep, typical values, creep recovery, factors affecting creep and its determination with ASTM procedure.	4
IV	Microstructure of Concrete: Interfacial transition zone, hydration kinetics, hydrated cement paste (hcp), ettringite, calcium hydroxide, presence of micro-cracks in concrete mass - their characteristics and significance on performance of concrete,	3

	Penetrability of Concrete: Permeability, sorptivity and diffusion in concrete- test methods and significance.	
	Durability of Concrete: Physical and chemical processes, recently employed methods of tests for ensuring longer and durable concrete structures like Resistivity, RCPT, etc- case studies involving decision based on rapid chloride permeability test (RCPT), DIN permeability, etc	4
V	Special Aggregates: Light weight, heavy weight- their characteristics and uses in concrete. Specific purpose concretes and cement based composites: Self Compacting Concrete : Mix proportioning, EFNARC guidelines. Fiber cements and fiber reinforced cement based composites, mass concrete and polymer concrete etc.- materials, production and application areas.	4
	High performance concrete- performance characteristics in fresh and hardened states, production precautions - case studies of use of HPC in India: Delhi Metro construction, Mumbai – Worli Sea link project, atomic power projects, Hydro electric power projects etc. Nano Technology in Cement and Concrete: Use of nano silica, CNTs and other nano materials.	4
	TOTAL	40

Text Book:

1. Properties of Concrete by A.M. Neville, Longman Publishers.

REFERENCE BOOKS

1. Concrete Technology by M.S. Shetty, Dahnpat Rai & Sons.
2. Concrete Technology by Neville & Brooks, Pearson Education.
3. Concrete Microstructure P.K. Metha, Tata Mc Graw Hill.
4. Concrete Technology- A. S. Santhakumar, Oxford University Press

5CE6.3A: SOLID WASTE MANAGEMENT (L- 3)

B.Tech. (Civil) 5th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	General: Problems associated with Solid Waste Disposal. Generation of Solid Waste: Goals and objectives of solid waste management, Classification of Solid Waste. Solid Waste Generation, Factors Influencing Generation of Solid Waste, Characteristics of Solid Waste, Analysis of Solid Waste.	8
II	Onsite Handling, Storage and Processing: Public Health and Aesthetics, Onsite Handling, Onsite, Storage, Dust bins, Community Containers, Container Locations, On-site Processing Methods.	8
III	Solid Waste Collections, Transfer and Transport: Collection Systems, Equipment and Labor requirement, Collection Routes, Options for Transfer and Transport Systems.	8
IV	Processing and Disposal Methods: Processing Techniques and Methods of Disposal, Sanitary land filling, Composting and Incineration, Bioremediation.	8
V	Recovery of Resources, Conversion, Products and Energy: Material Recovery, Energy Generation and Recovery Operation, Reuse in other industry. Industrial Solid Waste: Nature, Treatment and Disposal Methods.	8
	TOTAL	40

REFERENCE BOOKS

- 1-Solid Waste Engineering Principles and Management Issues by G.Technobanogious H.Theisen & R.Blssen, Mc Graw Hill Book Co.
- 2.Solid Waste Management by C.L.Mantell, Mc Graw Hill Book Co.
3. Solid Waste Management in Developing Countries by Bhide& Sunrashen PHI.

Typical list of experiments for V Semester Labs

5CE7A: ENVIRONMENTAL ENGINEERING DESIGN & Lab. -I (P- 2)

1. To determine the pH of the given sample of water.
2. To determine the turbidity of the given sample of water
3. To determine Total Solids of the given water sample.
4. To determine the Total Dissolved Solids of the given water sample.
5. To find out conductivity of the given water sample.
6. To determine hardness of the given water sample.
7. To find out chloride of the given water sample.
8. To determine alkalinity of the given water sample.
9. To find out acidity of the given water sample.
10. To determine hardness of the given water sample.
11. To determine the optimum dose of alum by Jar test.
12. To study various water supply Fittings.

5CE8A: GEOTECHNICAL ENGG.-I LABORATORY (P-2)

1. Grain size distribution by Sieve Analysis
2. Determination of water content by Pycnometer.
3. Determination of specific Gravity by Pycnometer.
4. Determination of liquid limit by Casagrande's apparatus.
5. Determination of liquid limit by cone penetrometer.
6. Determination of plastic limit
7. Determination of shrinkage limit
8. Determination of field density by core-cutter
9. Determination of field density by sand replacement method
10. Determination of compaction properties by standard Proctor Test Apparatus
11. Determination of C- ϕ values by Direct Shear Test Apparatus
12. Determination of Unconfined Compressive Strength by unconfined compression Test Apparatus

5CE9A: SURVEY LAB. -II (P-3)

1. To measure the horizontal and vertical angles by Theodolite.
2. To determine the Height of an object by trigonometric leveling (Instruments in same vertical plane).
3. To determine the Height of an object by trigonometric leveling (Instruments in different vertical planes).
4. To shift the R.L. of known point by double leveling.
5. To measure and adjust the angles of a braced quadrilateral.
6. To prepare a contour map by indirect contouring.
7. To prepare the map of given area by plane tabling.

8. To determine the Azimuth of a given line by ex-meridian observations of Sun.
9. Survey Camp (including exercise on triangulation, topographic, or project survey) with maximum duration of 10 days.

5CE 10A : COMPUTERS AIDED BUILDING DESIGN (P- 3)

Design Problems as syllabus of theory

5CE11A : STRUCTURAL ENGINEERING LAB (P-2)

1. Study of friction, screw jacks, winch crabs etc.
2. Deflection of a truss
3. Clark-Maxwell reciprocal theorem with truss
4. Funicular polygon for flexible cable
5. Analysis of redundant frame
6. Deflection of curved members
7. Buckling of columns
8. Clark-Maxwell reciprocal theorem with simply supported beam
9. ILD for deflection in a steel beam using unit load method
10. ILD for support reaction using Muller-Breslau Principle
11. Unsymmetrical bending.
12. Two hinged and three hinged arches.

6CE1A :THEORY OF STRUCTURES – II (L-3, T-1)

B.Tech. (Civil) 6th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Influence line diagram & Rolling load: ILD for beams & frames, Muller-Breslau principle and its application for drawing ILD, Rolling load, maximum stress resultants in a member/section, absolute maximum stress resultant in a structure.	8
II	Arches: analysis of three hinged two hinged and fixed type parabolic arches with supports at the same level and at different levels.	8
III	Cable and Suspension bridges: Analysis of cables with concentrated and continuous loading, analysis of two & three hinged stiffening girder.	8
IV	Unsymmetrical bending: Definition, location of NA, computation of stresses and deflection, shear center and its location, Theories of Failures	8
V	Introduction to matrix method, Force displacement relation, flexibility and stiffness coefficients, relation between flexibility and stiffness	8

	matrices, system approach of flexibility method and stiffness method, coordinate transformation matrix, rotation matrix, element and global stiffness matrix for pin jointed structures and beam element in 2D only.	
	TOTAL	40

REFERENCE BOOKS

- 1-Mechanics of Structures Vol. I & II by S.B. Junarkar & Shah, Charotar Publishing House.
- 2- Theory of Structures by B.C. Purnmia, Laxmi Publication (P) Ltd.
- 3- Theory of Structures by Timoshenko, Mc Graw Hill Book Co.
- 4- Structural Analysis by Ghali & Neville, E&FN Spon.
5. Structural Analysis by Hibbler R.C., Pearsons

6CE2A: GEOTECHNICAL ENGINEERING – II (L-3, T-1)

B.Tech. (Civil) 6th semester

**Max. Marks: 80
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	Introduction to Scope of Subject	1
	Stresses in Soil under surface loading: Bossinesq's and Westergaard's analysis for vertical pressure and its distribution in a soil mass. Vertical stresses due to concentrated loads, Horizontal and shear stresses due to concentrated loads. Isobar diagram, Vertical stress distribution on a horizontal plane. Influence diagram.	3
	Vertical stresses at point under line load and strip load. Vertical stresses at a point under circular and rectangular loaded area. Approximate methods of obtaining vertical pressure due to surface loading. Newmark's chart, Fensck's Chart. Pressure bulb and its significance in Foundation exploration. Contact pressure below foundations.	3
	Review of the Chapter	1
II	Compressibility and Consolidation: Introduction to consolidation, comparison of compaction and consolidation, Spring Analogy.	2
	Terzaghis one dimensional consolidation theory, Degree of consolidation, consolidation test, Compressibility parameters, co-efficient of consolidation. Preconsolidation pressure and its determination. Normally, Over and Under consolidated soils. Methods of computation of Settlement and its rate. Coefficient of consolidation for layered soil. Total and differential Settlement.	3
	Preconsolidation pressure and its determination. Normally, Over and Under consolidated soils. Methods of computation of Settlement and its rate. Coefficient of consolidation for layered soil. Total and differential Settlement.	2
	Review of the Chapter	1
III	Stability of Slopes: Classifications of slopes, Stability analysis of infinite slopes. Stability analysis of finite slopes by Swedish and Friction circle	2

	method.	
	Stability analysis by Taylor's stability number, Taylor stability number curves. Stability of slopes of earthen embankments under sudden draw down, steady seepage and during construction. Bishop's method of stability analysis.	4
	Review of the Chapter	1
IV	Earth Pressure: Active, passive and earth pressure at rest. Rankine's and Coulomb's theories of earth pressure.	2
	Rebhann's and Culman's graphical methods for active earth pressure for vertical and inclined back retaining walls, horizontal and inclined cohesion less back fill.	3
	Earth pressure on cantilever sheet piles Stability analysis of retaining walls.	2
	Review of the Chapter	1
V	Bearing Capacity of Soils: Terminology related to bearing capacity, Common types of foundations. Terzaghi and Meyehoff's theory for bearing capacity.	2
	Rankine's method for minimum depth of foundation. Skempton's method. Effect of eccentricity and water table on bearing capacity.	3
	Plate load and penetration tests for determining bearing capacity. Introduction to pile, well and machine Foundations.	2
	Site Investigations: Methods of explorations. Planning of Investigations, Depth of exploration, Number of boreholes, Undisturbed and Disturbed samples. Types of samplers. Brief description of procedures of sampling, Transportation and Storage of samples. Geophysical methods of investigations	2
	Review of the Chapter	1
	TOTAL	41

TEXT BOOK

1. Engineering in Theory & Practice Vol. I by Alam Singh, CBS Publishers and Distributors, Delhi. (2003)
2. Soil Mech. & Foundation Engineering by K.R. Arora, Standard Publishers and Distributors, Delhi.

REFERENCE BOOKS

1	Geotechnical Engineering by Purushottam Raj, Tata Mc Graw Hills, Delhi.	
2	Soil Mechanics in Engineering Practices by Terzaghi & Peck, John Wiley & Co.	2010
3	Theory and Practice Of Foundation Design by Som and Das, PRENTICE Hall of India Delhi (PHI).	2003
4	Soil Mechanics in Engineering and Practice by Terzaghi, CBS Publishers and Distributors.	
5	Geotechnical Engineering by Gulhati and Datta, Tata Mc Graw Hill, Delhi.	2005
6	An Introduction to Geotechnical Engineering by Robert D.Holtz, William D. Kovacs, Thomas C. Sheahan, Pearson Education Delhi.	2013

7	Design Aids in Soil Mechanics and Foundation Engineering by S.R.Kaniraj, Tata Mc Graw Hill, Delhi.	

6CE3A : ENVIRONMENTAL ENGINEERING –II (L-3)

B.Tech. (Civil) 6th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	General: Terms: sewerage, domestic sewage, sewage treatment, disposal scope, Role of an Environmental engineer, historical overview. Sewage Characteristics: Quality parameters: BOD, COD, TOC, Solids, DO, Nitrogen, Phosphorus, Standards of disposal into natural watercourses and on land, Indian standards.	8
II	Collection of Sewage: Systems of sewerage, Separate, combined, and partially separate, components of sewerage systems, systems of layout, quantity of sanitary sewage and variations, quantity of storms water, rational method, shapes of sewer, Hydraulic design of sewers: diameter self cleansing velocity and slopes, construction and testing of sewer line, Sewer materials, joints and appurtenances, Sewage pumping and pumping stations, maintenance of sewerage system.	8
III	Sewage Treatment: Various units: their purpose, sequence and efficiencies, preliminary treatment, screening and grit removal units, oil and grease removal, primary treatment, secondary treatment, activated sludge process, trickling filter, sludge digestion and drying beds, stabilization pond, septic tank, soakage systems, recent trends in sewage treatment, advanced wastewater treatment :nutrient removal, solids removal.	8
IV	Wastewater Disposal and Reuse: Disposal of sewage by dilution, self-purification of streams, sewage disposal by irrigation sewage farming, waste waters reuse. Plumbing for Design of Buildings: Various systems of plumbing – one pipe, two pipes, single stack, traps, layout of house drainage.	8
V	Air and Noise Pollution: Air quality, Emission standards, vehicular pollution, Effect of air pollution on human health, Noise Pollution, global effect of air and noise pollution, green house effect, acid rain etc.	8
	TOTAL	40

REFERENCE BOOKS

- 1- Environmental Engineering II by B.C. Punmia, Arihant Publishers, Jodhpur.
- 2- Sanitary Engineering by SK Garg, Khanna Publishing Co.
3. Manual on Sewage and Sewage Treatment Ministry of Urban Development Govt. of India.
4. Water and Waste Water Engineering by Fair, G.M., Geyer G.C. and Okun D.A, Ann Arbor Sc.Publishing.

6CE4A: DESIGN OF CONCRETE STRUCTURES – I (L-3)

B.Tech. (Civil) 6th semester

**Max. Marks: 80
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	Objective and fundamental concepts of design of RC members, Types and function of reinforcement. Introduction to various related IS codes. Design Philosophies: Working stress, ultimate strength and limit states of design. Analysis and Design of singly reinforced rectangular beam section for flexure using Working Stress Method and Limit State Method.	8
II	Analysis and design of singly reinforced, flanged beams and doubly reinforced rectangular beams for flexure using Limit State Method. Limit state of serviceability for deflection, control of deflection as per codal provisions of empirical coefficients.	8
III	Limit state of collapse in shear: analysis and design of prismatic sections for shear using LSM. Limit state of collapse in bond: concept of bond stress, anchorage length and development length, curtailment of reinforcement as per codal provisions.	8
IV	Analysis and design of one way and two way slabs using LSM and Flat slab using direct design method as per code, Detailing of reinforcement.	8
V	Columns: Short and long columns, their structural behaviour. Analysis and design of axially loaded short columns, using LSM. Analysis of uniaxially eccentrically loaded short columns. Introduction to Pu-Mu interaction curves and their use for eccentrically loaded columns. Design of Column Footings: Analysis and design of Isolated column footing and combined footing for two columns (without central beam) for axial loads using LSM.	8
	TOTAL	40

REFERENCE BOOKS

- 1- *Illustrated Reinforced Concrete Design* by Karve & Shah; Standard Publishers, Delhi.
- 2- *Limit State Design of Reinforced Concrete* by Verghese P.C.; PHI Delhi.
- 3- *Limit State Design* by Dayaratnam; Oxford and IBH Publishing House.
- 4- *Reinforced Concrete : Limit State Design* by A.K.Jain; Nem Cahnd and Brothers, Roorkee.
- 5- *Reinforced Concrete Structural Elements* by P Purushothaman; Mc Graw Hill
- 6- *Reinforced Concrete Fundamentals* by Phil M. Ferguson; Prentice Hall
- 7- *Design of reinforced Concrete* by Jack C. Cormac & James K. Nelson; C.H.I.P.S.
- 8- *Reinforced Concrete Design* by Wang & Salmon; Harper & Row.
- 9- *Design of Concrete Structures* by Nilson & Winter; Mc Graw Hill

6CE5A: TRANSPORTATION ENGINEERING–I (L- 3, T-1)

B.Tech. (Civil) 6th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction: Importance and Role of Transportation Systems, Technological and Operating Characteristics of Transportation Systems, Components of transportation Systems, Transportation Coordination, Transportation Modes and their comparison. Highway Planning: Highway Planning Process, specifically in India, Transport or Highway related Agencies in India, Classification of Roads and Road Development Plans, Road Patterns, Controlling Factors and Surveys for Highway Alignment.	8
II	Highway Materials and Construction: Desirable Properties, Testing Procedures, Standards and standard values relating to Soil, Stone Aggregates, Bitumen and Tar, fly-ash/pond-ash. Methods of constructing different types of roads viz. Earth roads, Stabilized roads, WBM roads, fly ash embankments, Bituminous roads and Concrete roads. Specific features of rural roads. Equipments for highway construction of rigid and flexible pavements.	8
III	Highway Geometric Design: Cross Sectional Elements, camber, Sight Distances – definition and analysis of SSD and OSD, Design of Horizontal Alignment – Super elevation, extra widening, transition curves. Design of Vertical Alignment – Gradients, Vertical curves. Recommendations Indian Road congress code of Practice.	8
IV	Elementary Traffic Engineering: Significance of different Traffic Engineering Studies viz. Speed, Volume, O & D, Parking and Accident's Study. Importance and types of Traffic Signs, Signals, Road Markings and Road Intersections.	8
V	Structural design of Highway Pavements: Design of Flexible Pavements by G. I. and CBR methods. Design of Rigid Pavements by Westergard and modified methods. Design as guide lines of relevant Indian Road congress code of Practice.	8

	Hill Roads: Special factors in Alignment and Geometric design, Drainage and maintenance of Hill roads. Road side Arboriculture and Landscaping. Recent Developments in Urban Roads and their role in economic developments.	
	TOTAL	40

REFERENCE BOOKS

- 1.Highway Engineering by Khanna SK & CG Justo, Nem Chand and Brothers, Roorkee.
- 2-Highway Engg. by L.R. Kadiyali, Khanna Tech Publications, Delhi.
- 3- Specification for Roads & Bridges by Ministry of Road Transports & Highways and Indian Road Congress.
4. Transportation Engineering and Planning, 3rd ed., Papacostas & Prevedouros, PHI Publishers.
5. Highway Engineering by Rangawala, Charotar Publishing House.

6CE6.1A: REMOTE SENSING AND GIS (L-3)

B.Tech. (Civil) 6th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Photogrammetry: Definition of Photogrammetric Terms, Geometry of aerial and terrestrial photographs, Aerial camera and photo-theodolite, Scale of a Photograph, Tilt and Height displacements, Stereoscopic vision and stereoscopes, Height determination from parallax measurements, Flight planning, Maps and Map substitutes and their uses.	8
II	Remote Sensing: Introduction and definition of remote sensing terms, Remote Sensing System, Electromagnetic radiation and spectrum, Spectral signature, Atmospheric windows.	8
III	Different types of platforms, sensors and their characteristics, Orbital parameters of a satellite, Multi concept in Remote Sensing.	8
IV	Image Interpretation: Principles of interpretation of aerial and satellite images, equipments and aids required for interpretation, ground truth – collection and verification, advantages of multirate and multiband images. Digital Image Processing concept.	8
V	Geographic Information System (GIS) : Introduction & applications of GIS in map revision, Land use, Agriculture, Forestry, Archaeology, Municipal, Geology, water resources, Soil Erosion, Land suitability analysis, change detection.	8
	TOTAL	40

REFERENCE BOOKS

- 1.- Basics of Remote Sensing & GIS by Dr. S.Kumar , Univertsity Sc. Press.

- 2- Geographic Information System by Kang Tsung Chang, Tata Mc Graw Hills.
3. Remote Sensing and GIS by Legg.C.A., Ellis Horwood, London.
4. Remote sensing and GIS by Bhatt Oxford University Press.

6CE6.2A: ROCK MECHANICS (L- 3)

B.Tech. (Civil) 6th semester

Max. Marks: 80
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	ENGINEERING CLASSIFICATION OF ROCKS: Objectives, Intact rock classification, Rock mass Classification. Terzaghi's, Rock load classification, Austrian classification, Deere's rock quality classification, rock structure rating concept, RMR classification, Q classification. Inter relation between Q and RMR, prediction of ground condition and support pressure. Effect of Tunnel size on support pressure.	8
II	ENGINEERING PROPERTIES AND LABORATORY TESTS ON ROCKS: Porosity, Density, Moisture content, Degree of saturation, Co-efficient of permeability, Durability, Compressive strength, Tensile strength, Shear strength, elasticity, Plasticity Deformability. Sampling and Samples Preparations, Uniaxial Compressive strength, Tensile Strength – Brazilian test, Shear strength test – Direct Shear test and Punch shear test, Triaxial Test, Flexural strength.	8
III	INSITU TESTS ON ROCKS: Necessity of Insitu test, Plate load test for deformability, Shear test, Test for internal stresses – flat Jack, pressure meter test.	4
	JOINTED ROCKS: Rocks Joint properties, Joint properties, Joint Roughness Co-efficient, Scale effects, Dilation, Orientation of Joints, Gouge, Joint Intensity, Uniaxial Compressive strength of Jointed Rocks.	4
IV	STRENGTH OF ROCKS IN UNCONFINED CONDITION: Ramamurthy Strength Criteria, Singh and Rao Strength Criteria, Kulatilake Methodology, Hoek Criteria, Barton Methodology.	4
	STRENGTH OF ROCKS IN CONFINED CONDITION: History of Hoek and Brown Failure Criteria and latest methodology, Parabolic Strength Criteria.	4
	GROUTING AND ROCK BOLTING: Grouting materials, Grouting operations, methods of Grouting, Mechanism of Rock Bolting, Principal of	

V	design.	4
	BEARING CAPACITY OF ROCKS: Bearing capacity of intact rocks, jointed rocks, IS Code methodology, Singh and Rao Method and latest methodologies.	4

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Publication
1	Rock Engg. For Engineers by B.P. Verma , Khanna Publishers.	2005
2	Rock Engg. By Bhawani Singh, Elsevier Science Ltd.	2010
3	Foundation on Rocks by Duncan C.Wyllie, Spon Press.	2011
4	Engineering in Rock for Slopes, Foundation and Tunnels, by Ramamurthy, PHI Delhi.	2012
5	IS Codes on Rocks	latest

6CE6.3A: REPAIR AND REHABILITATION OF BUILDINGS (L- 3)

B.Tech. (Civil) 6th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Deterioration of concrete in structures: physical processes of deterioration like F & T abrasion, erosion, pitting, chemical processes like carbonation, chloride ingress, corrosion, alkali aggregate reaction, sulphate attack; their causes, mechanism, effect, preventive measures. Cracks: Cracks in concrete, type, pattern, quantification, measurement & preventive measures etc.	8
II	N.D.T.: Non destructive test methods for concrete including rebound hammer, ultrasonic pulse velocity, rebar locator, corrosion meter, penetration resistance and pull out test, core cutting etc. Corrosion: Methods for corrosion measurement and assessment including half-cell potential and resistivity, Mapping of data.	8
III	Materials for repair: polymers and resins, self curing compound, FRP, Ferro cement etc; properties, selection criterion, bonding aspect.	8
IV	Repair Techniques: grouting, jacketing, shotcrete, externally bonded plates and under water repair; materials, equipments, precautions process etc.	8
V	Investigation for structures: Distress, observation and preliminary test methods.	8

	Case studies: related to rehabilitation of bridge piers, dams, canals, heritage structures, corrosion damaged structures.	
	TOTAL	40

REFERENCE BOOKS

- 1- Properties of Concrete by A.M. Neville, Pearson.
- 2- Concrete Technology by M.S. Shetty, S. Cahnd & Comp.
- 3- Hand book of Analytical Techniques in Concrete Tech by V.S.. Ram Chandran, Standard Publishers.

Typical list of experiments for VI Semester Labs

6CE7A: GEOTECHNICAL ENGG. DESIGN AND LABORATORY. – II (P-2)

1. To determine the differential free swell index of soil.
2. To determine the grain size distribution of fine grained soil by Hydrometer.
3. To determine the CBR of soil.
4. To determine the compressibility parameters of soil by consolidation test.
5. To determine the swelling pressure of soil.
6. To determine the permeability of soil by constant and falling head methods.
7. To determine the shear strength parameters of soil by tri-axial test.
8. Design problems based different units of theory syllabus.

6CE8A: ENVIRONMENTAL ENGINEERING LAB. & DESIGN – II (P-2)

1. To determine the pH of the given sample of sewage.
2. To determine Total Solids of the given sewage sample.
3. To determine the Total Dissolved Solids of the given sewage sample.
4. To find out Total Settle-able Solids of the given sewage sample.
5. To determine Total Suspended Solids of the given sewage sample.
6. To find out the Quantity of Dissolved Oxygen present in the given water sample by Winkler's Method.
7. To determine Biochemical Oxygen Demand exerted by the given wastewater sample.
8. To find out Chemical Oxygen Demand of the waste water sample.
9. To study various Sanitary Fittings.

Design as per syllabus of theory.

6CE9A : DESIGN OF CONCRETE STRUCTURES- I (P-3)

Design problems as per different units of syllabus of theory.

6CE10A : ROAD MATERIAL TESTING LAB (P- 2)

1. Aggregate Impact test
2. To determine the flakiness index & Angularity number test of given sample of aggregate.
3. To determine fineness modulus of a given sample of coarse aggregate.
4. Los angles abrasion test
5. Aggregate crushing value test

6. Specific gravity and water absorption test of aggregate.
7. Standard tar viscometer test
8. To determine the elongation index for given sample of aggregate.
9. Ductility test
10. To determine the softening point for give sample of bitumen.
11. Marshall stability test
12. Float test

7CE1A: WATER RESOURCES ENGINEERING – I (L- 3)

B.Tech. (Civil) 7th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction: Definitions, functions and advantages of irrigation, present status of irrigation in India, classification for agriculture, soil moisture and crop water relations, Irrigation water quality. Consumptive use of water, principal Indian crop seasons and water requirements, multiple cropping, hybrid crops, water harvesting and conservation.	8
II	Canal Irrigation: Types of canals, parts of canal irrigation system, channel alignment, assessment of water requirements, estimation of channel losses, design of channels, regime and semi theoretical approaches (Kennedy's Theory, Lacey's Theory), cross section of channels, silt control in canals. Water Distribution System: Rotational delivery (Warabandi, Jama Bandi, Khasra Bandi, Sajra Sheets), continuous delivery and delivery on demand, Role of command area development authority, Functions and organizational structures.	8
III	Distribution of Canal Water: System of regulation and control, outlets, assessment of canal revenue. Hydraulics of Alluvial Rivers : Critical tractive force, regimes of flow, resistance relationship for natural streams, bed load, suspended load and total equations, different stages of rivers, meandering, aggradations, and degradation, river training & bank protection works.	8
IV	Water Logging: Causes, preventive and curative measures, drainage of irrigated lands, saline and alkaline lands, types of channels lining and design of lined channel. Well Irrigation: Open wells and tube wells, types of tube wells, duty of tube well water.	8
V	Hydrology: Definition, Hydrologic cycle, Application to Engineering problems, measurement of rainfall, rain gauge, peak flow, flood frequency method, catchment area formulae, Flood hydrograph, Rainfall analysis, Infiltration, Run off, Unit hydrograph and its determination, Estimation of run off.	8
TOTAL		40

REFERENCE BOOKS

- 1- Irrigation Water Power and Water Resource Engineering By KR Arora, Standard Publishers and Distributors, Delhi.
- 2- Water Resource Engineering by Modi, Standard Publishers.
- 3-Irrigation and Water Power Engineering by BC Punmia & B B Lal, Laxmi Publication (P) Ltd.
- 4.Irrigation Engineering by G.L.Asawa, New Age International Publishers, New Delhi.

7CE2A: DESIGN OF STEEL STRUCTURES – I (L 3)

(Design procedure shall be conforming to IS 800-2007)

B.Tech. (Civil) 7th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction: Types of steels and their broad specifications. Plastic Analysis: Plastic analysis of steel structures, fundamentals, static and mechanism method of analysis, bending of beams of rectangular and I sections beams, shape factor. Classification of Cross Sections: As per IS 800-2007 Plastic, compact, semi compact, slender sections, their characteristics including moment-rotation.	8
II	Connections: Types of bolts, load transfer mechanism, prying action. Design of bolted and welded connections under axial and eccentric loadings. Tension Members: Design strength in gross section yielding, net section rupture and block shear. Design of axially loaded tension members.	8
III	Compression Member: Types of buckling. Column buckling curves, Imperfection factor, Buckling curves for different cross sections. Design of compression member; Axially loaded compression members including angle section design: single and in pair, built up columns, design of lacings and battens.	8
IV	Beams: Design of beams: simple and compound sections, main and subsidiary beams and their connections. Laterally supported and unsupported beam design, Web buckling, web crippling, lateral torsional buckling.	8
V	Member design under combined forces: Compressive load and uniaxial moment. tension and uniaxial moment Column Bases: Design of column bases, Slab base, gusseted base for axial and eccentric compressive load. Grillage foundation design.	8
	TOTAL	40

REFERENCE BOOKS

- 1-Design of Steel Structures by N. Subramanian, Oxford University Press.
2. Limit state Design of Steel Structures: S K Duggal, TMH publication

- 3- Design of Steel Structures by S. Bhavikatti, I.K. International Pvt. Ltd.
 4- Design of Steel Structures by V.L. Shah, Structures Publications.

7CE3A : DESIGN OF CONCRETE STRUCTURES-II (L- 3)

B.Tech. (Civil) 7th semester

Max. Marks: 80
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Elements of Pre-stressed Concrete: Principles and systems, material properties, losses of pre-stress, I.S. specifications, analysis and design of rectangular and T sections for flexure and shear.	8
II	Torsion: Analysis and Design of beams for torsion as per codal method.. Continuous and Curved Beams: Analysis and Design of continuous beams using coefficients (IS Code), concept of moment redistribution. Analysis and design of beams curved in plan.	8
III	Circular Domes: Analysis and design of Circular domes with u.d.l. & concentrated load at crown. Water Tanks and Towers: Water Tanks and Water Towers-design of rectangular, circular and Intze type tanks, column brace type staging.	8
IV	Yield Line Theory: Introduction to Yield line concept, Application of Y.L.T. to slabs with simple support conditions. Retaining walls: Analysis and design of Cantilever Retaining Walls: Introduction to counterfort and buttress type retaining walls, their structural behaviour and stability analysis.	8
V	Culverts and Bridges: Analysis and Design of super structure of slab culverts and T-bridge for I.R.C. loading.	8
TOTAL		40

REFERENCE BOOKS

1. *Reinforced Concrete Vol. II* by H.J. Shah; Charotar Publication House.
2. *Advanced Reinforced Concrete Design* by Verghese; Tata Mc Graw Hill.
3. *Advanced Reinforced Concrete Design* by Krishnaraju; Tata Mc Graw Hill.
4. *Bridge Engineering* by Ponnuswamy; Tata Mc Graw Hill
5. *Prestressed Concrete Structures* by N. Krishna Raju; Tata Mc Graw Hill.
6. *Bridge Engineering* by Johnson Victor; Oxford and IBH Publishers.
7. *Prestressed Concrete* by T.Y.Lin and Burn; John Wiley & Sons.
8. *Reinforced Concrete Structures* by Park & Poulay; Willey.

9. *Reinforced Concrete Designers Hand Book* By Reynolds & Steedman
10. *Manual of Concrete Practice* ACI (www.concrete.org)
11. Prestressed concrete structures by Praveen Nagrajan, Pearsons

7CE4A: TRANSPORTATION ENGINEERING – II (L-3)

B.Tech. (Civil) 7th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction and Permanent Way Components: Types and Selection of Gauges, Selection of Alignment, Ideal Permanent Ways and Cross-sections in different conditions, Drainage, Salient Features and types of Components viz. Rails, Sleepers, Ballast, Rail Fastenings. Study of Specific Aspects: Coning of Wheels, Creep, Wear, failures in Rails, Rail Joints, Length of Rail, Sleeper Density and Spacing, Stations, Yards and Sidings, Turn-Table, Signaling.	8
II	Points and Crossings: Types of Turnouts, Points or Switches, layout Plans of different types of Crossings, Design calculations of turnouts. Railway Systems Specific to Urban Movements: Surface railways (sub urban railway system of Mumbai, Chennai and Delhi), Underground system (Metro of Kolkata/ Delhi), Elevated Systems (as Proposed for Jaipur, Delhi, Mumbai), Light Rail System (MRTS, Thane). Recent Developments in Railway Networking.	8
III	Geometric Design: Gradient and Grade Compensation, Super elevation and cant, cant deficiency, Types of Curves, Transition curves, their designs, Widening of Gauges.	8
IV	Airport Engineering:-Introduction: Requirements to Airport Planning, Airport Classifications, Factors in Airport Site Selection, Airport Size, Obstructions, Zoning. Planning and Design of Airport: Requirements of Airport, Planning of Terminal Area, and different Layouts, Location of Gates, Types of Runway patterns, Runway Layout, Runway Length, Geometric Design of Runways, Layout of Taxiways, Geometric Standards, Exit or Turnaround Taxiways, Apron and Hangers.	8
V	Airport Pavement Design: Factors Affecting Pavement Design, Design methods of Flexible Pavements, Design methods of Rigid Pavements.	8
TOTAL		40

Text Book: 1.Railway Engineering by Sexena S.C. and Arora S.P, Dahnpat Rai Publishers, Delhi.

2- Airport Engineering by Rangwala,Charotar Publishing House.

Reference Book:

1- Transportation Engineering by A.K. Upadhyay, S.K.Kataria and Sons.

2. Railway Engineering by Satish Chandra and M.M Agarwal, Oxford University Press, Delhi.

7CE5A : Applications Numerical Methods in Civil Engineering (L-3)

B.Tech. (Civil) 7th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Errors & Approximations in Numerical Computation: Introduction to Mathematical Modeling and Engineering Problem Solving. Decimal & Binary Number system. Accuracy, Precision and Significant Digits. Errors and their types.: absolute and relative errors, approximations and round off errors, truncation errors and Taylor's series. Propagation of errors.	8
II	Roots of Equations: Iterative processes and their Convergence. Existence of roots in engineering practices & their geometrical representation. Roots of the equations by: Graphical Method, Method of Successive Substitution, Bisection Method, False Position Method, Newton-Raphson Method, Secant Method, Regula Falsi Method. Application to simple civil engineering problems.	8
III	Matrices and Determinants: Their types and basic operations. Rank of a matrix. Solution of Linear system of equations by Direct methods: Cramer's Rule, Gaussian elimination method, Gauss-Jordan Method and Cholesky Method. Application to simple civil engineering problems.	8
IV	Iterative Methods for solving Linear system of equations: Jacobi Method, LU decomposition and Matrix inversion, Gauss Seidel method. Application to simple civil engineering problems.	8
V	Interpolation and Curve Fitting: Newton's Forward Difference, Newton's Backward Difference, Newton's Central Difference, Newton's Divided Difference, Lagrangian Interpolation, Hermitian Interpolation, Method of least square. Application to simple civil engineering problems.	8
TOTAL		40

REFERENCE BOOKS

1. Introductory Methods of Numerical Analysis, Sastry S.S., Prentice Hall India
2. Numerical Methods for Engineering and Scientific Computation, Jain and Jain, New Age International Pvt. Ltd. New Delhi.
3. Engineering Statistics, Bowker, A.H. and Liberman G.J., Prentice Hall.
4. Probability and Statics in Engineering, Hines, John Willey and Sons.
5. Applied Statistics and Probability for Engineers, Montgomery, John Wiley and Sons.

6. Numerical Methods for Engineers by S.C. Chapra & R.P. Canale, Tata McGraw Hill
7. Numerical Methods in Science and Engineering by S. Rajasekaran, Wheeler Publishing

7CE6.1A: ADVANCE TRANSPORTATION ENGINEERING (L- 3)

B.Tech. (Civil) 7th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Traffic Studies: Road inventories, Traffic Volume Studies, Spot Speed Studies, Travel Time and delay Studies, Origin-Destination studies, Methodology and Analysis of O-D data, Traffic capacity, Parking studies and characteristics, Accident studies and characteristics, causes and preventive measures.	8
II	Statistical Methods for Traffic Engineering: Elementary concepts and Probability, Mean, Standard Deviation and variance, Poisson and Binomial Distribution, Normal distribution, sampling Theory and Significance testing, Linear Regression and correlation.	8
III	Traffic Characteristics: Macroscopic and Microscopic Characteristics related to Volume, Speed and Density, their relationships, Road User Characteristics – Human and vehicular Characteristics. Traffic Engineering Design: Principles of Road Junction design, Design of Roundabouts, Bus Stops and Parking Lots, Design of Signals.	8
IV	Traffic Management: Traffic Laws, Regulations and Ordinances for Drivers, Pedestrians and Mixed Traffic. Traffic control Measures – One Way streets, Kerb Parking Control, Intersection Control, Speed Control, Access Control. Expressways. Traffic Control Devices – Traffic Markings, Signs, Signals, Traffic Islands, their Classification, types and Sketches, Street Lighting.	8
V	Traffic and Environment: Detrimental Effects of Traffic on the environment – air pollution, noise pollution, visual intrusion, aesthetics etc. Road Safety: The identification of problem, causation and Prevention, Road layout and Improvements, Safety equipment.	8
TOTAL		40

Text Book:

1. Traffic Engineering and Transport Planning by L.R.Kadiyali, Khanna Tech Publications, Delhi.

REFERENCE BOOKS

1. Principles of Transportation Engineering by Parbha Chakraborty & Animesh Dash, PHI.
2. Traffic System Analysis Wohl and Martin, Mc Graw Hill Co.

7CE6.2A : DESIGN OF PRE-STRESSED CONCRETE STRUCTURES (L- 3)

B.Tech. (Civil) 7th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction: Systems of pre-stressing in detail, pre-stressing techniques, transfer of pre-stress, types of commercially available jacks, computation of losses of pre-stress. Anchorage Zone: end block stresses, design.	8
II	Cable profiles: Concordant and non-concordant cable profile and associated factors in continuous members. Modern cable laying: materials & practices, precautions etc. Computation of deflection in pre-stressed concrete members.	8
III	Design of Pre-stressed Concrete Sections: Flexural, shear and torsion resistance of members, preliminary and final design of sections, design of pre and post tensioned flexural members; simply supported and continuous members.	8
IV	Pre-stressed Slab: Design of slabs, tendon layout, precast slab, production and their applications. Partial Prestressing: Principles and advantages, methods, practices and design.	8
V	Design of circular pipes and circular water retaining structures etc. Case study of one bridge girder with design and constructional features.	8
TOTAL		40

Text Book: Design of Pre stressed Concrete by N.Krishnan Raju, Tata Mc Graw Hills.

REFERENCE BOOKS

- 1- Design of Pre stressed Concrete by T.Y. Lin, Wiley Eastern International.
- 2- Design of Pre stressed Concrete Structures by N.Sinha Ray, S.Chand Co.
3. Prestressed concrete structures by Praveen Nagrajan, Pearsons

7CE6.3A : RURAL WATER SUPPLY AND SANITATION (L- 3)

B.Tech. (Civil) 7th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	General: Importance of village community in India, Condition of Indian villages with special regard to economics, social and health aspects. Sources of water: Traditional sources of water in rural areas. Different types of wells, sanitary aspects in well construction, pumps used for village wells, Hand pump Technology, its operation and maintenance. Water harvesting techniques.	8
II	Quality of water: Estimation of total water requirement including cattle water demand, quality of water needed for village community, water quality surveillance, standards of water quality. Communicable Diseases: Diseases and immunity, Source of communicable diseases, Mode of transfer, Control of communicable diseases, Guinea worm Eradication.	8
III	Water Treatment: Slow sand filter, horizontal roughing filter and their combination. Disinfection of rural water sources, Fluoride and its removal. Schemes of Rural water supply: Different Schemes of Rural water supply in Rajasthan, Their Design and project formulation including the programmes and standards laid by Govt. of India and Govt. of Rajasthan.	8
IV	Milk and Food sanitation: Essentials of dairy farm and cattle shed sanitation, Tests for milk and dairy products, food epidemics, food poisoning, Botulism. Fly and Mosquito control: Life cycle of flies and mosquitoes, various methods of flies and mosquito control.	8
V	Rural Sanitation: Village latrines, VIP latrines, pour flush latrines, materials, construction and cost of the latrines, Pollution aspects and pollution travel from latrines. Storm water and sludge problems. Septic tank, soak pit, small bore sewer system; its design and construction. Animal waste, method of composting, Biogas, collection and disposal of wastes. Community Awareness and user participation: Planning of communication support in rural supply and sanitation projects.	8
	TOTAL	40

REFERENCE BOOKS

- 1 Rural Water Supply & Sanitation Manual by Govt. of India
2. Municipal and Rural Sanitation E.W.Steel, Mc Graw Hill Book Co.
- 3.Reports of Rajeev Gandhi National Drinking Water Mission

Typical list of experiments for VII Semester Labs

7CE7A : DESIGN OF WATER RESOURCES STRUCTURES– I (P-2)

Design Problems as per syllabus of theory.

7CE8A : STEEL STRUCTURES DESIGN - I (P-3)

Design Problems as per different units of syllabus of theory.

7CE9A: CONCRETE STRUCTURES DESIGN -II (P-3)

Design Problems as per different units of syllabus of theory.

7CE10A :APPLICATION OF NUMERICAL METHODS IN CIVIL ENGINEERING (P-3)

Computer programming for application of numerical methods (as described in 7CE5) in solving problems related to Civil Engineering.

7CETR: PRACTICAL TRAINING AND INDUSTRIAL VISIT (P-2)

7CEPR : PROJECT Part- I (P-2)

8CE1A : WATER RESOURCES ENGINEERING- II (L-3, T-1)

B.Tech. (Civil) 8th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Regulation of works: Falls, Classification of falls, Design of falls, Distributory head regulator and cross-head regulator, Escape, bed bars. Cross-Drainage Structure: Necessity of Cross-drainage structures, their types and selection, comparative merits and demerits, design of various types of cross-drainage structure-aqueducts, siphon aqueduct, super passage siphon, level crossing and other types.	8
II	Diversion Head works: Design for surface and subsurface flows, Bligh's and Khosla's methods. Selection of site and layout, different parts of diversion head works, types of weirs and barrages, design of weirs on permeable foundation, silt excluders and different types of silt ejectors. Energy dissipation.	8
III	Embankment Dams: Suitable sites, causes of failures, stability and seepage analysis, flownet, slope stability analysis, precautions of piping, principles of design of earth dams. Gravity Dams: Force acting on a gravity dam, stability requirements, Instrumentation.	8
IV	Spillways: Spillway capacity, flood routing through spillways, different types of spillways and gates, energy dissipation below spillways. Hydro Power Plant: General features of hydroelectric schemes, elements of power house structure, selection of turbines, draft tube and setting of turbine, cavitations.	8
V	Reservoirs: Evaluation of impact of water projects on river regimes and environment. Reservoir sedimentation and water shed management. Optimization: Introduction to optimization techniques and system approach. Introduction to G.I.S. and Computer aided irrigation design.	8
TOTAL		40

Text Book: 1.Theory and Design of Irrigation Structures by Varshney Gupta and Gupta, Nem Chand & Brothers, Roorkee.

REFERENCE BOOKS

- 1- Irrigation Water Power and Water Resource Engineering By KR Arora, Standard Publishers and Distributors, Delhi.
- 2- Water Resources Engineering by Modi ,Standard Publishers.
3. Fundamentals of Irrigation Engineering by Bharat Singh, Nem Chand Brothers, Roorkee.

8CE2A: DESIGN OF STEEL STRUCTURES–II (L 3)

B.Tech. (Civil) 8th semester

Max. Marks: 80
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Design of gantry girder. Design of roof trusses including wind loading and purlin design, Introduction to Pre Engineered Buildings and tubular sections and their applications.	8
II	Design of plate girder: Design of welded and bolted sections. Connections for flange plate to flange angles and flange angles to web, etc. Design of welded connections. Web and flange splicing. Horizontal, Intermediate and Bearing stiffeners. Curtailment of plates. Shear strength determination by post critical and tension field action methods. End panel design options and procedure as per IS 800.	8
III	Bridges: Types of bridges, Loadings, Standard loading for railway bridges, Design of Deck type plate-girder bridges, design of its bracings and frames.	8
IV	Design aspects of foot over bridges. Design of through type truss girder bridges including stringer design, cross girder design, main truss members, portal and sway bracings etc.	8
V	Water tanks, circular tanks with segmental bottoms, rectangular tanks, pressed steel tanks, design of staging.	8
TOTAL		40

REFERENCE BOOKS

- 1-Design of Steel Structures by S. Bhavikatti, I.K. International Pvt. Ltd.
- 2- Design of Steel Structures by V.L Shah, Structures Publications.
3. Limit State Design of Steel Structures: S K Duggal- Tat Mc Graw Hill
- 4-Design of Steel Structures by N. Subramanian, Oxford University Press.
- 5-Design of Steel Structures by B.C. Punmia Laxmi Publication
- 6-Design of Steel Structures Vol. II by Ram Chandra, Standard Publishers.

8CE3A: PROJECT PLANNING & CONSTRUCTION MANAGEMENT(L- 3)

B.Tech. (Civil) 8th semester

Max. Marks: 80
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS

I	FINANCIAL EVALUATION OF PROJECTS AND PROJECT PLANNING: Capital investment proposals, criterions to judge the worth whileness of capital projects viz. net present value, benefit cost ratio, internal rate of return, Risk cost management, main causes of project failure. Categories of construction projects, objectives, project development process, Functions of project management, Project management organization and staffing, Stages and steps involved in project planning, Plan development process, objectives of construction project management.	8
II	PROJECT SCHEDULING: Importance of project scheduling, project work breakdown process – determining activities involved, work breakdown structure, assessing activity duration, duration estimate procedure, Project work scheduling, Project management techniques – CPM and PERT networks analysis, concept of precedence network analysis.	8
III	PROJECT COST AND TIME CONTROL: Monitoring the time progress and cost controlling measures in a construction project, Time cost trade-off process: direct and indirect project costs, cost slope, Process of crashing of activities, determination of the optimum duration of a project, updating of project networks, resources allocation.	8
IV	CONTRACT MANAGEMENT: Elements of tender operation, Types of tenders and contracts, Contract document, Legal aspects of contracts, Contract negotiation & award of work, breach of contract, determination of a contract, arbitration.	8
V	SAFETY AND OTHER ASPECTS OF CONSTRUCTION MANAGEMENT: Causes and prevention of accidents at construction sites, Safety measures to be followed in various construction works like excavation, demolition of structures, explosive handling, hot bitumen work. Project Management Information System – Concept, frame work, benefits of computerized information system. Environmental and social aspects of various types of construction projects.	8
	TOTAL	40

Text Book: 1.Project Management with CPM /PERT by B.C. Punmia, Laxmi Publication (P) Ltd.

REFERENCE BOOKS

- 1.Construction Project Management by K.K. Chitkara, Tata Mc Graw Hills.
- 2- Project Management by Modder & Phillph, CBS Publishers.

8CE 4.1A: BRIDGE ENGINEERING (L- 3)

B.Tech. (Civil) 8th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction: Type of bridges & classification of road & railways bridges. IRC & Railway loadings for bridges, wind load & Earthquake forces. Steel bridges Design of through type & deck type steel bridges for IRC loading. Design of deck type & through type truss bridges for railway loadings.	8
II	Reinforced concrete culverts & bridges: Reinforced concrete slab culvert, T-beam bridges-courbons & Hendry-Jaegar methods. Design of balanced cantilever bridge.	8
III	Prestressed Concrete bridges: Prestressed & Post stressed concrete bridges Design of deck slab & girder sections.	8
IV	Bearings: Bearings for slab bridges and girder bridges. Elastomeric bearings, design concepts as per IRC 83 (Part II).	8
V	Joints: Expansion joints.	8
	TOTAL	40

REFERENCE BOOKS

- 1- Design of Bridge Structures by T.R. Jagadeesh & M.A. Jayaram, Prentice Hall Of India (PHI).
- 2- Bridge Engineering by Victor, Oxford and IBH Publishers.
- 3- Design of Bridges by Krishna Raju, Oxford and IBH Publishers.
- 4- Bridge Super Structures by Raj Gopalan, Standard Publishers & Distributors.
- 5-Goncrete Bridge Practice by Raina V.K., Tata Mc Graw Hill Co.
- 6- Bridge Engineering by Ponnuswamy, Tata Mc Graw Hills.

8CE4.2A: ADVANCED FOUNDATION ENGINEERING (L- 3)

B.Tech. (Civil) 8th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Shallow Foundation: Methods of estimation of bearing capacity, computation of bearing capacity factors, Effect of eccentric and inclined loads, effect of water table on bearing capacity, Terzaghi, Vesic, Hansen, Moyerhof's analysis, Bearing capacity of stratified soils. IS code recommendations for minimum depth, factor of safety, design for local shear	8

	and general shear failure.	
II	Settlement Under Foundation: Methods of estimation of settlement of footings. Limits of settlements for various structures, Indian Standard Code Provisions (IS: 1904, 6403, 8009). Determination of allowable bearing capacity as per IS code. Schemartman's method, Dee beer's and Mortin method of finding out settlement from static cone penetration test. Methods of finding out bearing capacity from plate load test, standard penetration test data.	8
III	Pile Foundation: types of pile and their use, modes of failure. Bearing capacity and settlement of pile foundation. Types of piles, Allowable load, Pile load test, Dynamic and static formulae. Bearing Capacity factors. Pile group bearing capacity and settlement. Negative skin friction. Behavior of piles under lateral loading. Winkler's assumption. Pile resistance and deflection under lateral loads, elastic method, Brooms method.	8
IV	Foundation on Difficult Soils: Collapsible soil; identification, Collapse settlement: foundation design. Sanitary land fills settlement of sanitary land fill. Expensive soils: Behaviour of expansive soil, foundation practices, under-reamed piles. Methods of finding out load carrying capacity of under reamed piles in clayey and sandy soil. Provision of IS 2911 Part III-1980 for design of under-reamed pile foundations.	8
V	Raft foundation: Common types of raft, combined footing. Bearing capacity of raft, differential settlement of raft; semi empirical method of design of raft foundation. Well foundations: design and construction. Bearing capacity, settlement and lateral resistance. Tilts and shifts, IS and IRC codes methods.	8
	TOTAL	40

REFERENCE BOOKS

- 1- Basic & Applied Soil Mechanics -by Ranjan & Rao, New Age International Publishers.
- 2- Geotechnical Engineering by Gulhati & Dutta , Tata Mc Graw Hills, Delhi.
- 3- Design Aids in foundation Engineering by Kaniraj, Tata Mc Graw Hills, Delhi.

8CE4.3A: EARTHQUAKE RESISTANT CONSTRUCTION & DESIGN (L- 3)

B.Tech. (Civil) 8th semester

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introductory Seismology: Various terminology related with earthquake, Causes of earthquake, plate tectonics, Tsunami. Seismic wave propagation. Magnitude, intensity & energy of earthquake, magnitude & intensity scales, classifications of earthquakes, Seismic zoning case histories of earthquakes.	8

	Seismic hazards, induced hazards.	
II	Earthquake recording, Seismic instruments, Seismographs & Seismograms. Basic concept of liquefaction and isolation. Introduction to various IS related codes. Structural systems, Effects of earthquake on buildings in general, structural and nonstructural failures. Dynamic characteristics of buildings, natural period of vibration, damping, stiffness etc. Seismic performance of traditionally built masonry constructions, typical failure mechanism of masonry buildings under earthquakes.	8
III	IS 4326: 1993: Planning consideration & architectural concept, provisions for earthquake resistant construction/ seismic strengthening of masonry constructions.	8
IV	Seismic performance of reinforced concrete buildings. Plan, elevation & stiffness irregularities & their effects. Typical earthquake damages of RC constructions, short column effect, soft storey effect, strong column-weak beam analogy. IS 13920: 1993: Ductile detailing of reinforced concrete buildings and shear wall concept.	8
V	Seismic design philosophy, IS 1893 (part I):2002 codal provisions : Load combinations, Design lateral loads, response reduction factors, structural modeling of building frames, equivalent load method for earthquake analysis of multistory frames.	8
	TOTAL	40

REFERENCE BOOKS

1. Structural Dynamics by Anil K Chopra , Pearson Education.
2. Dynamics of Structures by Clough & Penzin, Mc Graw Hill Book Co.
3. Earthquake Engineering by Pankaj Agarwal & Manish Shree Khande, Prentice Hall of India.
4. Earthquake Tips by C.V R. Murthy, IIT Kanpur.
5. Earthquake-Resistant Design of Steel Structures by Duggal, Oxford University Press.

8CE5A : DESIGN OF WATER RESOURCES STRUCTURES– II (P- 3)

Design as per syllabus of theory.

6CE6A : STEEL STRUCTURES DESIGN - II (P- 3)

Design problems as per different units of syllabus of theory

8CE7A : PROFESSIONAL PRACTICES AND ESTIMATING (P-3)

1. Estimates – Methods of building estimates, types; site plan, index plan, layout plan, plinth area, floor area; Technical sanction, Administrative approval; estimate of buildings, roads, earthwork and R.C.C. works.
2. Analysis of rates- for earthwork, concrete work, D.P.C., stone masonry,, plastering, pointing and roadwork.
3. Specifications- For different classes of building and Civil Engineering works.
4. Types of contracts – Tenders, tender form, submission and opening of tenders, measurement book, muster roll, piecework agreement and work order.
5. Arbitration
6. Valuation of real estate.

8CE7 : STRUCTURAL ANALYSIS BY MATRIX METHODS OF (P- 2)

Introduction to matrix methods; Stiffness (Deflection) and Flexibility (Force) matrices for bar, plate, and beam elements w.r.t. local axes and global axes, for entire structure w.r.t. global axes (Direct method and by assembly method. Introduction of Finite Element Methods.

8CE8A : DESIGN of FOUNDATIONS (P- 3)

1. Design of isolated shallow footings, combined footings, raft foundations.
2. Design of pile foundations.
3. Design of wells and cassions.
4. Design of machine foundation.
5. Design of retaining structures etc.

8CESM: SEMINAR (P-2)

8CEPR: PROJECT Part II (P-2)

Scheme and Syllabus
Rajasthan Technical University, Kota
B. Tech. in Electrical Engineering
(Session 2017-18)

Course	Electrical Engineering	Code	EE

SEMESTER III		Hrs. / Week			IA	Exam	Total
Subject Code	Title	L	T	P			
3EE1A	Electronic Devices & Circuits	3	1	Theory Subjects	20	80	100
3EE2A	Circuit Analysis-I	3	1		20	80	100
3EE3A	Digital Electronics	3	1		20	80	100
3EE4A	Object Oriented Programming	3			20	80	100
3EE5A	Electrical Machines-I	3	1		20	80	100
3EE6A	Advanced Engg. Mathematics-1	3			20	80	100
3EE7A	Electronic Devices Lab	Practical laboratory courses		2	45	30	75
3EE8A	Electrical Circuit Lab			2	30	20	50
3EE9A	Digital Electronics Lab			2	45	30	75
3EE10A	C++ Programming Lab			2	45	30	75
3EE11A	Humanities & Social Sciences			2	45	30	75
3EEDC	Discipline & Extra Curricular Activity						50
	Total	18	4	10			1000

SEMESTER IV		Hrs. / Week			IA	Exam	Total
Subject Code	Title	L	T	P			
4EE1A	Analog Electronics	3	1	Theory Subjects	20	80	100
4EE2A	Circuit Analysis-II	3	1		20	80	100
4EE3A	Electrical Measurements	3	1		20	80	100
4EE4A	Generation of Electrical Power	3			20	80	100
4EE5A	Electrical Machines-II	3	1		20	80	100
4EE6A	Advanced Engineering Mathematics-II	3			20	80	100
4EE7A	Analog Electronics Lab	Practical laboratory courses		2	60	40	100
4EE8A	Electrical Measurement Lab			2	45	30	75
4EE9A	Power System Design Lab			2	30	20	50
4EE10A	Electrical Machines Lab			2	45	30	75
4EE11A	Electrical Machine Design			2	30	20	50
4EEDC	Discipline & Extra Curricular Activity						50
	Total	18	4	10			1000

Course	Electrical Engineering	Code	EE

SEMESTER V		Hrs. / Week			IA	Exam	Total
Subject Code	Title	L	T	P			
5EE1A	Power Electronics	3	1	Theory Subjects	20	80	100
5EE2A	Microprocessors & Computer Architecture	3			20	80	100
5EE3A	Control Systems	3	1		20	80	100
5EE4A	Data Base Management System	3			20	80	100
5EE5A	Transmission & Distribution of Electrical Power	3	1		20	80	100
5EE6.1A	Optimisation Techniques	3	1		20	80	100
5EE6.2A	Principle of Communication Systems						
5EE6.3A	Introduction to VLSI						
5EE7A	Power Electronics Lab	Practical laboratory courses		2	45	30	75
5EE8A	Microprocessor Lab			2	45	30	75
5EE9A	System Programming Lab			2	45	30	75
5EE10A	DBMS Lab			2	45	30	75
5EE11A	Professional Ethics and Disaster Manage			2	30	20	50
5EEDC	Discipline & Extra Curricular Activity						50
	Total	18	3	10			1000

SEMESTER VI		Hrs. / Week			IA	Exam	Total
Subject Code	Title	L	T	P			
6EE1A	Modern Control Theory	3	1	Theory Subjects	20	80	100
6EE2A	High Voltage Engineering	3			20	80	100
6EE3A	Switchgear & Protection	3	1		20	80	100
6EE4A	Advanced Power Electronics	3	1		20	80	100
6EE5A	Smart Grid Technology	3			20	80	100
6EE6.1A	Advanced Microprocessors	3	1		20	80	100
6EE6.2A	Power System Instrumentation						
6EE6.3A	Digital Communication and Information Theory						
6EE7A	Control System Lab	Practical laboratory courses		2	45	30	75
6EE8A	Power System Lab			2	45	30	75
6EE9A	Advanced Power Electronics Lab			2	45	30	75
6EE10A	Smart Grid Lab			2	45	30	75
6EE11A	Entrepreneurship Development			2	30	20	50
6EEDC	Discipline & Extra Curricular Activity						50
	Total	18	3	10			1000

Course	Electrical Engineering	Code	EE

SEMESTER VII	Title	Hrs. / Week			IA	Exam	Total
Subject Code		L	T	P			
7EE1A	Power System Planning	3		Theory Subjects	20	80	100
7EE2A	Power System Analysis	3	1		20	80	100
7EE3A	Artificial Intelligence Techniques	3			20	80	100
7EE4A	Non Conventional Energy Sources	3			20	80	100
7EE5A	Power System Engineering	3	1		20	80	100
7EE6.1A	Electromagnetic Field Theory	3	1		20	80	100
7EE6.2A	Computer Aided Design of Electrical Machines						
7EE6.3A	Economic Operation of Power Systems						
7EE7A	Power System Planning Lab	Practical laboratory courses	2	45	30	75	
7EE8A	Power System Modelling & Simulation Lab		2	45	30	75	
7EE9A	Industrial Economics & Management		2	30	20	50	
7EETR	Practical Training & Industrial visit		2		100	100	
7EEPR	Project-1		2	50		50	
7EEDC	Discipline & Extra Curricular Activity						50
	Total	18	2	10			1000

SEMESTER VIII	Title	Hrs. / Week			IA	Exam	Total
Subject Code		L	T	P			
8EE1A	EHV AC/DC Transmission	3	1	Theory Subjects	20	80	100
8EE2A	Electric Drives and Their Control	3	1		20	80	100
8EE3A	Protection of Power System	3			20	80	100
8EE4.1A	Utilization of Electrical Power	3			20	80	100
8EE4.2A	FACTS Devices & Their Applications						
8EE4.3A	Power System Transients						
8EE5A	Computer Based Power System Lab	Practical laboratory courses		3	60	40	100
8EE6A	Electrical Drives and Control Lab			3	60	40	100
8EE7A	High Voltage Engineering Lab			2			50
8EEPR	Project-2			2	120	80	200
8EESM	Seminar			2	60	40	100
8EEDC	Discipline & Extra Curricular Activity						50
	Total	12	2	12			1000

Syllabus B.Tech. (Electrical Engineering), 3rd semester

3EE1A: ELECTRONIC DEVICES & CIRCUITS (Common to EE, EX, EC and ED)

B.Tech. (Electrical) 3rd Semester

Max. Marks: 80

3L+1T

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Semiconductor Physics: Mobility and conductivity, charge densities in a semiconductor, Fermi Dirac distribution, Fermi-Dirac statistics and Boltzmann approximation to the Fermi-Dirac statistics, carrier concentrations and Fermi levels in semiconductor.	5
	Generation and recombination of charges, diffusion and continuity equation, transport equations, Mass action Law, Hall effect.	3
2	Junction Diodes: Formation of homogenous and heterojunction diodes and their energy band diagrams, calculation of contact potential and depletion width, V-I characteristics, Small signal models of diode, Diode as a circuit element, diode parameters and load line concept, C-V characteristics and dopant profile.	4
	Applications of diodes in rectifier, clipping, clamping circuits and voltage multipliers. Transient behavior of PN diode. Breakdown diodes, Schottky diodes, and Zener diode as voltage regulator. Construction, characteristics and operating principle of UJT.	4
3	Transistors: Characteristics, Current Components, Current Gains: alpha and beta. Variation of transistor parameter with temperature and current level, Operating point, Hybrid model, DC model of transistor, h-parameter equivalent circuits. CE, CB and CC configuration	4
	DC and AC analysis of single stage CE, CC (Emitter follower) and CB amplifiers AC & DC load line, Ebers-Moll model. Biasing & stabilization techniques. Thermal runaway, Thermal stability.	4
4	JFET & MOSFET: Construction and operation of JFET & MOSFET, noise performances of FET, parasitic of MOSFET, small signal models of JFET & MOSFET	4
	Biasing of JFET's & MOSFET's. Low frequency single stage CS and CD (source follower) JFET amplifiers. FET as voltage variable resistor and active load.	4
5	Small Signal Amplifiers at Low Frequency: Analysis of BJT and FET multistage amplifier, DC and RC coupled amplifiers. Frequency response of single and multistage amplifier, mid-band gain, gains at low and high frequency.	4
	Analysis of DC and differential amplifiers, Miller's Theorem, use of Miller and bootstrap configuration. Cascade and cascode configuration of multistage amplifiers (CE-CE, CE-CB, CS-CS and CS-CD), Darlington pair.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Millman Halkias, Integrated Electronics, TMH	2011
2	R. L. Boylestad, Louis Nashelsky, Electronic devices & circuits theory, Pearson Education	2009

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	David Bell, Electronic Devices & Circuits, Oxford Publications	2009
2	Schultz, Grob's, Basic Electronics, TMH	2007
3	Millman, Electronics Devices and Circuits, ed. 3, TMH	2006
4	Cathey, Electronics Devices and Circuits, ed. 3, TMH	2005
5	J. Millman and A. Grabel, Microelectronics, TMH, International	1999
6	B. G. Streetman, Solid State Electronic Devices, Prentice Hall of India, New Delhi	2002
7	A. S. Sedra and K. C. Smith, Microelectronic Circuits, Saunderson's College, Publishing	2014
8	Salivahnan, Electronics Devices and Circuits, ed. 3, TMH.	2011

3EE2A: CIRCUIT ANALYSIS-I

B.Tech. (Electrical) 3rd Semester
3L+1T

Max. Marks: 80
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Introduction: Introduction to circuit elements and their characteristics. Current and voltage reference. Response of single element, double element and triple element circuits. Resonance, selectivity & Q-factor in ac circuits.	4
	Network Analysis: Network voltages. Mesh & node systems of network equations and their comparison. Graph of network, tree, incidence matrix, fundamental circuit functions, cut sets, f-circuits analysis and f-cut set analysis, node and node pair analysis. Duality. Method of obtaining dual network.	4
2	Network Theorems: Thevenin's, Norton's, Superposition, Reciprocity, Compensation, Millman's theorem	4
	Tellegen's, Maximum power transfer and Miller's theorems in DC & AC Circuits.	4
3	Polyphase Circuits: General Circuit Relations: Three Phase Star, Three Phase Delta, Star and Delta Combination, Four Wire Star Connection. Balanced and unbalanced Three Phase Voltages, currents and Impedances. Power and Reactive Volt-Amperes in a 3-Phase System	5
	Power Relations in AC Circuits: Instantaneous Power in AC Circuits, Power Factor, Apparent Power, Reactive Power, Power Triangle, Complex Power.	3
4	Non-Sinusoidal Waves: Complex Periodic Waves and Their Analysis By Fourier Series. Different Kinds of Symmetry, Determination of Co-Efficient. Average and Effective Values of a Non-Sinusoidal Wave, Power in a Circuit of Non-Sinusoidal Waves of Current and Voltage	6
	Form Factor, Equivalent Sinusoidal Wave and Equivalent Power Factor. Response of Linear Network to Non-Sinusoidal Periodic Waves.	2
5	Time Domain and Frequency Domain Analysis: Response of networks to step, ramp, impulse, pulse and sinusoidal inputs. Time domain and frequency domain analysis of circuits.	4
	Shifting theorem, initial and final value theorems. Special signal waveforms with Laplace transform & applications to circuit operations.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Van Valkenburg, Network Analysis, PHI	2013
2	Hayt & Kemmerly, Engineering Circuit Analysis, 6/e (TMH)	2012

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	J. Edminster & M. Nahvi, Electric Circuits (SIE), 5/e, Scaum's Out Line.	2013
2	Nagsarkar & Sukhija, Circuits & Networks, Oxford	2010
3	John Bird, Electric Circuit Theory & Technology, ELSEVIER	2007
4	D. Roy Chodhary, Network & Systems, New Age	2010
5	Ghosh & Chakrabarti, Network Analysis and Synthesis, (TMH)	2009
6	A. Chakravorty, Circuit Theory, Publisher Dhanpat Rai & Co. (Pvt.) Ltd.	2013

3EE3A: DIGITAL ELECTRONICS (Common to EE, EX, EC, EIC, CS and IT)**B.Tech. (Electrical) 3rd Semester
3L+1T****Max. Marks: 80
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
1	Number Systems, Basic Logic Gates & Boolean Algebra: Binary Arithmetic & Radix representation of different numbers. Sign & magnitude representation, Fixed point representation, complement notation, various codes & arithmetic in different codes & their inter conversion.	4
	Features of logic algebra, postulates of Boolean algebra. Theorems of Boolean algebra. Boolean function. Derived logic gates: Exclusive-OR, NAND, NOR gates, their block diagrams and truth tables. Logic diagrams from Boolean expressions and vice-versa. Converting logic diagrams to universal logic. Positive, negative and mixed logic. Logic gate conversion.	4
2	Digital Logic Gate Characteristics: TTL logic gate characteristics: Theory & operation of TTL NAND gate circuitry. Open collector TTL. Three state output logic.	4
	TTL subfamilies. MOS & CMOS logic families. Realization of logic gates in RTL, DTL, ECL, C-MOS & MOSFET. Interfacing logic families to one another.	4
3	Minimization Techniques: Minterm, Maxterm, Karnaugh Map, K map upto 4 variables. Simplification of logic functions with K-map	4
	Conversion of truth tables in POS and SOP form. Incomplete specified functions. Variable mapping. Quinn-McKlusky minimization techniques.	4
4	Combinational Systems: Combinational logic circuit design, half and full adder, subtractor. Binary serial and parallel adders. BCD adder. Binary multiplier. Decoder: Binary to Gray decoder, BCD to decimal, BCD to 7-segment decoder.	4
	Multiplexer, demultiplexer, encoder. Octal to binary, BCD to excess-3 encoder. Diode switching matrix. Design of logic circuits by multiplexers, encoders, decoders and demultiplexers.	4
5	Sequential Systems: Latches, flip-flops, R-S, D, J-K, Master Slave flip flops. Conversions of flip-flops.	3
	Counters: Synchronous & asynchronous ripple and decade counters, Modulus counter, skipping state counter, counter design, state diagrams and state reduction techniques. Ring counter. Counter applications. Registers: buffer register, shift register.	5

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Herbert Taub, Donald L. Schilling, Digital Integrated Electronics, TMH	2008
2	M. Morris Mano, Digital Logic and Computer Design, Pearson Edu.	2014

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Millman Taub, Pulse Switching and Network, TMH	2009
2	A. Anandkumar, Fundamentals of Digital circuits, PHI	2009
3	Floyd, Digital Fundamentals, Pearson	2008
4	S. Salivahanan, Sarivazhagan, Digital circuit design, Vikas publications	2009
5	Leach, Digital Principles and Applications, ed. 7, TMH	2008
6	Mandal, Digital Electronics: Principles and Applications, TMH	2009

3EE4A: OBJECT ORIENTED PROGRAMMING (Common to EE, EX, CS and IT)**B.Tech. (Electrical) 3rd Semester****Max. Marks: 80****3L****Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
1	Introduction: Review of structures in C, accessing members of structures using structure variables, pointer to structures, passing structures to functions	5
	Structures as user defined data types.	3
2	Introduction to Programming Paradigms: (Process oriented and Object oriented). Concept of object, class, objects as variables of class data type, difference in structures and class in terms of access to members, private and public Basics of C++: Structure of C++ programs, introduction to defining member functions within and outside a class, keyword <i>using</i> , declaring class, creating objects, constructors & destructor functions, Initializing member values with and without use of constructors, simple programs to access & manipulate data members, <i>cin</i> and <i>cout</i> functions.	4
	Dangers of returning reference to a private data member, constant objects and members function, composition of classes, friend functions and classes, using <i>this</i> pointer, creating and destroying objects dynamically using <i>new</i> and <i>delete</i> operators. Static class members, container classes and iterators, proxy classes. Members of a class, data & function members. Characteristics of OOP- Data hiding, Encapsulation, data security.	4
3	Operator Overloading: Fundamentals, Restrictions, operator functions as class members v/s as friend functions.	4
	Overloading stream function, binary operators and unary operators. Converting between types.	4
4	Inheritance: Base classes and derived classes, protected members, relationship between base class and derived classes, constructors and destructors in derived classes, public, private and protected inheritance	4
	Relationship among objects in an inheritance hierarchy, abstract classes, virtual functions and dynamic binding, virtual destructors.	4
5	Multiple inheritance, virtual base classes, pointers to classes and class members, multiple class members. Templates, exception handling.	8

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Dietel, How to Program C++, Pearson	2013
2	K. R. Venugopal, Mastering C++, TMH	1999

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Robert Lafore, Object Oriented Programming in C++, Pearson	2001
2	Rambaugh, Object Oriented Design & Modelling, Pearson	2004

3EE5A: ELECTRICAL MACHINES-I (Common to EE and EX)**B.Tech. (Electrical) 3rd Semester**
3L+1T**Max. Marks: 80**
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	(I)Magnetic circuits: Magnetic circuits, magneto motive force magnetic field strength, permeability, reluctance, analogy between electric and magnetic-circuits, B-H curve, hysteresis, series and parallel magnetic circuits, practical magnetic circuits, permanent magnet and their applications.	5
	(ii)Electromechanical energy conversion: Basic principles, conservation of energy, physical phenomenon involved in conversion, energy balance, energy stored in magnetic field.	3
2	DC Generators: Introduction, construction, types, emf equation, lap and wave windings, armature reaction, commutation, methods of improving commutation, equalizer rings	4
	Demagnetizing and cross magnetizing ampere turns, various characteristics of shunt, series and compound generators, voltage build up, losses and efficiency, condition for maximum efficiency.	4
3	DC Motors: Introduction, principals, back-emf, torque of motor, types, characteristics of shunt, series and compound motors, speed control (field and armature control methods), basic idea of solid state devices in controlling of DC motors	4
	Starting of DC motors, three point and four point starters, losses and efficiency, testing (brake test and swimburnes test), electric braking of DC motors, Applications.	4
4	Transformer: Construction, Principal, Types, emf equation, no load and short circuit test, equivalent circuits, back-to-back (Sumpner's test), phasor diagram, Voltage regulation	6
	Efficiency, Condition for maximum efficiency, all day efficiency, parallel operation , auto-transformer, basic idea of welding transformer, current and potential transformer, separation of losses.	2
5	Polyphase Transformer: Construction, Various connections and groups, choice of connections, open delta connection, Scott connection, three phase to two phase conversion and vice-versa, Applications, Parallel operation and its conditions	4
	Three to six phase conversion. Excitation phenomenon in transformers, magnetizing harmonic currents and their effects, switching currents in transformers, inrush of magnetizing current. Three winding transformer.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	A. E. Fitzgerald, C. Kingsley Jr and Umans, Electric Machinery, 6th Edition McGraw Hill, International Student Edition.	2002
2	Kothari & Nagrath, Electric Machines, 3/e, TMH	2004

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	M. G. Say, The Performance and Design of AC machines, Pit man & Sons.	2003
2	Guru, Electric Machinery, 3e, Oxford	2000
3	R. K. Srivastava, Electrical Machines, Cengage Learning.	2013
4	P. S. Bimbhra, Electrical Machinery, Khanna Pub.	1995
5	Stephen J Chapman, Electric Machinery Fundamentals, McGraw-Hill	2001
6	Husain Ashfaq, Electrical Machines, Dhanpat Rai & Sons	2013

3EE6A: ADVANCED ENGINEERING MATHEMATICS-I (Common to EE and EX)**B.Tech. (Electrical) 3rd Semester**
3L**Max. Marks: 80**
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Laplace Transform: Laplace transform with its simple properties, applications to the solution of ordinary and partial differential equations having constant coefficients with special reference to wave and diffusion equations, digital transforms.	8
2	Fourier Transform: Discrete Fourier transform, Fast Fourier transform, Complex form of Fourier transform and its inverse applications	4
	Fourier transform for the solution of partial differential equations having constant coefficients with special reference to heat equation and wave equation.	4
3	Fourier Series: Expansion of simple functions in Fourier series, half range series, change of interval, harmonic analysis.	5
	Calculus of Variation: Functional, strong and weak variations, simple variation problems, Euler's equation	
4	Complex Variables: Analytic functions, Cauchy-Riemann equations, Elementary conformal mapping with simple applications	6
	Line integral in complex domain, Cauchy's theorem, Cauchy's integral formula.	2
5	Complex Variables: Taylor's series, Laurent's series, poles, Residues. Evaluations of simple definite real integrals using the theorem of residues. Simple contour integration.	8

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	M. Ray, J. C. Chaturvedi & H.C. Sharma, Differential Equations, Students friends & company	2011
2	Chandrika Prasad, Mathematics for Engineers, Prasad Mudralaya	2012

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Bird, Higher Engineering Mathematics, ELSEVIER.	2004
2	Jeffrey, Advanced Engineering Mathematics, ELSEVIER.	2001
3	Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya	2006
4	Ervin Kreyzig, Advanced Engineering Maths, Wiley.	2005

3EE7A: ELECTRONIC DEVICES LAB (Common to EE, EX, EC and EI)

1. Study the following devices: (a) Analog & digital multimeters (b) Function/ Signal generators (c) Regulated d. c. power supplies (constant voltage and constant current operations) (d) Study of analog CRO, measurement of time period, amplitude, frequency & phase angle using Lissajous figures.
2. Plot V-I characteristic of P-N junction diode & calculate cut-in voltage, reverse saturation current and static & dynamic resistances.
3. Plot V-I characteristic of zener diode and study of zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.
4. Plot frequency response curve for single stage amplifier and to determine gain bandwidth product.
5. Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of I_{DSS} & V_p .
6. Application of Diode as clipper & clamper.
7. Plot gain- frequency characteristic of two stage RC coupled amplifier & calculate its bandwidth and compare it with theoretical value.
8. Plot gain- frequency characteristic of emitter follower & find out its input and output resistances.
9. Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h-parameters.
10. Study half wave rectifier and effect of filters on wave. Also calculate theoretical & practical ripple factor.
11. Study bridge rectifier and measure the effect of filter network on DC voltage output and ripple factor.

3EE8A: ELECTRICAL CIRCUIT LAB

1. Draw the circuit symbols.
2. Verify theorems for A. C. & D. C. circuits.
3. PSPICE Programs for Circuit Analysis:
 - a. DC: Analysis resistor networks to determine node voltages, components voltages, and component currents.
 - b. DC: Analysis of resistor networks that have several voltage and current sources and variable load resistors.
 - c. Transient: Analysis of RC & RL circuits to produce tables of component voltage & current levels for a given set of time instants & to produce graphs of voltages & currents versus time.
 - d. AC: Analysis of impedance networks to determine the magnitude & phase of node voltages, components voltages and component currents.
4. Determine the magnitude & phase and component voltages and currents in resonant circuits & produce voltage and current versus frequency graphs.
5. Programs for Circuit Analysis:
 - a. Calculate the resistance of a conductor, given its dimensions & resistivity or determine the change in conductor resistance when the temp changes.
 - b. D.C.: Analysis of resistor networks to determine all junction voltages, component voltages, and component currents.
 - c. Transient: Analysis RC & RL circuits to produce tables of component voltage & current levels for a given set of time instants.
6. Convert Y-connected resistor networks to delta-connected circuits.

3EE9A: DIGITAL ELECTRONICS LAB (Common to EE, EX, EC, EI, CS and IT)

1. To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR. Also to verify the truth table of Ex-OR, Ex-NOR (For 2, 3, & 4 inputs using gates with 2, 3, & 4 inputs).
2. To verify the truth table of OR, AND, NOR, Ex-OR, Ex-NOR realized using NAND & NOR gates.
3. To realize an SOP and POS expression
4. To realize Half adder/ Subtractor & Full Adder/ Subtractor using NAND & NOR gates and to verify their truth tables.
5. To realize a 4-bit ripple adder/ Subtractor using basic Half adder/ Subtractor & basic Full Adder/ Subtractor.

6. To verify the truth table of 4-to-1 multiplexer and 1-to-4 demultiplexer. Realize the multiplexer using basic gates only. Also to construct and 8-to-1 multiplexer and 1-to-8 demultiplexer using blocks of 4-to-1 multiplexer and 1-to-4 demultiplexer.
7. Design & Realize a combinational circuit that will accept a 2421 BCD code and drive a TIL -312 seven-segment display.
8. Using basic logic gates, realize the R-S, J-K and D-flip flops with and without clock signal and verify their truth table
9. Construct a divide by 2,4& 8 asynchronous counter. Construct a 4-bit binary counter and ring counter for a particular output pattern using D flip flop.
10. Perform input/output operations on parallel in/Parallel out and Serial in/Serial out registers using clock. Also exercise loading only one of multiple values into the register using multiplexer.

Note: As far as possible, the experiments shall be performed on bread board. However, Experiment Nos. 1-4 are to be performed on bread board only.

3EE10A: C++ PROGRAMMING LAB (Common to EE, EX, CS and IT)

1. To write a simple program for understanding of C++ program structure without any CLASS declaration. Program may be based on simple input output, understanding of keyword using.
2. Write a C++ program to demonstrate concept of declaration of class with public & private member, constructors, object creation using constructors, access restrictions, defining member functions within and outside a class. Scope resolution operators, accessing an object's data members and functions through different type of object handle name of object, reference to object, pointer to object, assigning class objects to each other.
3. Program involving multiple classes (without inheritance) to accomplish a task. Demonstrate composition of class.
4. Demonstration Friend function friend classes and this pointer.
5. Demonstration dynamic memory management using new & delete & static class members.
6. Demonstration of restrictions an operator overloading, operator functions as member function and/ or friend function, overloading stream insertion and stream extraction, operators, overloading operators etc.
7. Demonstrator use of protected members, public & private protected classes, multi-level inheritance etc.
8. Demonstrating multiple inheritance, virtual functions, virtual base classes, abstract classes

3EE11A: HUMANITIES & SOCIAL SCIENCE (Common to EE and EX)

Unit 1

India: Brief history of Indian Constitution, farming features, fundamental rights, duties, directive principles of state. History of Indian National Movement, socio economic growth after independence.

Unit 2

Society: Social groups- concept and types, socialization- concept and theory, social control: concept, social problem in contemporary India, status and role.

Unit 3

The Fundamentals of Economics: meaning, definition and importance of economics, Logic of choice, central economic problems, positive and normative approaches, economic systems-socialism and capitalism.

Unit 4

Microeconomics: Law of demand supply, utility approach, indifference curves, elasticity of demand and supply and applications, consumer surplus, Law of returns to factors and returns to scale.

Unit 5

Macroeconomics: concepts relating to National product-National income and its measurement, Simple Keynesian theory, simple multiplier, money and banking. Meaning, concept of international trade, determination of exchange rate, Balance of payments.

Syllabus B.Tech. (Electrical Engineering), 4th semester

4EE1A:ANALOG ELECTRONICS (Common to EE, EX, EC and EI)

B.Tech. (Electrical) 4th semester
3L+1T

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Feedback Amplifiers: Classification, Feedback concept, Feedback Topologies, Transfer gain with feedback, General characteristics of negative feedback amplifiers	5
	Analysis of voltage-series, voltage-shunt, current-series and current-shunt feedback amplifier. Stability criterion. Compensation techniques, miller compensation.	3
2	Oscillators & Multivibrators: Classification. Criterion for oscillation. Tuned collector, Hartley, Colpitts, RC Phase shift, Wien Bridge and crystal oscillators	5
	Astable, monostable and bistable multivibrators. Schmitt trigger. Blocking oscillators	3
3	High Frequency Amplifiers: Hybrid Pi model, conductances and capacitances of hybrid Pi model, high frequency analysis of CE amplifier	4
	Gain bandwidth product, unity gain frequency f_T . Emitter follower at high frequencies.	4
4	Tuned Amplifier: Band pass amplifier, Parallel resonant circuits, Band Width of Parallel resonant circuit. Analysis of Single Tuned Amplifier, Primary & Secondary Tuned Amplifier with BJT & FET	4
	Double Tuned Transformer Coupled Amplifier. Stagger Tuned Amplifier. Pulse Response of such Amplifier. Class C tuned amplifiers, Shunt Peaked Circuits for Increased Bandwidth.	4
5	Power Amplifiers: Classification, Power transistors & power MOSFET (DMOS, VMOS). Output power, power dissipation and efficiency analysis of Class A, class B, class AB, class C, class D and class E amplifiers as output stages.	4
	Pushpull amplifiers with and without transformers. Complementary symmetry & quasi complementary symmetry amplifiers	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Millman, Integrated Electronics, ed. 2, TMH.	2010
2	A. S. Sedra, Kenneth C. Smith, Microelectronic Circuits, Oxford university press.	2009

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	M. H. Rashid, Microelectronic Circuits Analysis and design, Cengage Learning.	2009
2	David A. BELL, Electronic Devices and Circuits, Oxford university press.	2009
3	Salivahnan, Electronics Devices and Circuits, ed. 3, TMH.	2011

4EE2A: CIRCUIT ANALYSIS-II**B.Tech. (Electrical) 4th semester
3L+1T****Max. Marks: 80
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
1	Impedance and Admittance Functions: The concept of complex frequency, transform impedance and admittance, series and parallel combinations	8
2	Network Functions: Terminals and terminal pairs, driving point impedance transfer functions, poles and zeros. Restrictions on pole and zero location in s-plane. Time domain behavior from pole and zero plot. Procedure for finding network functions for general two terminal pair networks	5 3
3	Network Synthesis: Hurwitz polynomial, positive real functions, reactive networks. Separation property for reactive networks. The four-reactance function forms, specification for reactance function. Foster form of reactance networks. Cauer form of reactance networks. Synthesis of R-L and R-C networks in Foster and Cauer forms.	3 5
4	Two Port General Networks: Two port parameters (impedance, admittance, hybrid, ABCD parameters) and their inter relations. Equivalence of two ports. Transformer equivalent, inter connection of two port networks. The ladder network, image impedance, image transfer function, application to L-C network, attenuation and phase shift in symmetrical T and pi networks.	2 6
5	Two Port Reactive Network (Filters): Constant K filters. The m-derived filter. Image impedance of m-derived half (or L) sections, composite filters. Bands pass and band elimination filters. The problem of termination, lattice filters, Barlett's bisection theorem. Introduction to active filters.	5 3

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	M. E. Van Valkenburg, An Introduction to Modern Network Synthesis, Wiley Eastern	2014
2	Nagsarkar & Sukhija, Circuits & Networks, Oxford	2011

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	M. E. Van Valkenburg, An Introduction to Modern Network Synthesis, Wiley Eastern	2008
2	Nagsarkar & Sukhija, Circuits & Networks, Oxford	2011
3	M. E. Van Valkenburg, An Introduction to Modern Network Synthesis, Wiley Eastern	2008
4	Nagsarkar & Sukhija, Circuits & Networks, Oxford	2011
5	M. E. Van Valkenburg, An Introduction to Modern Network Synthesis, Wiley Eastern	2008

4EE3A: ELECTRICAL MEASUREMENTS (Common to EE and EX)**B.Tech. (Electrical) 4th semester**
3L+1T**Max. Marks: 80**
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Measuring Instruments: Moving coil, moving iron, electrodynamic and induction instruments-construction, operation, torque equation and errors. Applications of instruments for measurement of current, voltage, single-phase power and single-phase energy.	6
	Errors in wattmeter and energy meter and their compensation and adjustment. Testing and calibration of single-phase energy meter by phantom loading.	2
2	Polyphase Metering: Blondel's Theorem for n-phase, p-wire system. Measurement of power and reactive kVA in 3-phase balanced and unbalanced systems: One-wattmeter, two-wattmeter and three-wattmeter methods. 3-phase induction type energy meter. Instrument Transformers: Construction and operation of current and potential transformers.	5
	Ratio and phase angle errors and their minimization. Effect of variation of power factor, secondary burden and frequency on errors. Testing of CTs and PTs. Applications of CTs and PTs for the measurement of current, voltage, power and energy.	3
3	Potentiometers: Construction, operation and standardization of DC potentiometers– slide wire and Crompton potentiometers. Use of potentiometer for measurement of resistance and voltmeter and ammeter calibrations.	4
	Volt ratio boxes. Construction, operation and standardization of AC potentiometer – in-phase and quadrature potentiometers. Applications of AC potentiometers.	4
4	Measurement of Resistances: Classification of resistance. Measurement of medium resistances – ammeter and voltmeter method, substitution method, Wheatstone bridge method.	4
	Measurement of low resistances – Potentiometer method and Kelvin's double bridge method. Measurement of high resistance: Price's Guard-wire method. Measurement of earth resistance.	4
5	AC Bridges: Generalized treatment of four-arm AC bridges. Sources and detectors. Maxwell's bridge, Hay's bridge and Anderson bridge for self-inductance measurement. Heaviside's bridge for mutual inductance measurement. De Sauty Bridge for capacitance measurement.	4
	Wien's bridge for capacitance and frequency measurements. Sources of error in bridge measurements and precautions. Screening of bridge components. Wagner earth device.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	H. S. Kalsi, Electronic Inst. & Measurement, TMH	2004
2	Morris, Electrical Measurements & Instrumentation, ELSEVIER	1997

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Bell, Electronic Instrumentation And Measurement, Oxford	1994
2	W. D. Cooper, Electronic Inst. & Measurement Techniques, Prentice Hall, India.	2004
3	A. K. Sawhney, Electrical & Electronic Measurement & Inst, DhanpatRai& Sons	2002
4	E. W. Golding & F. C. Widdis, Electrical Measurement & Measuring Instrument, A.W. Wheeler	2004
5	Forest K. Harries, Electrical Measurement, Willey Eastern Pvt. Ltd. India.	2008

4EE4A: GENERATION OF ELECTRICAL POWER**B.Tech. (Electrical) 6th semester****Max. Marks: 80****3L****Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
1	Conventional Energy Generation Methods : (i) Thermal Power plants: Basic schemes and working principle. (ii) Gas Power Plants: open cycle and closed cycle gas turbine plants, combined gas & steam plants-basic schemes.	5
	(iii) Hydro Power Plants: Classification of hydroelectric plants. Basic schemes of hydroelectric and pumped storage plants. (iv) Nuclear Power Plants: Nuclear fission and nuclear fusion. Fissile and fertile materials. Basic plant schemes with boiling water reactor, heavy water reactor and fast breeder reactor. Efficiencies of various power plants	3
2	New Energy Sources: Impact of thermal, gas, hydro and nuclear power stations on environment. Green House Effect (Global Warming).Renewable and non-renewable energy sources	5
	Conservation of natural resources and sustainable energy systems. Indian energy scene. Introduction to electric energy generation by wind, solar and tidal.	3
3	Loads and Load Curves: Types of load, chronological load curve, load duration curve, energy load curve and mass curve. Maximum demand, demand factor, load factor, diversity factor, capacity factor and utilization.	4
	Power Factor Improvement: Causes and effects of low power factor and advantages of power factor improvement. Power factor improvement using shunt capacitors and synchronous condensers.	4
4	Power Plant Economics: (i) Capital cost of plants, annual fixed and operating costs of plants, generation cost and depreciation. Effect of load factor on unit energy cost. Role of load diversity in power system economics.	5
	(ii) Calculation of most economic power factor when (a) kW demand is constant and (b) kVA demand is constant. (iii) Energy cost reduction: off peak energy utilization, co-generation, and energy conservation.	3
5	(i) Tariffs: Objectives of tariffs. General tariff form. Flat demand rate, straight meter rate, block meter rate. Two part tariff, power factor dependent tariffs, three-part tariff. Spot (time differentiated) pricing.	4
	(ii) Selection of Power Plants: Comparative study of thermal, hydro, nuclear and gas power plants. Base load and peak load plants. Size and types of generating units, types of reserve and size of plant. Selection and location of power plants.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	B. R. Gupta. Generation of Electrical Energy (4/e), S. Chand Publication.	2013
2	S. L. Uppal. Electrical Power (13/e), Khanna Publishers	2009

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	V. K. Mehta, Principles of Power system (3/e), S. Chand Publication	2005
2	Soni, Gupta and Bhatnagar, Generation of Electrical Power, Dhanpat Rai & Sons	1996
3	L. Elgerd Olle, Electric Energy Systems Theory, PHI	2013
4	C. A. Gross, Power System Analysis, TMH	1979

4EE5A: ELECTRICAL MACHINES –II (Common to EE and EX)

B.Tech. (Electrical) 6th semester
3L+1T

Max. Marks: 80
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	AC Machines Fundamentals: Introduction, emf equation, mmf of three phase AC winding, production of rotating magnetic field, types of AC windings	5
	Concentric, distributed and chorded windings, pitch factor, distribution factor, effect of these factors on induced emf, effect of harmonics.	3
2	Polyphase Induction Motor: Introduction. Construction, cage and wound rotors, principal, starting and running torque, condition for maximum torque, equivalent circuits, no load and block rotor test.	5
	Torque-slip characteristics, losses and efficiency, circle diagram, starting of cage and wound motors, speed control, cogging and crawling, double cage rotor, induction generator, application.	3
3	(i) Single Phase Induction Motor: Introduction, construction, principal, double revolving field theory, equivalent circuit, performance calculations, starting methods, and their types, torque slip characteristics of various types.	4
	ii) Special Machines: Single phase synchronous motor, series motor, universal motor, Stepper motors variable reluctance, permanent magnet and hybrid stepper motors.	4
4	Synchronous Generators (Alternators): Introduction, Construction, advantages of rotating field, types of rotors, emf equation, excitation systems, equivalent circuit and their phasor diagrams, voltage regulation, synchronous impedance method, mmf method.	5
	Zero power factor method, two reaction theory of salient pole rotor, phasor diagram, power developed and power angle characteristics of salient pole machine, determination of X_d and X_q , synchronization, synchronizing power and torque, parallel operation application.	3
5	Synchronous Motors: Introduction, construction, principal of operation, starting of synchronous motor, equivalent circuit and phasor diagrams, power and torque, performance calculation, speed torque characteristics, power factor control-effect of change of excitation.	4
	V curve and inverted V curve, synchronous condenser and reactors, synchronous phase modifiers, hunting-causes and remedies, applications, synchronous induction motor application.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	A. E. Fitzgerald, C. Kingsley Jr and Umans, Electric Machinery, 6th Edition McGraw Hill, International Student Edition.	2002
2	Kothari & Nagrath, Electric Machines 3/e, TMH	2004

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	M. G. Say, The Performance and Design of AC machines, Pit man & Sons.	2002
2	Guru, Electric Machinery 3e, Oxford	2000
3	R. K. Srivastava, Electrical Machines, Cengage Learning.	2010
4	P. S. Bimbhra, Electrical Machinery, Khanna Pub.	1995
5	Stephen J Chapman, Electric Machinery Fundamentals, McGraw-Hill	2001
6	Husain Ashfaq, Electrical Machines, Dhanpat Rai & Sons	2012
7	Irving L. Kosow, Electric Machine and Transformers, Prentice Hall of India.	1992

4EE6A: ADVANCED ENGINEERING MATHEMATICS-II (Common to EE and EX)**B.Tech. (Electrical) 4th semester****Max. Marks: 80****3L****Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
1	Numerical Analysis: Finite differences - Forward backward and central difference. Newton's forward and backward differences interpolation formulae. Sterling's formulae, Lagrange's interpolation formula. Solution of non-linear equations in one variable by Newton Raphson and Simultaneous algebraic equation by Gauss and Regula Falsi method.	6
	Solution of simultaneous equations by Gauss elimination and Gauss Seidel methods. Fitting of curves (straight line and parabola of second degree) by method of least squares.	2
2	Numerical Analysis: Numerical differentiation, numerical integration trapezoidal rule, Simpson's one-third and one eighth rule. Numerical Integration of ordinary differential equations of first order	5
	Picard's method, Euler's & modified Euler's methods. Milne's method and Runge Kutta fourth order method. Simple linear difference equations with constant coefficients.	3
3	Special Functions: Bessel's function of first and second kind, simple recurrence relations, orthogonal property of Bessel functions, Transformation, Generating functions	4
	Legendre's function of first kind, simple recurrence relations, orthogonal property, Generating functions.	4
4	Statistics & Probability: Elementary theory of probability, Baye's theorem with simple applications, Expected value.	4
	Theoretical probability distributions – Binomial, Poisson and Normal distributions.	4
5	Statistics & Probability: Lines of regression, co-relation and rank correlation.	4
	Transforms: Z-transforms, its inverse, simple properties and application to difference equations.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Jeffrey, Advanced Engineering Mathematics, ELSEVIER	2006
2	Ervin Kreysig, Advanced Engineering Maths, John Wiley	2010

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Bird, Higher Engineering Mathematics, ELSEVIER	2004
2	Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya	2002
3	Kaplan, W., Advanced Mathematics for Engineers, Addison-Wesley Publishing Co.	2008
4	Brigham, E.O., The Fast Fourier Transform and its Applications, Prentice-Hall	1988
5	J. N. Kapur, Mathematical Statistics, S. Chand & company Ltd	2000
6	R. K. Jain & S. R. K. Iyenger, Advance Engineering Mathematics, Narosa Pub.	2002
7	E. Kreysig, Advanced Engineering Mathematics, John Wiley & Sons	2005

4EE7A: ANALOG ELECTRONICS LAB (Common to EE, EX, EC and EI)

1. Plot gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1kHz with and without negative feedback.
2. Study of series and shunt voltage regulators and measurement of line and load regulation and ripple factor.
3. Plot and study the characteristics of small signal amplifier using FET.
4. Study of push pull amplifier. Measure variation of output power & distortion with load.
5. Study Wein bridge oscillator and observe the effect of variation in R & C on oscillator frequency.
6. Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.
7. Study the following oscillators and observe the effect of variation of C on oscillator frequency: (a) Hartley (b) Colpitts.
8. Design Fabrication and Testing of k-derived filters (LP/HP).
9. Study of a Digital Storage CRO and store a transient on it.
10. To plot the characteristics of UJT and UJT as relaxation.
11. To plot the characteristics of MOSFET and CMOS.

4EE8A: ELECTRICAL MEASUREMENT LAB (Common to EE and EX)

1. Study working and applications of (i) C.R.O. (ii) Digital Storage C.R.O. & (ii) C.R.O. Probes.
2. Study working and applications of Meggar, Tong-tester, P.F. Meter and Phase Shifter.
3. Measure power and power factor in 3-phase load by (i) Two-wattmeter method and (ii) One-wattmeter method.
4. Calibrate an ammeter using DC slide wire potentiometer.
5. Calibrate a voltmeter using Crompton potentiometer.
6. Measure low resistance by Crompton potentiometer.
7. Measure Low resistance by Kelvin's double bridge.
8. Measure earth resistance using fall of potential method.
9. Calibrate a single-phase energy meter by phantom loading at different power factors.
10. Measure self-inductance using Anderson's bridge.
11. Measure capacitance using De Sauty Bridge

4EE9A: POWER SYSTEM DESIGN LAB

1. Generating station design: Design considerations and basic schemes of hydro, thermal, nuclear and gas power plants. Electrical equipment for power stations.
2. Auxiliary power supply scheme for thermal power plant.
3. Distribution system Design: Design of feeders & distributors. Calculation of voltage drops in distributors. Calculation of conductor size using Kelvin's law.
4. Methods of short term, medium term and long term load forecasting.
5. Sending end and receiving end power circle diagrams.
6. Instrument Transformers: Design considerations of CTs & PTs for measurement and protection.
7. Substations: Types of substations, various bus-bar arrangements. Electrical equipment for substations.

4EE10A:ELECTRICAL MACHINE LAB (Common to EE and EX)

1. Speed control of D.C. shunt motor by (a) Field current control method & plot the curve for speed versus field current. (b) Armature voltage control method & plot the curve for speed versus armature voltage.
2. To perform O.C. and S.C. test on a 1-phase transformer and to determine the parameters of its equivalent circuit its voltage regulation and efficiency.
3. To perform back-to-back test on two identical 1-phase transformers and find their efficiency & parameters of the equivalent circuit.
4. To determine the efficiency and voltage regulation of a single-phase transformer by direct loading.
5. To plot the O.C.C. & S.C.C. of an alternator and to determine its Z_s , X_d and regulation by synchronous impedance method.
6. To plot the V-curve for a synchronous motor for different values of loads.
7. To perform the heat run test on a delta/delta connected 3-phase transformer and determine the parameters for its equivalent circuit.
8. To perform no load and blocked rotor test on a 3 phase induction motor and to determine the parameters of its equivalent circuits. Draw the circle diagram and compute the following (i) Max. Torque (ii) Current (iii) slips (iv) p.f. (v) Efficiency.
9. To Plot V-Curve and inverted V-Curve of synchronous motor.
10. To synchronize an alternator across the infinite bus (RSEB) and control load sharing.

4EE11A: ELECTRICAL MACHINE DESIGN (Common to EE and EX)

1. Design of transformers: output of transformer, output equation- volt per turn, core area and weight of iron & copper, optimum design—(i) minimum cost and (ii) minimum losses. Design of core and windings. Design a 3-phase transformer.
2. Design of rotating machines: General concepts. specific loading, output equations –dc machines and ac machines, factor affecting size of rotating machines, choice of specific magnetic and electric loadings.
3. Design of 3-phase induction motors: output equation, choice of air gap flux density and ampere conductors' parameter, main dimensions. Design of a 3-phase squirrel cage induction motor.
4. Design of single phase induction motors: output equation, main dimensions, relative size of single phase and 3-phase induction motors. Design of a single phase capacitor start induction motor.
5. Design of synchronous machines: output equation, choice of specific magnetic and electric loadings, main dimensions, short circuit ratio. Design a 3-phase, 2-pole turbo alternator.

Syllabus B.Tech. (Electrical Engineering), 5th semester

5EE1A: POWER ELECTRONICS (Common for EE and EX)

B.Tech. (Electrical) 5th Semester
3L+1T

Max. Marks: 80
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Power Semiconductor Devices: Construction, Principle of operation, Characteristics and applications of Power Transistor & Thyristor.	3
	Characteristics of GTO, DIAC, MCT, TRIAC, Power MOSFET and IGBT; Two-Transistor Model of Thyristor, Thyristor Commutation methods.	5
2	SCR: Construction and characteristics, specification and ratings, pulse transformer, optical isolators, methods of turn on, triggering circuits for SCR: R, RC, UJT relaxation oscillator.	4
	Rating extension by series and parallel connections, string efficiency. Protection of SCR-Protection against over voltage, over current, dv/dt, di/dt, Gate protection.	4
3	Converters-I: Single Phase half & full wave converters with RL & RLE load, Single phase dual converters, Three phase half wave converters.	5
	Three phase full converters with RL load, Three phase dual converters.	3
4	Converters-II: Single and three-phase semi converters with RL & RLE load. Power factor improvement-Extinction angle control, symmetrical angle control, pulse width modulation control and sinusoidal pulse width modulation control.	6
	Inversion operation. Effect of load and source impedances.	2
5	DC-DC Converters: Step Up/Down Converter, Control strategies, Chopper Configurations, Analysis of type A Chopper	4
	Voltage, current and load commutated chopper. Multiphase Chopper	4

Text Books

S.No.	Name of authors'/books/publisher	Year of Pub.
1	M. D. Singh and K. B. Khanchandani: Power Electronics 2/e, MGH.	2008
2	M. H. Rashid: Power Electronics, Circuits Devices and Applications, Pearson.	2011

Reference Books

S. No.	Name of authors'/books/publisher	Year of Pub.
1	V. R. Moorthi: Power Electronics-Devices, Circuits and Industrial Applications, Oxford.	2005
2	Theodore Wildi: Electrical Machines, Drives and Power Systems, Pearson.	2007
3	Ned Mohan: Power Electronics, John Wiley.	2013
4	Krein P. T.: Elements of Power Electronics, Oxford.	1998
5	P. S. Bimbhra: Power Electronics, Khanna Publishers.	2012

5EE2A: MICROPROCESSOR AND COMPUTER ARCHITECTURE**B.Tech. (Electrical) 5th Semester**
3L**Max. Marks: 80**
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Introduction to 8085 Microprocessor Architecture: CPU, address bus, data bus and control bus. Input/Output devices, buffers, encoders, latches and memories.	4
	Internal Data Operations and Registers, Pins and Signals, Peripheral Devices and Memory Organization, Interrupts.	4
2	8085 Microprocessor Instructions: Classification, Format and Timing.	4
	Instruction Set: 8 Bit and 16 Bit Instructions, Programming and Debugging, Subroutines.	4
3	8085 Microprocessor Interfacing: 8259, 8257, 8255, 8253, 8155 chips and their applications.	5
	A/D conversion, memory, keyboard and display interface (8279).	3
4	8086 Microprocessor: Architecture: Architecture of INTEL 8086 (Bus Interface Unit, Execution unit), register organization, memory addressing, memory segmentation, Operating Modes	6
	Instruction Set of 8086: Addressing Modes: Instruction format: Discussion on instruction Set: Groups: data transfer, arithmetic, logic string, branch control transfer, processor control. Interrupts: Hardware and software interrupts, responses and types.	2
5	Basic Computer Architecture: Central Processing Unit, memory and input/output interfacing. Memory Classification Volatile and non-volatile memory, Primary and secondary memory, Static and Dynamic memory, Logical, Virtual and Physical memory.	4
	Types Of Memory: Magnetic core memory, binary cell, Rom architecture and different types of ROM, RAM architecture, PROM, PAL, PLA, Flash and Cache memory, SDRAM, RDRAM and DDRAM. Memory latency, memory bandwidth, memory seek time.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Gaonkar, Ramesh S.: Microprocessor Architecture, programming and Applications with the 8085, Pen Ram International Publishing 5th Ed.	2002
2	K. Udaykumar and B. S. Umashankar: The 8085 Microprocessor: Architecture, Programming and Interfacing, Pearson Publisher.	2008

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1.	Douglas V. Hall: Microprocessors and Interfacing, Revised Second Edition (SIE), MGH.	2007
2.	Ray. A. K. & Burchandi, K. M.: Advanced Microprocessors and Peripherals, Architecture, Programming and Interfacing, MGH.	2006
3.	Lyla B. Das: The X 86 Microprocessors: Architecture, Programming and Interfacing (8086 to Pentium), Pearson Publisher.	2010
4.	Krishna Kant: Microprocessors and Microcontrollers, PHI Learning.	2007
5.	M. Rafiqzaman: Microprocessors-Theory and applications, PHI.	1993
6.	B. Ram: Advanced Microprocessor & Interfacing. MGH.	2000

5EE3A: CONTROL SYSTEMS (Common for EE and EX)**B.Tech. (Electrical) 5th Semester
3L+1T****Max. Marks: 80
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
1	Introduction: Elements of control systems, concept of open loop and closed loop systems, Examples and application of open loop and closed loop systems, brief idea of multivariable control systems.	5
	Mathematical Modeling of Physical Systems: Representation of physical system (Electro Mechanical) by differential equations, Determination of transfer function by block diagram reduction techniques and signal flow method, Laplace transformation function, inverse Laplace transformation.	3
2	Time Response Analysis of First Order and Second Order System: Characteristic equations, response to step, ramp and parabolic inputs.	4
	Transient response analysis, steady state errors and error constants, Transient & steady state analysis of LTI systems	4
3	Control System Components: Constructional and working concept of ac servomotor, synchronous and stepper motor	5
	Stability and Algebraic Criteria: concept of stability and necessary conditions, Routh-Hurwitz criteria and limitations. Root Locus Technique: The root locus concepts, construction of root loci.	3
4	Frequency Response Analysis: Frequency response, correlation between time and frequency responses, polar and inverse polar plots, Bode plots	5
	Stability in Frequency Domain: Nyquist stability criterion, assessment of relative stability: gain margin and phase margin, M and N Loci, Nichols chart.	3
5	The design problem and preliminary considerations lead, lag and lead-lag networks, design of closed loop systems using compensation techniques in time domain and frequency domain.	4
	Brief idea of proportional, derivative and integral controllers.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Smajit Ghosh, Control Systems: Theory and Applications, 2/e, Pearson Publisher.	2004
2	Dhannesh N. Manik: Control System, Cengage Learning.	2012

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	I. J. Nagrath and M. Gopal: Control Systems Engineering, 3rd Ed, New Age Publication.	2008
2	K. R. Varmah: Control Systems, MGH	2010
3	Anandnatrajan et. al.: Control Systems Engineering, 4 th ed., Scitech Pub.	2013
4	K. Ogata: Modern Control Engineering, Prentice Hall of India.	2010
5	Norman S. Nise: Control System Engineering, John Wiley & Sons.	2011
6	Richard C. Dorf, Robert H. Bishop: Modern Control Systems, Prentice-Hall	2000
7	Robert H. Bishop: Modern Control Systems, Boyd and Fraser pub	2000

5EE4A: DATA BASE MANGEMENT SYSTEM (Common for EE and EX)**B.Tech. (Electrical) 5th Semester**
3L**Max. Marks: 80**
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Introduction, need, purpose and goals of DBMS. DBMS Architecture, Concept of keys, Generalization and specialization,	4
	Introduction to relational data model, ER modeling, concept of ER diagram	4
2	Database Design: Conceptual Data Base design. Theory of normalization, Primitive and composite data types, concept of physical and logical databases,	3
	Data abstraction and data independence, relational algebra and relational calculus.	5
3	SQL, DDL and DML. Constraints assertions, views database security. Application Development using SQL: Host Language interface embedded SQL programming.	5
	GL's, Forms management and report writers. Stored procedures and triggers. Dynamic SQL, JDBC.	3
4	Internal of RDBMS: Physical data organization in sequential, indexed, random and hashed files. Inverted and multi-list structures	8
5	(i) Transaction Management: Transaction concept, transaction state, serializability, conflict serializability, views serializability. (ii) Concurrency Control: Lock based protocol.	4
	(iii) Deadlock Handling: Prevention detection, recovery. (iv) Recovery System: Log based recovery.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Silverschatz Korth and Sudarshan: Database System Concepts, 6th ed., MGH.	2011
2	Raghu Rama Krishnan: Database Management Systems, 2nd ed., MGH.	2003

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	S. K Singh: Database System Concepts, Designs and Applications, Pearson Education	2011
2	Elmasari: Fundamentals of Data Base Systems, Pearson Education.	2003
3	G. K. Gupta: Database Management Systems, MGH.	2011
4	Date C. J.: An Introduction To Database System, Addition Wesley.	2003
5	Alex Berson & Stephen J. Smith: Data Warehousing, Data Mining & OLAP, MGH.	2011
6	Mallach: Data Warehousing System, MGH.	2003
7	Majumdar & Bhattacharya: Database Management System, MGH.	2011

5EE5A: TRANSMISSION & DISTRIBUTION OF ELECTRICAL POWER (Common for EE and EX)**B.Tech. (Electrical) 5th Semester**
3L+1T**Max. Marks: 80**
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Supply systems: Basic network of power system. Transmission and distribution voltage, effect of system voltage on size of conductor and losses. Comparison of DC 2-wire, DC 3-wire, 1-phase AC and 3-phase AC (3-wire and 4-wire) systems.	5
	Distribution Systems: Primary and secondary distribution systems, feeder, distributor and service mains. Radial and ring-main distribution systems. Kelvin's law for conductor size.	3
2	Mechanical Features of Overhead Lines: Conductor material and types of conductor. Conductor arrangements and spacing.	4
	Calculation of sag and tension, supports at different levels, effect of wind and ice loading, stringing chart and sag template. Conductor vibrations and vibration dampers.	4
3	Parameters of Transmission Lines: Resistance inductance and capacitance of overheadlines, effect of earth, line transposition. Geometric mean radius and distance.	4
	Inductance and capacitance of line with symmetrical and unsymmetrical spacing Inductance and capacitance of double circuit lines. Skin and proximity effects. Equivalent circuits and performance of short and medium transmission lines.	4
4	Generalized ABCD Line Constants: equivalent circuit and performance of long transmission line. Ferranti effect. Interference with communication circuits. Power flow through a transmission line	6
	Corona: Electric stress between parallel conductors. Disruptive critical voltage and visual critical voltage, Factors affecting corona. Corona power loss. Effects of corona.	2
5	Insulators: Pin, shackle, suspension, post and strain insulators. Voltage distribution across an insulator string, grading and methods of improving string efficiency.	4
	Underground Cables: Conductor, insulator, sheathing and armoring materials. Types of cables. Insulator resistance and capacitance calculation. Electrostatic stresses and reduction of maximum stresses. Causes of breakdown. Thermal rating of cable. Introduction to oil filled and gas filled cables.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	S. Sivanagaraju and S. Satyanarayana: Electric Power Transmission and Distribution, Pearson Publisher.	2008
2	A. S. Pabla: Electric Power Distribution, MGH.	2012

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	B. R. Gupta: Power System Analysis & Design, S. Chand Publishers.	2008
2	Soni, Gupta and Bhatnagar: A Course in Electrical Power, Dhanpat Rai.	1987
3	C. L. Wadhwa: Electrical Power Systems, New Age.	2009
4	Nagrath Kothari: Modern Power System Analysis, MGH.	2011
5	J. J. Grainger & W. D. Stevenson: Power System Analysis, MGH.	2003
6	Kamaraju: Electrical Power Distribution Systems, MGH.	2009

5EE6.1A: OPTIMIZATION TECHNIQUES**B.Tech. (Electrical) 5th Semester
3L+1T****Max. Marks: 80
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
1	Introduction: Engineering application of Optimization, Formulation of design problems as mathematical programming problems, classification of optimization problems.	8
2	Optimization Techniques: Classical optimization, multivariable with no constraints, unconstrained minimization techniques,	4
	Penalty function techniques, Lagrange multipliers and feasibility techniques.	4
3	Linear Programming: Graphical method, Simplex method, Duality in linear programming (LP), Sensitivity analysis Applications in civil engineering.	5
4	Non Linear Programming Techniques/Method: Unconstrained optimization, one dimensional minimization, golden section, elimination, quadratic and cubic, Fibonacci, interpolation	6
	Direct search, Descent, Constrained optimization, Direct and indirect, Optimization with calculus, Khun-Tucker conditions.	2
5	Constrained Optimization Techniques: Direct, complex, cutting plane, exterior penalty function methods for structural engineering problems.	8

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Rao S. S.: Engineering Optimization- Theory and Practice, New Age International.	2009
2	Hadley. G.: Linear programming, Narosa Publishing House, New Delhi.	2003

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Deb. K.: Optimization for Engineering Design- Algorithms and Examples, PHI.	2012
2	Bhavikatti S. S.: Structural Optimization Using Sequential Linear Programming, Vikas Publishing House, New Delhi.	2003
3	Spunt: Optimum Structural Design, Prentice Hall.	1971
4	Uri Krisch: Optimum Structural Design, MGH.	1981

5EE6.2A: PRINCIPLE OF COMMUNICATION SYSTEMS (Common for EE and EX)**B.Tech. (Electrical) 5th Semester**
3L+1T**Max. Marks: 80**
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Noise Effects in Communication Systems: Resistor noise, Networks with reactive elements, Noise temperature, Noise bandwidth, effective input noise temperature,	2
	Noise figure. Noise figure & equivalent noise temperature in cascaded circuits.	6
2	Amplitude Modulation: Frequency translation, Recovery of base band signal, Spectrum & power relations in AM systems.	4
	Methods of generation & demodulation of AM-DSB, AMDSB/SC and AM-SSB signals. Modulation & detector circuits for AM systems. AM transmitters & receivers.	4
3	Frequency Modulation: Phase & freq. modulation & their relationship, Spectrum & bandwidth of a sinusoidally modulated FM signal, phasor diagram, Narrow band & wide band FM. Generation & demodulation of FM signals.	5
	FM transmitters & receivers, Comparison of AM, FM & PM. Pre emphasis & de-emphasis. Threshold in FM, PLL demodulator.	3
4	Noise in AM and FM: Calculation of signal-to-noise ratio in SSB-SC, DSB-SC, DSB with carrier, Noise calculation of square law demodulator & envelope detector.	6
	Calculation of S/N ratio in FM demodulators, Super-heterodyne receivers.	2
5	Pulse Modulation Systems: Sampling theorem, Generation and demodulation methods of PAM, PWM, PPM.	8

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	John G. Proakis, and Masoud Salehi: Fundamentals of Communication Systems, Pearson Publisher.	2007
2	P. Ramakrishna Rao: Communication Systems, MGH.	2013

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	V. Chandra Sekar: Communication Systems, Oxford.	2006
2	Taub and Schilling: Principles of Communication Systems 3/e, MGH.	2008
3	B. P. Lathi: Modern Analog & Digital Communication System, 4 th ed., Oxford.	2009
4	Simon Hykin: Communication Systems, John Wiley and Sons.	2008
5	R. P. Singh and S. D. Sapre: Communication System Analog & Digital 2/e, MGH.	2008
6	G. Kennedy and B. Davis: Electronic Communication Systems, MGH.	1993
7	Roy Blake: Wireless Communication Technology, Thomson Asia Pvt. Ltd. Singapore.	2008

5EE6.3A INTRODUCTION TO VLSI (Common for EE and EX)

B.Tech. (Electrical) 5th semester
3L+1T

Max. Marks: 80
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Introduction to MOS Technology: Basic MOS transistors, Enhancement Mode transistor action, Depletion Mode transistor action, NMOS and CMOS fabrication.	8
2	Basic Electrical Properties of MOS Circuits: I_{DS} versus V_{DS} relationship, Aspects of threshold voltage, Transistor Trans conductance gm.	4
	The NMOS inverter, Pull up to Pull-down ratio for a NMOS Inverter and CMOS Inverter (B_n/B_p), MOS transistor circuit Model, Noise Margin.	4
3	CMOS Logic Circuits: The inverter, Combinational Logic, NAND Gate NOR gate, Compound Gates, 2 input CMOS Multiplexer, Memory latches and registers	5
	Transmission Gate, Gate delays, CMOS-Gate Transistor sizing, Power dissipation	3
4	Basic Physical Design of Simple Gates and Layout Issues: Layout issues for inverter, Layout for NAND and NOR Gates,	6
	Complex Logic gates Layout, Layout optimization for performance.	2
5	Introduction to VHDL, Verilog & other design tools. VHDL Code for simple Logic gates, flip-flops, shift-registers, Counters, Multiplexers, adders and subtractors.	8

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	S. M. Sze: VLSI Technology, MGH.	2003
2	Debaprasad Das: VLSI Design, Oxford.	2011

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Angsuman Sarkaret. al.: VLSI Design and EDA Tools, Scitech Pub.	2011
2	S. M. Kang: CMOS Digital Integrated Circuits, MGH.	2003
3	Stephen A. Campbell: The Science & Engineering of Microelectronic Fabrication, Oxford.	2001
4	James D. Plummer, Micheal Deal & Petter B. Griffin: Silicon VLSI Tech. Fundamental Practice & Modeling, Prentice Hall.	2000

5EE7A: POWER ELECTRONICS LAB (Common for EE and EX)

- 1 Study the comparison of following power electronics devices regarding ratings, performance characteristics and applications: Power Diode, Power Transistor, Thyristor, Diac, Triac, GTO, MOSFET, MCT and SIT.
- 2 Determine V-I characteristics of SCR and measure forward breakdown voltage, latching and holding currents.
- 3 Find V-I characteristics of TRIAC and DIAC.
- 4 Find output characteristics of MOSFET and IGBT.
- 5 Find transfer characteristics of MOSFET and IGBT.
- 6 Find UJT static emitter characteristics and study the variation in peak point and valley point.
- 7 Study and test firing circuits for SCR-R, RC and UJT firing circuits.
- 8 Study and test 3-phase diode bridge rectifier with R and RL loads. Study the effect of filters.
- 9 Study and obtain waveforms of single-phase half wave controlled rectifier with and without filters. Study the variation of output voltage with respect to firing angle.
- 10 Study and obtain waveforms of single-phase half controlled bridge rectifier with R and RL loads. Study and show the effect of freewheeling diode.
- 11 Study and obtain waveforms of single-phase full controlled bridge converter with R and RL loads. Study and show rectification and inversion operations with and without freewheeling diode.
- 12 Control the speed of a dc motor using single-phase half controlled bridge rectifier and full controlled bridge rectifier. Plot armature voltage versus speed characteristics.

Reference/Suggested Books

1. O. P. Arora: Power Electronics Laboratory-Experiments and Organization, Narosa Pub.
2. P. B. Zbar: Industrial Electronics- A Text-Lab Manual, MGH.

5EE8A: MICROPROCESSOR LAB

- 1 Study the hardware, functions, memory structure and operation of 8085-Microprocessor kit.
- 2 Program to perform integer division: (1) 8-bit by 8-bit (2) 16-bit by 8-bit.
- 3 Transfer of a block of data in memory to another place in memory
- 4 Transfer of block to another location in reverse order.
- 5 Searching a number in an array.
- 6 Sorting of array in: (1) Ascending order (2) Descending order.
- 7 Finding parity of a 32-bit number.
- 8 Program to perform following conversion (1) BCD to ASCII (2) BCD to hexadecimal.
- 9 Program to multiply two 8-bit numbers
- 10 Program to generate and sum 15 Fibonacci numbers.
- 11 Program for rolling display of message "India", "HELLO".
- 12 To insert a number at correct place in a sorted array.
- 13 Reversing bits of an 8-bit number.
- 14 Fabrication of 8-bit LED interfaces for 8085 kit through 8155 and 8255.
- 15 Data transfer on output port 8155 & 8255 & implementation of disco light, running light, and sequential lights on the above mentioned hardware.
- 16 Parallel data transfer between two DYN-85 kit using 8253 ports.
- 17 Generation of different waveform on 8253/8254 programmable timer.

5EE9A: SYSTEM PROGRAMMING LAB (Common for EE and EX)

Basics of MATLAB matrices and vectors, matrix and array operations, Saving and loading data, plotting simple graphs, scripts and functions, Script files, Function files, Global Variables, Loops, Branches, Control flow, Advanced data objects, Multi-dimensional matrices, Structures, Applications in linear algebra curve fitting and interpolation. Numerical integration, Ordinary differential equation. (All contents is to be covered with tutorial sheets)

Simulink: Idea about simulink, problems based on simulink. (All contents is to be covered with tutorial sheets) Write a program to generate Machine Op- code table using two pass Assembler.

Reference/Suggested Books

1. Almos Gilat: MATLAB: An Introduction with Applications, Wiley India Ltd., 2004.
2. Ram N. Patel et. al.: Programming in MATLAB, Pearson.

5EE10A: DBMS LAB (Common for EE and EX)

- 1 Designing database and constraints using DDL statements.
- 2 Experiments for practicing SQL query execution on designed database.
- 3 Database connectivity using JDBC/ODBC.
- 4 Features of embedded SQL.
- 5 Designing front end in HLL and accessing data from backend database.
- 6 Designing simple projects using front end-back end programming
- 7 Project for generating Electricity Bills
- 8 Project for managing student's attendance/marks details.

5EE11A PROFESSIONAL ETHICS AND DISASTERS MANAGEMENT (Common for EE and EX)

- 1 **Objectives:** to help the students
 - To appreciate the importance and values and ethics in implementing the technology and ensure sustainable development, happiness and prosperity.
 - To understand the co-existence with nature and to be aware of potential natural and manmade disasters.
- 2 **Human Values:** Effect of Technological Growth and Sustainable Development.
Profession and Human Values: Values crisis in contemporary society. Nature of values. Psychological Values, Societal Values and Aesthetic Values. Moral and Ethical values.
- 3 **Professional Ethics:**
 - Professional and Professionalism-Professional Accountability, Role of a professional, Ethic and image of profession.
 - Engineering Profession and Ethics-Technology and society, Ethical obligations of Engineering professionals, Roles of Engineers in industry, society, nation and the world.
 - Professional Responsibilities-Collegiality, Loyalty, Confidentiality, Conflict of Interest, Whistle Blowing.
- 4 **Disaster Management:** Understanding Disasters and Hazards and related issues social and environmental. Risk and Vulnerability. Types of Disasters, their occurrence/ causes, impact and preventive measures:
Natural Disasters- Hydro-meteorological Based Disasters like Flood, Flash Flood, Cloud Burst, Drought, Cyclone, Forest Fires; Geological Based Disasters like Earthquake, Tsunami, Landslides, Volcanic Eruptions.
- 5 **Manmade Disasters:** Chemical Industrial Hazards, Major Power Break Downs, Traffic Accidents, Fire Hazards, Nuclear Accidents. Disaster profile of Indian continent. Case studies. Disaster Management Cycle and its components.
In order to fulfill objectives of course,
(A) The institute shall be required to organize at least 3 expert lectures by eminent social workers/professional leaders.
(B) Each student shall compulsorily be required to:
I. Visit a social institution/NGO for at least 7 days during the semester and submit a Summary report.
II. Perform a case study of a disaster that has occurred in last decade and submit a Summary report.

Reference/Suggested Books

1. R Subramanian: Professional Ethics, oxford publishers.
2. Engineering Ethics: Concepts and cases by Charles E. Harris, Jr., Michael S. Pritchard, Michael J. Rabins. Cengage Learning, Delhi
3. Stephen H. Unger: Controlling Technology- Ethics and Responsible Engineers, John Wiley and Sons.
4. Deborah Johnson: Ethical Issues in Engineering, Prentice Hall.
5. A. N. Tripathi: Human Values in the engineering Profession, Moniograph, Published by IIM Calcutta.
6. D. K. Sinha: Towards Basics of Natural Disaster Reduction, Researchco Book Center, Delhi.
7. Amita Sinvhal: Understanding Earthquake Disasters, MGH, New Delhi.
8. Selected Resources available on www.nidmindia.nic.in

Syllabus B.Tech. (Electrical Engineering), 6th semester

6EE1A: MODERN CONTROL THEORY (Common for EE and EX)

B.Tech. (Electrical) 6th semester

Max. Marks: 80

3L+1T

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Introduction: Concept of Linear vector space Linear Independence, Bases & Representation, domain and range. Concept of Linearity, relaxedness, time invariance, causality.	5
	State Space Approach of Control System Analysis: Modern Vs conventional control theory, concept of state, state variable state vector, state space, state space equations, Writing statespace equations of mechanical, Electrical systems, Analogous systems.	3
2	State Space Representation using physical and phase variables, comparison form of system representation. Block diagram representation of state model. Signal flow graph representation.	5
	State space representation using canonical variables. Diagonal matrix. Jordan canonical form, Derivation of transfer functions from state-model.	3
3	Solution of State Equations: Eigenvalues and Eigen vectors. Matrix.Exponential, State transition matrix, Properties of state transition matrix.	4
	Computation of State transition matrix concepts of controllability & observability, Pole placement by state feedback.	4
4	Digital Control Systems: Introduction, sampled data control systems, signal reconstruction, difference equations.	4
	The z-transform, Z-Transfer Function. Block diagram analysis of sampled data systems, z and s domain relationship.	4
5	Modeling of sample-hold circuit, steady state accuracy, stability in z-plane and Jury stability criterion, bilinear transformation	4
	Routh-Hurwitz criterion on s-planes, digital PID controllers, Introduction to adaptive control.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	I. J. Nagrath and M. Gopal: Control Systems Engineering, 3rd Ed, New Age Publication.	2008
2	S. K. Bhattacharya: Control Systems Engineering, 3e, Pearson Publishers.	2009

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Dhannesh N. Manik: Control System, Cengage Learning.	2010
2	Richard C. Dorf, Robert H. Bishop: Modern Control Systems, Prentice-Hall.	2008
3	M. Gopal: Digital Control and State Variable Methods, MGH.	2012
4	B. C. Kuo: Digital Control System, Oxford.	1980
5	C. H. Houpis and G. B. Lamont, Digital Control Systems, MGH.	1992
6	Donald E. Kiv: Optimal Control Theory- An Introduction, Prentice Hall.	2009
7	D. Roy, Choudhary: Modern Control Engineering, Prentice Hall of India.	2005
8	C. T. Chen: System Theory & Design, Oxford University Press.	1999

6EE2A HIGH VOLTAGE ENGINEERING

B.Tech. (Electrical) 6th semester
3L

Max. Marks: 80
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	(i) Breakdown in Gases: Introduction to mechanism of breakdown in gases, Townsend's breakdown mechanism. Breakdown in electromagnetic gases, Application of gases in power system.	4
	(ii) Breakdown in Liquids: Introduction to mechanism of breakdown in liquids, suspended solid particle mechanism and cavity breakdown. Application of oil in power apparatus.	
	(iii) Breakdown in solids: Introduction to mechanism of breakdown in solids, electromechanical breakdown, treeing & tracking breakdown and thermal breakdown	4
2	(i) High DC Voltage Generation: Generation of high dc voltage, basic voltage multiplier circuit.	5
	(ii) High AC Voltage Generation: Cascaded Transformers.	
	(iii) Impulse Voltage generation: Impulse voltage, basic impulse circuit, Mark's multistage impulse generator.	3
3	(iv) Measurement of High Voltage: Potential dividers - resistive, capacitive and mixed potential dividers. Sphere gap- Construction and operation. Klydonograph.	
	Nondestructive Insulation Tests: (i) Measurement of resistivity, dielectric constant and loss factor. High Voltage Schering Bridge- measurement of capacitance and dielectric loss.	3
4	(ii) Partial Discharges: Introduction to partial discharge, partial discharge equivalent circuit. Basic wide-band and narrow band PD detection circuits.	5
	(i) Over voltages: Causes of over voltages, introduction to lightning phenomena, over voltages due to lightning.	2
5	(ii) Travelling Waves: Travelling waves on transmission lines-open end line, short circuited line, line terminated through a resistance, line connected to a cable, reflection and refraction at a T-junction and line terminated through a capacitance. Attenuation of traveling waves.	6
	(i) Over Voltage Protection: Basic construction and operation of ground wires-protection angle and protective zone, ground rods, counterpoise, surge absorber, rod gap and arcing horn, lightning arresters - expulsion type, non -linear gap type and metal oxide gapless type.	5
	(ii) Insulation Coordination: Volt-time curves, basic impulse insulation levels, coordination of insulation levels	3

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Naidu: High Voltage Engineering 4/e, MGH.	2013
2	John Kuffel, E. Kuffel and W. S. Zaengl: High Voltage engineering, Elsevier.	2000

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	C. L.Wadhwa: High Voltage Engineering, Wiley Eastern Ltd.	2007
2	Subir Ray: An Introduction to High Voltage Engineering, Prentice Hall of India.	2013

6EE3A: SWITCHGEAR & PROTECTION (Common for EE and EX)

B.Tech. (Electrical) 6th semester
3L+1T

Max. Marks: 80
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Static Relays: Introduction to static relays, merits and demerits. Comparators: amplitude and phase comparators, duality between amplitude and phase comparators. Introduction to (a) amplitude comparators-circulating current type, phase splitting type and sampling type, (b) phase comparators-vector product type and coincidence type.	6
	Static Over Current Relays: Introduction to instantaneous, definite time, inverse time and directional overcurrent relays.	2
2	Static Differential Relays: Brief description of static differential relay schemes-single phase and three phase schemes. Introduction to static differential protection of generator and transformer.	5
	Static Distance Relays: Introduction to static impedance, reactance and mho relays.	3
3	Carrier Current Protection: Basic apparatus and scheme of power line carrier system. Principle of operation of directional comparison and phase comparison carrier protection and carrier assisted distance protection.	4
	Distance Protection: Effect of power swings on the performance of distance protection. Out of step tripping and blocking relays, mho relay with blinders. Introduction to quadrilateral and elliptical relays.	4
4	Circuit Breakers-I: Electric arc and its characteristics, arc interruption-high resistance interruption and current zero interruption. Arc interruption theories-recovery rate theory and energy balance theory.	4
	Restriking voltage and recovery voltage, develop expressions for restriking voltage and RRRV. Resistance switching, current chopping and interruption of capacitive current. Oil circuit breakers-bulk oil and minimum oil circuit breakers. Air circuit breakers. Miniature Circuit breaker (MCB).	4
5	Circuit Breakers-II: Air blast, SF6 and vacuum circuit breakers. Selection of circuit breakers, rating of circuit breakers.	4
	Digital Protection: Introduction to digital protection. Brief description of block diagram of digital relay. Introduction to digital overcurrent, transformer differential and transmission line distance protection.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Bhaves Bhalja, R. P. Maheshari and Nilesh G. Chothani: Protection and Switchgear, Oxford.	2011
2	Bhuvanesh A. Oza and Nair: Power System Protection and Switchgear, MGH.	2010

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	B. Ravindranath and M. Chander: Power system Protection and Switchgear, Wiley.	1977
2	B. Ram and D. N. Vishwakarma: Power System Protection and Switchgear, MGH.	2001
3	Y. G. Paithankar and S. R. Bhide: Fundamentals of Power System Protection, PHI.	2010
4	T.S.M. Rao: Power System Protection- Static Relays with Microprocessor Applications, MGH.	1989
5	A. R. Van C. Warrington: Protective Relays-Their Theory and Practice, Vol. I & II, Jhon Willey & Sons.	1978
6	S. S. Rao: Switchgear and Protection, Khanna Publishers.	2008

6EE4A: ADVANCED POWER ELECTRONICS (Common for EE and EX)**B.Tech. (Electrical) 6th semester**
3L+1T**Max. Marks: 80**
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	AC Voltage Controllers: Principle of On-Off Control, Principle of Phase control, SinglePhase Bi-directional Controllers with Resistive Loads, Single Phase Controllers with Inductive Loads, Three Phase full wave AC controllers, AC Voltage Controller with PWM Control.	5
2	Cyclo-converters: Basic principle of operation, single phase to single phase, three-phase to three-phase and three-phase to single phase cyclo-converters. Output equation, Control circuit.	8
3	Inverters: Principle of Operation, Single-phase bridge inverters. Three phase bridge Inverters: 180 and 120 degree of conduction. VSI and CSI.	6
	Voltage control of Single Phase and Three Phase Inverters, Harmonic analysis, harmonic reduction techniques, Pulse width modulation techniques.	5
4	Resonant Pulse Inverter: Series resonant inverter with unidirectional switches, parallel resonant inverter, class E resonant inverter, L-type and M-type ZCS resonant converter, ZVS resonant converter.	8
5	Power Supplies: Switched Mode DC Power Supplies, fly-back converter, forward converter, half and full bridge converter, resonant DC power supplies, bi-directional power supplies.	4
	Resonant AC power supplies, bidirectional AC power supplies. Multistage conversions, Control Circuits: Voltage Mode Control, Current Mode Control	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	M. H. Rashid: Power Electronics: Circuits, Devices & Applications, Pearson Publishers.	2004
2	Bimal Bose: Power Electronics & Motor Drives, Elsevier-2006.	2010

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	V. R. Moorthy: Power Electronics: Devices, Circuits and Industrial Applications, Oxford.	2005
2	P. C. Sen: Power Electronics, MGH.	1987
3	Ned Mohan, T. M. Undeland and W. P. Robbins: Power Electronics- Converters, Applications and Design, Wiley India Ltd, 2008.	2007
4	R. Krishnan: electric motor drives- modeling, analysis and control, Pearson Edu.	2001

6EE5A: SMART GRID TECHNOLOGY

B.Tech. (Electrical) 6th semester
3L

Max. Marks: 80
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Introduction to Smart Grid: Evolution of Electric Grid, Concept, Definitions and Need for Smart Grid, Smart grid drivers, functions, opportunities, challenges and benefits	5
	Difference between conventional & Smart Grid, Concept of Resilient & Self-Healing Grid, Present development & International policies in Smart Grid, Diverse perspectives from experts and global Smart Grid initiatives.	3
2	Smart Grid Technologies: Technology Drivers, Smart energy resources, Smart substations, Substation Automation, Feeder Automation, Transmission systems: EMS, FACTS and HVDC, Wide area monitoring,	5
	Protection and Control, Distribution Systems: DMS, Volt/Var control, Fault Detection, Isolation and service restoration, Outage management, High-Efficiency Distribution Transformers, Phase Shifting Transformers, Plug in Hybrid Electric Vehicles (PHEV).	3
3	Smart Meters and Advanced Metering Infrastructure: Introduction to Smart Meters, Advanced Metering infrastructure (AMI) drivers and benefits, AMI protocols, standards and initiatives,	4
	AMI needs in the smart grid, Phasor Measurement, Unit (PMU), Intelligent Electronic Devices (IED) & their application for monitoring & protection.	4
4	Power Quality Management in Smart Grid: Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources,	5
	Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.	3
5	High Performance Computing for Smart Grid Applications: Local Area Network (LAN), House Area Network (HAN), Wide Area Network (WAN), Broadband over Power line (BPL),	4
	IP based Protocols, Basics of Web Service and CLOUD Computing to make Smart Grids smarter, Cyber Security for Smart Grid	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Vehbi C. Güngör, Dilan Sahin, Taskin Kocak, Salih Ergüt, Concettina Buccella, Carlo Cecati, and Gerhard P. Hancke: Smart Grid Technologies- Communication Technologies and Standards IEEE Transactions on Industrial Informatics, Vol. 7, No. 4, November 2011.	2011
2	Xi Fang, Satyajayant Misra, Guoliang Xue, and Dejun Yang: Smart Grid – The New and Improved Power Grid- A Survey, IEEE Transaction on Smart Grids,	2011

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Stuart Borlase: Smart Grid-Infrastructure, Technology and Solutions, CRC Press	2012

6EE6.1A: ADVANCED MICROPROCESSORS**B.Tech. (Electrical) 6th semester
3L+1T****Max. Marks: 80
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
1	8086 Microprocessor: Hardware specifications, architecture, address spaces, clock generator, bus controller and arbiter, Minimum and maximum mode, System Bus Timing.	8
2	Software & Instruction Set: Assembly language programming: addressing mode and instructions of 8086, linking and execution of programs, MACRO programming, assembler directives and operators.	8
3	I/O Interfaces: Programmable peripheral interfacing (8255, 8155), Programmable Timer interfacing (8253, 8254), Programmable interrupt controller (8259), Serial Communication Interfaces.	8
4	Data & Memory Interfacing: A/D, D/A converter interfacing, Memory interfacing and Decoding, DMA controller.	8
5	Multiprocessor Configurations: 8086 based Multiprocessor systems. 8087 Numeric data processor. Introduction to 8-bit and 16-bit microcontrollers.	8

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	A. Nagoor Kani: Microprocessors and Microcontrollers, 2 nd ed., MGH.	2012
2	N. Senthil Kumar and Saravanan: Microprocessors and Interfacing, Oxford.	2012

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	John Freer: System design with Advance Microprocessors, A.H. Wheeler	1987
2	Ray & Bhurchandi: Advanced Microprocessors and Peripherals 2/e (MGH)	2006
3	Lyla B. Das: The X 86 Microprocessors- Architecture, Programming and Interfacing (8086 to Pentium), Pearson Publisher.	2010
4	Gibson: 16-Bit Microprocessor.	
5	Brey: 16-Bit Microprocessor	2009
6	Ray, A. K. & Burchandi, K. M.: Advanced Microprocessors and Peripherals- Architecture, Programming and Interfacing, MGH.	2006
7	Brey, Barry B.: The INTEL Microprocessors, Pearson Education.	2011
8	Ayala: The 8051 Micro Controller, Cengage Learning.	2004

6EE6.2A: POWER SYSTEM INSTRUMENTATION(Common for EE and EX)**B.Tech. (Electrical) 6th semester**
3L+1T**Max. Marks: 80**
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Theory of Errors: Accuracy and precision, systematic and random errors, limits of error, probable error and standard deviation. Gaussian error curves, combination of errors.	8
2	Transducers: Construction & Operating Characteristics of active and digital transducers, Measurement of temperature, pressure, displacement, acceleration, noise level.	4
	Instrumentation for strain, displacement, velocity, acceleration, force, torque and temperature.	4
3	Signal Conditioning: Instrumentation amplifiers, isolation amplifiers, analog multipliers, analog dividers, function generators, timers, sample and hold, optical and magnetic isolators.	5
	Frequency to voltage converters, temperature to current converters. Shielding and grounding.	3
4	Power System Instrumentation-I: Measurement of voltage, current, phase angle, frequency, active power and reactive power in power plants. Energy meters and multipart tariff meters. Basic idea of LT & HT panel's.	8
5	Power System Instrumentation-II: Capacitive voltage transformers and their transient behavior, Current Transformers for measurement and protection, composite errors and transient response.	8

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	R. H. Cerni and L. E. Foster: Instrumentation for Engineering Measurements, John Wiley and Sons.	1962
2	Curtis and D. Hohnson: Process Control Instrumentation Technology, John Wiley and sons.	2013

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	R. Morrison: Instrumentation Fundamentals and Applications, John Wiley and Sons.	1984
2	A. K. Sawhney: Advanced Measurements & Instrumentation, Dhanpat Rai & Sons.	1994
3	E.O. Decblin: Measurement System– Application & design, MGH.	1975
4	W.D. Cooper and A.P. Beltried: Electronics Instrumentation and Measurement Techniques, Prentice Hall International.	1987
5	A. S. Moris: Principles of Measurement & Instrumentation, Prentice Hall	1993

6EE6.3A: DIGITAL COMMUNICATION AND INFORMATION THEORY(Common for EE and EX)**B.Tech. (Electrical) 6th semester****Max. Marks: 80****3L+1T****Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
1	PCM & Delta Modulation Systems: PCM and delta modulation, quantization noise in PCM and delta modulation. Signal-to-noise ratio in PCM and delta modulation,	4
	T1 Carrier System, Comparison of PCM and DM. Adaptive delta Modulation. Bit, word and frame synchronization, Matched filter detection.	4
2	Digital Modulation Techniques: Various techniques of phase shift, amplitude shift and frequency shift keying. Minimum shift keying. Modulation & Demodulation.	8
3	Error Probability in Digital Modulation: Calculation of error probabilities for PSK, ASK, FSK & MSK techniques.	8
4	Information Theory: Amount of Information, Average Information, Entropy, Information rate, Increase in Average information per bit by coding, Shannon's Theorem and Shannon's bound	4
	Capacity of a Gaussian Channel, BW-S/N trade off, Orthogonal signal transmission.	4
5	Coding: Coding of Information, Hamming code, Single Parity-Bit Code, Linear Block code, cyclic code & convolution code.	8

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	R. N. Mutagi: Digital Communication, 2 nd ed., Oxford.	2013
2	P. Ramakrishna Rao: Communication Systems, MGH.	2013

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	H. Taub & D.L. Schilling: Principles of Communication Systems, MGH.	2008
2	Simon Haykin: Communication Systems, John Wiley & Sons.	2008
3	Proakis: Digital Communication, MGH.	2008
4	Sklar: Digital Communication, Pearson Education.	2009
5	P. Chakrabarti: Principles of Digital Communications, Danpatrai & Sons.	1999
6	K. Sam Shanmugam: Digital and Analog Communication System, John Wiley Sons.	2006
7	Lathi, B. P.: Modern Digital & Analog Communication System, Oxford Press.	2009
8	A.B. Carlson: Digital Communication Systems, MGH.	1988

6EE7A: CONTROL SYSTEM LAB (Common for EE and EX)

- 1 Introduction to MATLAB Computing Control Software.
- 2 Defining Systems in TF, ZPK form.
- 3 (a) Plot step response of a given TF and system in state-space. Take different values of damping ratio and ω_n natural undamped frequency.
(b) Plot ramp response.
- 4 For a given 2nd order system plot step response and obtain time response specification.
- 5 To design 1st order R-C circuits and observe its response with the following inputs and trace the curve.
(a) Step
(b) Ramp
(c) Impulse
- 6 To design 2nd order electrical network and study its transient response for step input and following cases.
(a) Under damped system
(b) Over damped System.
(c) Critically damped system.
- 7 To Study the frequency response of following compensating Networks, plot the graph and find out corner frequencies.
(a) Log Network
(b) Lead Network
(c) Log-lead Network.
- 8 To draw characteristics of ac servomotor
- 9 To perform experiment on Potentiometer error detector.
- 10 Check for the stability of a given closed loop system.
- 11 Plot bode plot for a 2nd order system and find GM and PM.

6EE8A: POWER SYSTEM LAB (Common for EE and EX)

- 1 Study the burden effect on the performance of CT and measure ratio error.
- 2 Find out the sequence components of currents in three 1-Phase transformers and 3-Phase transformer and compare their results.
- 3 (i) Study over current relay.
(ii) Draw the current-time characteristic of an over current relay for TMS=1 & 0.5 and PSM=1.25 & 1.0.
- 4 (i) Study percentage bias differential relay.
(ii) Plot the characteristics of a percentage bias differential relay for 20%, 30% and 40% biasing.
- 5 Study gas actuated Buchholz relay.
- 6 Study under frequency relay and check its setting experimentally.
- 7 Design a HV transmission line.
- 8 Study a typical grid substation.
- 9 Study earthing of power station, substation and building

6EE9A: ADVANCED POWER ELECTRONICS LAB (Common for EE and EX)

- 1 Study and test AC voltage regulators using triac, antiparallel thyristors and triac&diac.
- 2 Study and test single phase PWM inverter.
- 3 Study and test buck, boost and buck-boost regulators.
- 4 Study and test MOSFET chopper.
- 5 Study and test Zero voltage switching.
- 6 Study and test SCR DC circuit breaker.
- 7 Control speed of a dc motor using a chopper and plot armature voltage versus speed characteristic.
- 8 Control speed of a single-phase induction motor using single phase AC voltage regulator.
- 9 (i) Study single-phase dual converter.
(ii) Study speed control of dc motor using single-phase dual converter.
- 10 Study one, two and four quadrant choppers (DC-DC converters).
- 11 Study speed control of dc motor using one, two and four quadrant choppers.
- 12 Study single-phase cycloconverter.

6EE10A: SMART GRID LAB

1. Study different components of smart grid
2. To visit thermal/nuclear power plant
3. To design and simulate hybrid wind-solar power generation system using simulating software
4. Study Different terminology used in power quality assessment
5. Study and measure certain parameters of power quality in laboratory with and without power quality improvement devices.

6EE11A: ENTREPRENEURSHIP DEVELOPMENT (Common for EE and EX)

- 1 Definition of entrepreneur, qualities of a successful entrepreneur, Charms of being an entrepreneur, achievement- motivation, leadership and entrepreneurial competencies.
- 2 Decision-making, procedures and formalities for starting own business, financial support system.
- 3 Identification and selection of business opportunities and market survey, business plan. Implementation and customer satisfaction.
- 4 Business crises, problem-solving attitude, communication skill. Government policies for entrepreneurs.
- 5 Knowledge based enterprises, Scope of entrepreneur in present context, area of future entrepreneurship.
- 6 Marketing & Sales Promotion, Techno-Economic Feasibility Assessment by Preparation of Preliminary & Detailed project report.

Syllabus B.Tech. (Electrical Engineering), 7th semester

7EE1A: POWER SYSTEM PLANNING (Common for EE and EX)

B. Tech. (Electrical) 7th Semester
3L+1T

Max. Marks: 80
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Introduction of power planning, National and Regional Planning, structure of P.S., planning tools	4
	Electricity Regulation, Electrical Forecasting, forecasting techniques modeling.	4
2	Generation planning, Integrated power generation cogeneration/captive power, Power pooling and power trading. Transmission and distribution planning.	4
	Power system Economics. Power sector finance, financial planning, private participation Rural Electrification investment, concept of Rational tariffs.	4
3	Power supply Reliability, Reliability planning. System operation planning, load management, load prediction, reactive power balance	4
	Online power flow studies, state estimation, computerized management, power system simulator.	4
4	Computer aided planning, wheeling. Environmental effects, the greenhouse effect	4
	Technological impacts. Insulation coordination. Reactive compensation.	4
5	Optimal power system expansion planning : Formulation of least cost optimization problem incorporating the capital,	3
	Operating and maintenance cost of candidate plants of different types (Thermal, Hydro, Nuclear, Non-conventional etc.) and minimum assured reliability constraint – optimization techniques for solution by programming.	5

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	X. Wang, J. R. Mc Donald: Modern Power System Planning, MGH.	1994
2	A. S. Pabla: Electrical Power System Planning, Machmillan India Ltd.	2012

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	M. Tllic, F. Faliana and L. Fink: Power System Restructuring Engineering and Economics, Kulwar Academic Publisher.	2010
2	L. L. Lie: Power System Restructuring and Deregulation, John Willey & Sons UK.	2001

7EE2A: POWER SYSTEM ANALYSIS (Common for EE and EX)**B. Tech. (Electrical) 7th Semester**
3L+1T**Max. Marks: 80**
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Percent and per unit quantities. Single line diagram for a balanced 3-phase system	4
	Admittance Model: Branch and node admittances Equivalent admittance network and calculation of Y bus. Modification of an existing Y bus.	4
2	Impedence Model: Bus admittance and impedance matrices. Thevenin's theorem and Z bus. Direct determination of Z bus. Modification of an existing bus.	3
	Symmetrical fault Analysis: Transient on a Transmission line, short circuit of a synchronous machine on no load, short circuit of a loaded synchronous machine. Equivalent circuits of synchronous machine under sub transient, transient and steady state conditions. Selection of circuit breakers, Algorithm for short circuit studies. Analysis of three-phase faults.	5
3	Symmetrical Components: Fortescue theorem, symmetrical component transformation. Phase shift in star-delta transformers. Sequence Impedances of transmission lines, Synchronous Machine and Transformers, zero sequence network of transformers and transmission lines. Construction of sequence networks of power system.	4
	Fault Analysis: Analysis of single line to ground faults using symmetrical components, connection of sequence networks under the fault condition.	4
4	Unsymmetrical Fault Analysis: (i) Analysis of line-to-line and double line to ground faults using symmetrical components, connection of sequence networks under fault conditions.	5
	Analysis of unsymmetrical shunt faults using bus impedance matrix method.	3
5	Load Flow Analysis: Load flow problem, development of load flow equations, bus classification	4
	Gauss Seidel, Newton Raphson, decoupled and fast decoupled methods for load flow analysis. Comparison of load flow methods.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	J. J. Grainger, William, D. Stevenson Jr.: Power System Analysis, MGH.	2003
2	T. K. Nagsarkar & M. S. Sukhija: Power System Analysis, Oxford University Press.	2007

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	J. D. Glover, M. S. Sharma & T. J. Overbye: Power System Analysis and Design, Cengage Learning.	2007
2	Nasser Tleis: Power System Modelling and Fault Analysis, Elsevier.	2007
3	Kothari & Nagrath: Modern Power System Analysis, MGH.	2011
4	Haadi Saadat: Power System Analysis.	2002

7EE3A: ARTIFICIAL INTELLIGENCE TECHNIQUES (Common for EE and EX)**B. Tech. (Electrical) 7th Semester
3L****Max. Marks: 80
Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
1	Artificial Intelligence: Introduction to AI and knowledge based Expert systems, Introduction, Importance and Definition of AI, ES, ES building tools and shells.	4
		4
2	Knowledge Representation: Concept of knowledge, Representation of knowledge using logics rules, frames. Procedural versus. Declarative knowledge, forward versus backward chaining	4
	Control Strategies: Concept of heuristic search, search techniques depth first search, Breadth first search, Generate & test hill climbing, best first search.	4
3	Artificial Neural Network: Biological Neurons and synapses, characteristics Artificial Neural Networks, types of activation functions.	4
	Perceptions: Perception representation, limitations of perceptrons. Single layer and multiplayer perceptrons. Perceptron learning algorithms.	4
4	Basic Concepts in Learning ANN: Supervised learning, Back propagation algorithm, unsupervised learning, Kohonen's top field network & Algorithm.	8
5	Fuzzy Logic: Fuzzy logic concepts, Fuzzy relation and membership functions, Defuzzification, Fuzzy controllers,	4
	Genetic Algorithm: concepts, coding, reproduction, crossover, mutation, scaling and fitness.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Saroj Kaushik: Artificial Intelligence, Cengage Learning.	2007
2	Elaine Rich and Kevin Knight: Artificial Intelligence 3/e, MGH	2004

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Padhy: Artificial Intelligence & Intelligent Systems, Oxford	2005
2	James Anderson: An introduction to Neural Networks.	1995
3	Dan. W Patterson: Artificial Intelligence and Expert Systems.	1990
4	Kumar Satish: Neural Networks, 2 nd ed., MGH.	2004
5	S. Rajsekaran & G. A. Vijayalakshmi Pai: Neural Networks, Fuzzy Logic and Genetic Algorithm- Synthesis and Applications, Prentice Hall of India.	2003
6	Siman Haykin: Neural Networks, Prentice Hall of India.	2004

7EE4A: NON CONVENTIONAL ENERGY SOURCES (Common for EE and EX)**B. Tech. (Electrical) 7th Semester****Max. Marks: 80****3L****Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
1	Introduction: World energy situation, conventional and non-conventional energy sources, Indian energy scene.	4
	Tidal Energy: Introduction to tidal power. Components of tidal power plants, double basin arrangement. Power generation. Advantages and limitations of tidal power generation. Prospects of tidal energy in India.	4
2	Solar Energy: Solar radiation, solar radiation geometry, solar radiation on tilted surface. Solar energy collector. Flat- plate collector, concentrating collector - paraboloidal and heliostat.	4
	Solar pond. Basic solar power plant. Solar cell, solar cell array, basic photo-voltaic power generating system.	4
3	Wind Energy: Basic principle of wind energy conversion, efficiency of conversion, site selection. Electric power generation-basic components, horizontal axis and vertical axis wind turbines, towers, generators, control and monitoring components. Basic electric generation schemes- constant speed constant frequency, variable speed constant frequency and variable speed variable frequency schemes. Applications of wind energy.	4
	Geothermal Energy: Geothermal fields, estimates of geothermal power. Basic geothermal steam power plant, binary fluid geothermal power plant and geothermal preheat hybrid power plant. Advantages and disadvantages of geothermal energy. Applications of geothermal energy. Geothermal energy in India.	4
4	Nuclear Fusion Energy: Introduction, nuclear fission and nuclear fusion. Requirements for nuclear fusion. Plasma confinement – magnetic confinement and inertial confinement.	4
	Basic Tokamak reactor, laser fusion reactor. Advantages of nuclear fusion. Fusion hybrid and cold fusion.	4
5	Biomass Energy: Introduction, biomass categories, bio-fuels. Introduction to biomass conversion technologies.	3
	Biogas generation, basic biogas plants-fixed dome type, floating gasholder type, Deen Bandhu biogas plant, Pragati design biogas plant. Utilization of bio gas. Energy plantation. Pyrolysis scheme. Alternative liquid fuels –ethanol and methanol. Ethanol production.	5

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	G. D. Rao: Renewable Energy	2010
2	B. H. Khan: Non-Conventional Energy Resources, MGH.	2006

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	A. N. Mathur: Non-Conventional Resources of Energy.	2010
2	Boyle: Renewable Energy, 3 rd ed Oxford.	2007
3	Bent Sorensen, 4 th ed.: Renewable Energy, Elsevier.	2009
4	V. V. N. Kishore: Renewable Energy Engineering and Technology, TERI.	2006
5	Garg & Prakash: Solar Energy : Fundamentals and Applications, MGH	2000
6	David Boyles: Bio Energy, Elis Horwood Ltd.,	1984

7	N.K. Bansal, M. Kleemann, M. Heliss: Renewable energy sources and conversion technology, MGH, 1990.	1990

7EE5A: POWER SYSTEM ENGINEERING (Common for EE and EX)

B. Tech.(Electrical) 7th Semester

3L+1T

Max. Marks: 80

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Economic Operation of Power Systems: Introduction, system constraints, optimal operation of power systems. Input output, heat rate and incremental rate curves of thermal generating units.	3
	Economic distribution of load between generating units within a plant. Economic distribution of load between power stations, transmission loss equation. Introduction to unit commitment and dynamic programming.	5
2	Power System Stability-I: Power angle equations and power angle curves under steady state and transient conditions. Rotor dynamics and swing equation (solution of swing equation not included).	5
	Synchronizing power coefficient. Introduction to steady state and dynamic stabilities, steady state stability limit.	3
3	Power System Stability-II: Introduction to transient stability. Equal area criterion and its application to transient stability studies under basic disturbances.	4
	Critical clearing angle and critical clearing time. Factors affecting stability and methods to improve stability.	4
4	Excitation Systems: Introduction of excitation systems of synchronous machines, types of excitation systems, Elements of various excitation systems and their control (functional block diagrams and their brief description)-DC excitation systems, AC excitation systems, brushless excitation system.	4
	Interconnected Power Systems: Introduction to isolated and interconnected powers systems. Reserve capacity of power stations, spinning and maintenance reserves. Advantages and problems of interconnected power systems. Power systems inter connection in India.	4
5	Tap Changing transformer, phase angle control and phase shifting transformer. Series compensation of transmission lines, location and protection of series capacitors, advantages and problems	5
	Introduction to power system security. Introduction to voltage stability.	3

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	J. Nagrath and D.P. Kothari: Power System Engineering 2/e, MGH.	2011
2	J. J. Grainger and W. D. Stevenson: Power System Analysis, MGH.	2003

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	B. R. Gupta: Power System Analysis and Design, Third Edition, S. Chand & Co.	2008
2	C. L. Wadhwa: Electrical Power Systems, New age international Ltd. Third Edition	2009
3	W. D. Stevenson: Element of Power System Analysis, MGH.	1955
4	B. R. Gupta: Generation of Electrical Energy, S. Chand Publication.	2009

7EE6.1A: ELECTROMAGNETIC FIELD THEORY**B. Tech. (Electrical) 7th Semester**
3L+1T**Max. Marks: 80**
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Introduction: Vector Relation in rectangular, cylindrical, spherical and general curvilinear coordinate system.	4
	Concept and physical interpretation of gradient, Divergence and curl, Green's Stoke's and Helmholtz theorems	4
2	Electrostatics: Electric field vectors-electric field intensity, flux density & polarization. Electric field due to various charge configurations. The potential functions and displacement vector.	4
	Gauss's law, Poisson's and Laplace's equation and their solution. Uniqueness theorem. Continuity equation. Capacitance and electrostatics energy. Field determination by method of images. Boundary conditions. Field mappings and concept of field cells.	4
3	Magnetostatics: Magnetic field vector: Magnetic field intensity, flux density & magnetization, Bio-Savart's law, Ampere's law, Magnetic scalar and vector potential, self & mutual inductance.	4
	Energy stored in magnetic field, Boundary conditions, Analogy between electric and magnetic field, Field mapping and concept of field cells.	4
4	Time Varying Fields: Faraday's law, Displacement currents and equation of continuity.	4
	Maxwell's equations, Uniform plane wave in free space, dielectrics and conductors, skin effect sinusoidal time variations, reflections, refraction & polarization of UPW, standing wave ratio. Pointing vector and power considerations.	4
5	Transmission Lines: The high-frequency circuit. LCR ladder model. The transmission Lin equation. Solution for loss-less lines.	4
	Wave velocity and wave impedance. Reflection and Transmission coefficients at junctions. VSWR.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Hayt: Engineering Electromagnetics, 7/e, (With CD), MGH	2012
2	Matthew N. O. Sadiku: Principles of Electromagnetics, 4 th ed., Oxford	2009

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	G. S. N. Raju: Electromagnetic Field Theory and Transmission Lines, Pearson.	2006
2	J. D. Kraus: Electromagnetic. 5th edition, MGH.	1999
3	S. Baskaran and K. Malathi: Electromagnetic Field and Waves, Scitech Pub.	2013
4	R. S. Kshetrimayum, Electromagnetic Field Theory, Cengage Learning.	2012
5	V.V. Sarwate: Electromagnetic Field and Waves, Willey Eastern Ltd.	1993
6	Bhag Guru: Electromagnetic Field Theory Fundamentals, Cambridge Uni. Press.	2004

7EE6.2A: COMPUTER AIDED DESIGN OF ELECTRICAL MACHINES (Common for EE and EX)**B. Tech. (Electrical) 7th Semester**
3L+1T**Max. Marks: 80****Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
1	Basic Principles of Electrical Machine Design: Specifications, Factors affecting the design, Limitations, main dimension, loadings, output equation, factor affecting the size and rating.	4
	Electrical Engineering Materials: conducting, magnetic and insulating materials. Magnetic Circuit Calculation: Ohm's law for magnetic circuit, mmf required for air gap and iron parts, tapered teeth, real and apparent flux density, magnetizing current.	4
2	Heating and Cooling of Electrical Machines: heat dissipation and heat flow equations, Newton's law of cooling, equations for temperature rise,	4
	Rating of Machines: Continuous, short and intermittent ratings, mean temperature rise, hydrogen cooling of turbo alternators, quantity of cooling medium.	4
3	Computer Aided Design of Transformers: Power and Distribution Transformers, core and yoke cross sections, square and stepped core, output equations, main dimensions, types & design of windings, optimization concepts.	8
4	Computer Aided Design of Synchronous Machines: Turbo and Hydro alternators, choice of specific magnetic & electric loading, short circuit ratio and its effects air gap length, output equation, main dimensions, flow charts for design of synchronous machine, design of stator core & winding.	8
5	Computer Aided Design of Induction Machines: Output equation, main dimensions, design criteria, flow charts for design of induction motor, air gap length, design of stator core and winding, rotor design.	8

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	A. K. Sawhney: A Course in Electrical Machine Design, Dhanpat Rai & Sons.	1984
2	B. Edikins: Generalized Theory of Electrical Machines.	1995

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Fitzgerald: Electrical Machinery, Kingsley.	2002
2	M. G. Say: The Performance and Design of AC Machines, Pitman & Sons.	1958
3	R. K. Agrawal: Electrical Machine Design	2009

7EE6.3A: ECONOMIC OPERATION OF POWER SYSTEMS**B. Tech. (Electrical) 7th Semester**
3L+1T**Max. Marks: 80**
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Economics of Power Generation: Introduction, cost of electrical energy, expression for cost of electrical energy, depreciation, power plant cost analysis, economics in plant selection,	4
	selection of types of generation and types of equipments, factors effecting economic generations and distributions, generating cost, economics of different types of generating plants	4
2	Economical Operations of Thermal Power Plants: Methods of loading turbo generators, input, output and heat rate characteristics, incremental cost, two generations units,	4
	large no of units, sequence of adding units, effects of transmission losses, economic scheduling considering transmission losses, coordination equations, penalty factors	4
3	Hydro Thermal coordination: Advantages of combined operation, base load peak load operation requirement, combined working of run-off river and steam plant	4
	Reservoirs hydroplants and thermal plants (long term operational aspects), short term hydro thermal coordination, coordination equations, scheduling methods and applications.	4
4	Parallel Operations of Generators: Conditions, synchronizing current and power, two alternators in parallel (effect of change in excitation, load sharing, sharing of load currents),	4
	Infinite bus bars, active and reactive power control, synchronizing power, torque, operating limits of alternators, operating characteristics of cylindrical alternator rotor.	4
5	Economics for Electrical Engineers: Concepts of physical and financial efficiencies of electrical goods and services, supply and demand, break even and minimum cost analysis, linear and nonlinear break even, min cost analysis	8

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	J. Wood & B. F. Wollenburg: Power Generation, Operation and Control, John Wiley.	2013
2	D. P. Kothari & I. J. Nagrath: Modern Power System Analysis, MGH.	2003

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	O. I. Elgerd: Electric Energy System Theory, MGH.	1983
2	P. Kundur: Power System Stability and Control, MGH.	1994
3	Arthur R. Bergen and Vijay Vittal: Power System Analysis, Second Edition. PHI.	1999
4	C. L. Wadhwa: Electrical Power Systems, Newage International (P) Ltd.	2000
5	C. Gross, Power Systems Analysis, 2nd Edition. John Wiley & Sons.	1986

7EE7A: POWER SYSTEM PLANNING LAB (Common for EE and EX)

1. Status of National and Regional Planning, for power system
2. Write components of Structure of power system
3. Explain in detail various planning tools.
4. Write short note on Electricity Regulation
5. Modeling of Electrical Forecasting techniques
6. Transmission and distribution planning
7. concept of Rational tariffs
8. Rural Electrification

7EE8A: POWER SYSTEM MODELLING AND SIMULATION LAB (Common for EE and EX)

1. Simulate Swing Equation in Simulink (MATLAB)
2. Modeling of Synchronous Machine.
3. Modeling of Induction Machine.
4. Simulate simple circuits using Circuit Maker.
5. (a) Modeling of Synchronous Machine with PSS (b) Simulation of Synchronous Machine with FACTS device.
6. (a) Modeling of Synchronous Machine with FACTS device (b) Simulation of Synchronous Machine with FACTS devices.
7. FACTS Controller designs with FACT devices for SMIB system.

7EE9A: INDUSTRIAL ECONOMICS & MANAGEMENT (Common for EE and EX)

UNIT

CONTENTS

- 1 **Money Banking and Trade:** Functions of money, supply & demand for money, money price level & inflation, black money, meaning, magnitude & consequences. Functions of Commercial banks, banking system in India, shortcomings and improvements. Function of RBI, monetary policy-making, objectives and features.
Sources of public revenue, principles of taxation, direct and indirect taxes, Theory of international trade, balance of trade and payment, Foreign exchange control, devaluation New economic policy: Liberalization, extending privatization, globalization.
- 2 **Management Principles:** Management functions, responsibilities of management to society, development of management thought.
Nature of planning, decision making, management by objectives, Line and staff authority relationships, decentralization and delegation of authority, span of management.
- 3 **Production Management:** Production planning and control, inventory control, quality control and Total quality management. ISO standards Related to quality/Environment/safety etc.
Tools of Project Management: CPM, PERT, project information systems. Marketing functions, management of sales and advertising marketing research.
- 4 **Human Resource Management:** Function, application of industrial psychology for selection, training and recruitment.
Communication process, media channels and barriers to effective communication, theories of motivation, leadership.
- 5 **Finance and Account Management:** Engineering Economics: Investment decision, present worth, annual worth and rate of return methods. Payback time.
Need for good cost accounting system, cost control techniques of financial control, financial statements, financial ratios, breakeven analysis, budgeting and budgetary control.

Syllabus B.Tech. (Electrical Engineering), 8th semester

8EE1A: EHV AC/DC TRANSMISSION (Common for EE and EX)

B. Tech. (Electrical) 8th Semester
3L+1T

Max. Marks: 80
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	EHV AC Transmission: Need of EHV transmission lines, power handling capacity and surge impedance loading. Problems of EHV transmission,	4
	Bundled Conductors: geometric mean radius of bundle, properties of bundle conductors. Electrostatic fields of EHV lines and their effects, corona effects: Corona loss, audio and radio noise.	4
2	Load Frequency Control: Introduction to control of active and reactive power flow, turbine speed governing system. Speed governing characteristic of generating unit and load sharing between parallel operating generators	4
	Method of Load Frequency Control: Flat frequency, flat tie line and tie line load bias control. Automatic generation control (description of block diagram only).	4
3	Voltage Control: No load receiving end voltage and reactive power generation. Methods of voltage control. Synchronous phase modifier	4
	Shunt capacitors and reactors, saturable reactors, Thyristorised static VAR compensators- TCR, FC-TCR and TSC- TCR.	4
4	FACTS: Introduction to FACTS controllers, types of FACTS controllers, Brief description of STATCOM, Thyristor controlled series capacitors and unified power flow controller.	8
5	HVDC Transmission: Types of D.C. links, advantages and disadvantages of HVDC transmission. Basic scheme and equipment of converter station. Ground return.	4
	Basic principles of DC link control and basic converter control characteristics. Application of HVDC transmission.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	E. W. Kimbark: Direct Current Transmission, Vol. 1, Wiley Interscience.	1971
2	K. R. Padiyar: HVDC Power Transmission System, Wiley Eastern Ltd.	1990

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	K. R. Padiyar: HVDC Power Transmission Systems. NEW AGE PUB	1992
2	J. Arrillaga: H.V.D.C Transmission, Peter Peregrines.	1983
3	J. Arrillaga HVDC et. al, : Computer Modelling of Electrical Power System. John Wiley.	1993

8EE2A: ELECTRIC DRIVES AND THEIR CONTROL (Common for EE and EX)**B. Tech. (Electrical) 8th Semester**
3L+1T**Max. Marks: 80**
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Dynamics of Electric Drives: Fundamental torque equations, speed-torque conventions and multi-quadrant operation,	4
	Nature and classification of load torques, steady state stability, load equalization, close loop configurations of drives.	4
2	DC Drives: Speed torque curves, torque and power limitation in armature voltage and field control,	4
	Starting, Braking: Regenerative Braking, dynamic braking and plugging. Speed Control-Controlled Rectifier fed DC drives, Chopper Controlled DC drives.	4
3	Induction Motor Drives-I: Starting, Braking-Regenerative braking, plugging and dynamic braking.	4
	Speed Control: Stator voltage control, variable frequency control from voltage source, Voltage Source Inverter (VSI) Control.	4
4	Induction Motor Drives-II: Variable frequency control from current source, Current Source Inverter (CSI) Control,	4
	Cycloconverter Control, Static rotor resistance control, Slip Power Recovery- Stator Scherbius drive, Static Kramer drive.	4
5	Synchronous Motor Drive: Control of Synchronous Motor-Separately Controlled and VSI fed Self-Controlled Synchronous Motor Drives.	4
	Dynamic and Regenerative Braking of Synchronous Motor with VSI. Control of Synchronous Motor Using Current Source Inverter (CSI).	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	G. K. Dubey: Fundamentals of Electrical Drives, Narosa Publishing House, New Delhi.	2002
2	B. K. Bose: Power Electronics and Motor Drives, Elsevier.	2010

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	V. Subrahmanyam: Electric Drives- Concepts and Applications, MGH.	2011
2	Theodore Wildi: Electrical Machines, Drives and Power Systems, Pearson	2007
3	S. K. Pillai: A First Course on Electrical Drives, Wiley Eastern limited, India.	1989
4	N. K. De and Prashant K. Sen: Electric Drives, Prentice Hall of India Ltd.	1999

8EE3A: PROTECTION OF POWER SYSTEM (Common for EE and EX)**B. Tech. (Electrical) 8th Semester**
3L+1T**Max. Marks: 80**
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Causes and consequences of dangerous currents: Faults, overloads and switching over currents. Introduction to protection, trip circuit of a circuit breaker. Functional characteristics of a relay, zone of protection, primary and backup protection.	4
	CTs & PTs: Current transformer construction, measurement and protective CTs. Type of potential transformers. Steady state ratio and phase angle errors in CTs and PTs. Transient errors in CT and CVT (Capacitive Voltage Transformer).	4
2	Overcurrent Protection: HRC fuse and thermal relay. Overcurrent relays – instantaneous, definite time, inverse time and inverse definite minimum time overcurrent relays, time and current gradings.	4
	Induction disc type relay. Directional overcurrent relay, 30°, 60° and 90° connections. Earth fault relay. Brief description of overcurrent protective schemes for a feeder, parallel feeders and ring mains.	4
3	Generator Protection: Stator protection–differential and percentage differential protection, protection against stator inter-turn faults, stator overheating protection.	4
	Rotor protection-protection against excitation and prime mover failure, field earth fault and unbalanced stator currents (negative sequence current protection).	4
4	Transformer Protection: Percentage differential protection, magnetizing inrush current, percentage differential relay with harmonic restraint. Buchholz relay. Differential protection of generator transfer unit.	4
	Busbar Protection: Differential protection of busbars. Highimpedance relay scheme, frame leakage protection	4
5	Transmission Line Protection: Introduction to distance protection. Construction, operating principle and characteristics of an electromagnetic impedance relay. Effect of arc resistance. Induction cup type reactance and mho relays. Comparison between impedance, reactance and mho relays. Three stepped distance protection of transmission line.	4
	Induction Motor Protection: Introduction to various faults and abnormal operating conditions, unbalance supply voltage and single phasing. Introduction to protection of induction motors- HRC fuse and overcurrent, percentage differential, earth fault and negative sequence voltage relays	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Badri Ram: Power System Protection and Switchgear, MGH.	2011
2	Ravindra Nath M. Chander: Power System Protection and Switch Gear, John Wiley Eastern.	1977

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Sunil S. Rao.: Power System Protection and Switch Gear, Khanna Publishers.	1999
2	Oza: Power System Protection and Switchgear, MGH.	2010

3	T. S. Madhava Rao: Power System Protections (Static Relays), MGH.	1989
4	A. R. Van C Warrington: Protective Relays, Chapman and Hall London.	1968
5	S. K. Basu and S. Chaudhary: Power System Protection, Raju Primlan Oxford.	1983

8EE4.1A: UTILIZATION OF ELECTRICAL POWER (Common for EE and EX)

B. Tech. (Electrical) 8th Semester
3L+1T

Max. Marks: 80
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Electric Heating: Different methods of electric heating. Principle of high frequency induction and dielectric heating. Construction, operation, performance and applications of arc furnace and induction furnace	4
	Electric Welding: Welding process, welding transformer, Classification of Electric Welding: arc welding, resistance welding, welding of various metals.	4
2	Illuminations: Definitions, laws of illuminations, polar curves, luminous efficiency, photometer, incandescent lamps, filament materials,	4
	Halogen lamp, electric discharge lamps, sodium vapour lamp, mercury vapour lamp and fluorescent lamp. Light Calculations: commercial, industrial, street and flood lighting.	4
3	Electrolytic Process: Principles and applications of electrolysis, electro-deposition, Manufactures of chemicals, anodizing, electro-polishing, electro-cleaning, electroextraction, electro-refining, electro-stripping (parting) power supplies for electrolytic process.	4
4	Electric Traction & Means of Supplying Power: Systems of Electric Traction: DC & AC Systems, Power Supply for Electric Traction System: Comparison and application of different systems. Sub-station equipment and layout, conductor rail & pantograph.	4
5	Traction Methods: Types of services, speed time and speed distance curves, estimation of power and energy requirements, Mechanics of train movement.	4
	Co-efficient of adhesion, Adhesive weight, effective weight. Traction Motor Controls: DC and AC traction motors, Series parallel starting. Methods of electric braking of traction motors.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	C. L. Wadhwa: Utilization of Electric Traction Electric Power.	1989
2	H. Partab: Art and Science of Electrical Energy, Dhanpat Rai & Sons.	1975

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	H. Partab: Modern Electric Traction, Dhanpat Rai & Sons	1973

8EE4.2A: FACTS DEVICES & THEIR APPLICATIONS**B. Tech. (Electrical) 8th Semester**
3L+1T**Max. Marks: 80**
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Problems of AC transmission systems, power flow in parallel paths and meshed system, factors limiting loading capability,	4
	Stability consideration. Power flow control of an ac transmission line. Basic types of facts controllers. Advantages of FACTS technology.	4
2	Voltage-Sourced Converters: Basic concept of voltage-sourced converters, single and three phase bridge converters. Introduction to power factor control. Transformer connections for 12-pulse, 24 pulse and 48 pulse operations.	4
	Static Shunt Compensators: Mid-point and end point voltage regulation of transmission line, and stability improvement. Basic operating principle of Static Synchronous Compensators (STATCOM). Comparison between STATCOM and SVC.	4
3	Static Series Compensators: Concept of series capacitive compensation, voltage and transient stabilities, power oscillation and sub synchronous oscillation damping.	4
	Introduction to thyristor switched series capacitor (TSSC), thyristor controlled series capacitor (TCSC), and static synchronous series compensator, - operation, characteristics and applications.	4
4	Static Voltage and Phase Angle Regulators: Voltage and phase angle regulation. Power flow control and improvement of stability by phase angle regulator.	4
	Introduction to thyristor controlled voltage and phase angle regulators (TCVR and TCPAR) (ii) Introduction to thyristor controlled braking resistor and thyristor controlled voltage limiter.	4
5	UPFC: Unified Power Flow Controller (UPFC), basic operating principles, conventional transmission control capabilities. Comparison of UPFC to series compensators and phase angle regulator. Applications of UPFC.	4
	IPFC: Interline Power Flow Controller (IPFC), basic operating principles and characteristics. Applications of IPFC.	4

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	K. R. Padiyar: Flexible AC Transmission Systems	2009
2	N. G. Hingorani, L. Gyugyi: Understanding FACTS: IEEE Press Book.	2000

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	Yong Hua Song, Allan T Johns : Flexible AC Transmission Systems FACTS	1999
2	Xiao Ping Zhang, Christian Rehtanz, Bikash Pal: Flexible AC Transmission Systems.	2006
3	R. Mohan & R. M. Mathur: Thyristor-based FACTS Controllers for Electrical Transmission Systems, John Wiley	2002

8EE4.3A: POWER SYSTEM TRANSIENTS**B. Tech. (Electrical) 8th Semester**
3L+1T**Max. Marks: 80**
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
1	Wave terminology, Development of wave quotations, Terminal problems, Lattice diagrams,	4
	Origin and Nature of power system transients and surges, Surge parameters of plants, Equivalent Circuit representations. Lumped and distributed circuit transients.	4
2	Line energisation and de-energisation transients-Earth and earthwire effects. Current chopping in circuit breakers.	4
	Short line fault condition and its relation to circuit breaker duty. Trapped charge effects. Effect of source and source representation in short line fault studies.	4
3	Control of transients, Lightning phenomenon, influence of tower footing resistance and earth resistance,	4
	Traveling waves in distributed parameters multiconductor lines, parameters as a function of frequency.	4
4	Mechanism of Lightning Discharge Types of Lightning strokes, Harmful effects of lightning, protections against lightning, overhead Ground wires.	8
5	Lightening Arresters, Types of lightening arresters, Surge Absorber simulation of surge diverters in transient analysis. Fourier integral and z transform methods in power system transient	8

Text Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	C. S. Indulkar and D. P. Kothari: Power System Transients, NEW AGE.	2010
2	Lou Van der Sluis: Transients in Power Systems, John Wiley	2001

Reference Books

S. No.	Name of authors'/books/publisher	Year of pub.
1	N. R. Watson, J. Arrillaga: Power Systems Electromagnetic Transients, John Wiley	2001

8EE5A: COMPUTER BASED POWER SYSTEM LAB (Common for EE and EX)

1. Fault analysis (for 3 to 6 bus) and verify the results using MATLAB or any available software for the cases: (i) LG Fault (ii) LLG Fault (iii) LL Fault and (iv) 3-Phase Fault
2. Load flow analysis for a given system (for 3 to 6 bus) using (i) Gauss Seidal (ii) Newton Raphson (iii) Fast Decoupled Method and verify results using MATLAB or any available software
3. Study of voltage security analysis
4. Study of overload security analysis and obtain results for the given problem using MATLAB or any software.
5. Study of economic load dispatch problem with different methods.
6. Study of transient stability analysis using MATLAB/ETAP Software.

8EE6A: ELECTRICAL DRIVES AND CONTROL LAB (Common for EE and EX)

1. Study and test the firing circuit of three phase half controlled bridge converter.
2. Study and obtain waveforms of 3 phase half controlled bridge converter with R and RL loads.
3. Study and test the firing circuit of 3-phase full controlled bridge converter.
4. Study and obtain waveforms of 3-phase full controlled bridge converter with R and RL loads.
5. Study and test 3-phase AC voltage regulator.
6. Control speed of dc motor using 3-phase half controlled bridge converter. Plot armature voltage versus speed characteristic.
7. Control speed of dc motor using 3-phase full controlled bridge converter. Plot armature voltage versus speed characteristic.
8. Control speed of a 3-phase induction motor in variable stator voltage mode using 3-phase AC voltage regulator.
9. Control speed of a 3-phase BLDC motor.
10. Control speed of a 3-phase PMSM motor using frequency and voltage control
11. Control speed of universal motor using AC voltage regulator.
12. Study 3-phase dual converter.
13. Study speed control of dc motor using 3-phase dual converter.
14. Study three-phase cycloconverter and speed control of synchronous motor using cycloconverter.
15. Control of 3-Phase Induction Motor in variable frequency V/f constant mode using 3-phase inverter

8EE7A: HIGH VOLTAGE ENGINEERING LAB

1. Study filtration and Treatment of transformer oil.
2. Determine dielectric strength of transformer oil.
3. Determine capacitance and dielectric loss of an insulating material using Schering bridge.
4. Study solid dielectrics used in power apparatus.
5. Study applications of insulating materials.
6. Study direct testing and indirect testing of circuit breakers.
7. Study high voltage testing of electrical equipment: line insulator, cable, bushing, power capacitor, and power transformer.
8. Design an EHV transmission line.

Scheme and Syllabus
Rajasthan Technical University, Kota
B. Tech. in Information
Technology
(Session 2017-18)

Rajasthan Technical University, Kota

cheme for B.Tech. Information Technology-w.e.f. session 2012-13

III	Information Technology	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject	L	T	P		IA	TE	Total	Common with
3IT1A	Electronic Devices and Circuits	3			3	20	80	100	CS,IT
3IT2A	Data Structures and Algorithms	3			3	20	80	100	EE, EEE, EC, EIC, CS & IT
3IT3A	Digital Electronics	3			3	20	80	100	EE, EEE, EC, EIC, CS & IT
3IT4A	Object Oriented Programming	3			3	20	80	100	CS,IT
3IT5A	Linux and Shell Programming	3			3	20	80	100	EE, EEE, EC, EIC, CS & IT
3IT6A	Advanced Engineering Mathematics	3	1		3	20	80	100	IT
3IT7A	Electronic Devices Lab			3	3	45	30	75	CS,IT
3IT8A	Data Structures Lab			3	4	60	40	100	CS,IT
3IT9A	Digital Electronics Lab			2	3	30	20	50	CS,IT
3IT10A	C++ Programming			3	4	45	30	75	CS,IT
3IT11A	Unix Shell Programming			2	3	30	20	50	CS,IT
3ITDC	Discipline and extra Curricular Activities							50	
	Total	18	1	13				1000	

IV	Information Technology	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject	L	T	P		IA	TE	Total	Common with
4IT1A	Microprocessors and Interfaces	3			3	20	80	100	CS,IT
4IT2A	Discrete Mathematical Structures	3	1		3	20	80	100	CS,IT
4IT3A	Statistics and Probability Theory	3			3	20	80	100	CS,IT
4IT4A	Software Engineering	3			3	20	80	100	CS,IT
4IT5A	Principles of Communication	3			3	20	80	100	CS,IT
4IT6A	Principles of Programming Languages	3			3	20	80	100	CS,IT
4IT7A	Microprocessor Lab			3	3	60	40	100	CS,IT
4IT8A	Communication Lab			3	3	60	40	100	CS,IT
4IT9A	Computer Aided Software Engineering Lab			3	4	60	40	100	CS,IT
4IT10A	Business Entrepreneurship Development			2	3	30	20	50	
4ITDC	Discipline and extra Curricular Activities							50	
	Total	18	1	11				1000	

V	Information Technology	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject Name (Revised)	L	T	P		IA	TE	TOTAL	Common to
5IT1A	Computer Architecture	3			3	20	80	100	CS, IT
5IT2A	Digital Signal Processing	3	-		3	20	80	100	
5IT3A	Telecommunication Fundamentals	3	-	-	3	20	80	100	CS, IT
5IT4A	Database Management Systems	3			3	20	80	100	CS, IT
5IT5A	Operating Systems	3	-		3	20	80	100	CS, IT
5IT6.1A	Advanced Data Structure	3	-		3	20	80	100	CS, IT
5IT6.2A	E-Commerce								
5IT6.3A	Satellite & Microwave Communication								
5IT7A	DataBase Lab			3		60	40	100	CS, IT
5IT8A	Advance Communication Lab.	-	-	3		45	30	75	
5IT9A	Operating Systems Simulation Lab			3		60	40	100	CS, IT
5IT10A	Digital Hardware Design Lab			3		45	30	75	CS, IT
5ITDC	Discipline & Extra Curricular Activities							50	CS, IT
		18	0	12				1000	

VI	Information Technology	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject Name (Revised)	L	T	P		IA	TE	TOTAL	Common to
6IT1A	Computer Networks	3	-		3	20	80	100	CS, IT
6IT2A	Design and Analysis of Algorithms	3	-		3	20	80	100	CS, IT
6IT3A	Theory Of Computation	3			3	20	80	100	CS, IT
6IT4A	Programming in Java	3			3	20	80	100	
6IT5A	Information Theory & Coding	3	-		3	20	80	100	
6IT6.1A	Advance Topics in Operating Systems	3	-		3	20	80	100	CS, IT
6IT6.2A	Bio Informatics								
6IT6.3A	Human Computer Interface								CS, IT
6IT7A	Java Programming Lab			3		45	30	75	CS, IT
6IT8A	GUI Design Lab.			3		45	30	75	
6IT9A	UML Lab			2		30	20	50	
6IT10A	Design and Analysis of Algorithms Lab.			3		60	40	100	CS, IT
6IT11A	Humanities and Social Sciences			2		30	20	50	CS, IT
6ITDC	Discipline & Extra Curricular Activities							50	CS, IT
		18	0	13				1000	

VII	Information Technology	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject Name (Revised)	L	T	P		IA	TE	TOTAL	Common to
7IT1A	Software Project management	3	-		3	20	80	100	
7IT2A	Information System Security	3			3	20	80	100	CS, IT
7IT3A	Data Mining & Ware Housing	3			3	20	80	100	CS, IT
7IT4A	Internet Programming	3	-		3	20	80	100	
7IT5A	Computer Graphics & Multimedia Techniques	3			3	20	80	100	
7IT6.1A	Advance Database Management Systems	3	-		3	20	80	100	
7IT6.2A	Intelligent Systems								
7IT6.3A	Speech Processing								
7IT7A	Computer Graphics & Multimedia Lab.			2		30	20	50	
7IT8A	DMW Lab			3		60	40	100	
7IT9A	Internet Programming Lab.			2		30	20	50	
7ITPR	Project-I			2		50		50	CS, IT
7ITTR	Practical Training*			2			100	100	CS, IT
7ITDC	Discipline & Extra Curricular Activities							50	CS, IT
		18	0	11				1000	

VIII	Information Technology	Teaching Hrs			Exm Hrs	Max. Marks			Comments
Course Code	Subject Name (Revised)	L	T	P		IA	TE	TOTAL	Common to
8IT1A	Software Testing & Validation	3			3	20	80	100	
8IT2A	Digital Image Processing	3	-		3	20	80	100	CS, IT
8IT3A	Data Compression Techniques	3			3	20	80	100	
8IT4.1A	Mobile Computing	3	-		3	20	80	100	CS, IT
8IT4.2A	Information Retrieval								CS, IT
8IT4.3A	Robotics								
8IT5A	Software Testing Lab.			3		60	40	100	
8IT6A	Digital Image Processing lab			2		30	20	50	CS, IT
8IT7A	Advanced Web Programming			2		30	20	50	
8IT8A	Mobile Application Development Lab			2		30	20	50	
8ITPR	Project-II			2		120	80	200	CS, IT
8ITSM	Seminar			2		60	40	100	CS, IT
8ITDC	Discipline & Extra Curricular Activities							50	CS, IT
		12	0	13				1000	

3IT1A- ELECTRONIC DEVICES & CIRCUITS (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.		Evaluation
Branch: Information Technology Schedule per Week Lectures: 3		Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]
Units	Contents of the subject	
I	Mobility and conductivity, charge densities in a semiconductor, Fermi Dirac distribution, carrier concentrations and fermi levels in semiconductor, Generation and recombination of charges, diffusion and continuity equation, Mass action Law, Hall effect. Junction diodes, Diode as a ckt. element, load line concept, clipping and clamping circuits, Voltage multipliers.	
II	Transistor characteristics, Current components, Current gains: alpha and beta. Operating point. Hybrid model, h-parameter equivalent circuits. CE, CB and CC configuration. DC and AC analysis of CE,CC and CB amplifiers. Ebers-Moll model. Biasing & stabilization techniques. Thermal runaway, Thermal stability.	
III	SMALL SIGNAL AMPLIFIERS AT LOW FREQUENCY : Analysis of BJT and FET, RC coupled amplifiers. Frequency response, midband gain, gains at low and high frequency. Miller's Theorem. Cascading Transistor amplifiers, Emitter follower. JFET, MOSFET, Equivalent circuits and biasing of JFET's & MOSFET's. Low frequency CS and CD JFET amplifiers. FET as a voltage variable resistor. Source follower.	
IV	FEEDBACK AMPLIFIERS : Classification, Feedback concept, Transfer gain with feedback, General characteristics of negative feedback amplifiers. Analysis of voltage-series, voltage-shunt, current- series and current-shunt feedback amplifier. Stability criterion.	
V	OSCILLATORS : Classification. Criterion for oscillation. Tuned collector, Hartley, Colpitts, RC Phase shift, Wien bridge and crystal oscillators, Astable, monostable and bistable multivibrators. Schmitt trigger.	

Text/References:

1. Electronic devices & circuits theory By R.L. Boylestad, Louis Nashelsky ,Pearson education
2. Integrated Electronics By Millman Halkias, T.M.H
3. Electronic devices & circuits By David Bell, Oxford Publications
4. Grob's Basic Electronics By Schultz, T.M.H.

3IT2A- DATA STRUCTURES & ALGORITHMS (Common to Computer Science and Engineering & Info. Tech)

Class: III Sem. B.Tech.		Evaluation
Branch: Information Technology Schedule per Week Lectures: 3		Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]
Units	Contents of the subject	
I	Definition & characteristics of algorithms, structures. Difficulties in estimating exact execution time of algorithms. Concept of complexity of program. Asymptotic notations: Big-Oh, theta, Omega- Definitions and examples, Determination of time and space complexity of simple algorithms without recursion. Representing a function in asymptotic notations viz $5n^2-6n=\theta(n^2)$ Arrays: Array as storage element, Row major & column major form of arrays, computation of address of elements of n dimensional array.	
II	Arrays as storage elements for representing polynomial of one or more degrees for addition & multiplication, sparse matrices for transposing & multiplication, stack, queue, dequeue, circular queue for insertion and deletion with condition for over and underflow, transposition of sparse matrices with algorithms of varying complexity (Includes algorithms for operations as mentioned). Evaluation of Expression: Concept of precedence and associativity in expressions, difficulties in dealing with infix expressions, Resolving precedence of operators and association of operands, postfix & prefix expressions, conversion of expression from one form to other form using stack (with & without parenthesis), Evaluation of expression in infix, postfix & prefix forms using stack. Recursion.	
III	Linear linked lists: singly, doubly and circularly connected linear linked lists- insertion, deletion at/ from beginning and any point in ordered or unordered lists. Comparison of arrays and linked lists as data structures. Linked implementation of stack, queue and dequeue. Algorithms for of insertion, deletion and traversal of stack, queue, dequeue implemented using linked structures. Polynomial representation using linked lists for addition, Concepts of Head Node in linked lists. Searching: Sequential and binary search	
IV	Non-Linear Structures: Trees definition, characteristics concept of child, sibling, parent child relationship etc, binary tree: different types of binary trees based on distribution of nodes, binary tree (threaded and unthreaded) as data structure, insertion, deletion and traversal of binary trees, constructing binary tree from	

	traversal results. Threaded binary Tree. Time complexity of insertion, deletion and traversal in threaded and ordinary binary trees. AVL tree: Concept of balanced trees, balance factor in AVL trees, insertion into and deletion from AVL tree, balancing AVL tree after insertion and deletion. Application of trees for representation of sets.
V	Graphs: Definition, Relation between tree & graph, directed and undirected graph, representation of graphs using adjacency matrix and list. Depth first and breadth first traversal of graphs, finding connected components and spanning tree. Single source single destination shortest path algorithms. Sorting: Insertion, quick, heap, topological and bubble sorting algorithms for different characteristics of input data. Comparison of sorting algorithms in term of time complexity. NOTE: 1. Algorithm for any operation mentioned with a data structure or required to implement the particular data structure is included in the curriculum.

Text/References:

1. An introduction to data structures with applications By Jean-Paul Tremblay, P. G. Sorenson, TMH
2. Data Structures in C/C++, Horowitz, Sawhney, Galgotia
3. Data Structures in C/C++, Tanenbaum, Pearson
4. Data Structures in C++, Weiss, Parson

3IT3A- DIGITAL ELECTRONICS (Common to Computer Science and Engineering & Info. Tech)

Class: III Sem. B.Tech.	Evaluation
Branch: Information Technology Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	NUMBER SYSTEMS, BASIC LOGIC GATES & BOOLEAN ALGEBRA: Binary Arithmetic & Radix representation of different numbers. Sign & magnitude representation, Fixed point representation, complement notation, various codes & arithmetic in different codes & their inter conversion. Features of logic algebra, postulates of Boolean algebra. Theorems of Boolean algebra. Boolean function. Derived logic gates: Exclusive-OR, NAND, NOR gates, their block diagrams and truth tables. Logic diagrams from Boolean expressions and vice-versa. Converting logic diagrams to universal logic. Positive, negative and mixed logic. Logic gate conversion.
II	DIGITAL LOGIC GATE CHARACTERISTICS: TTL logic gate characteristics. Theory & operation of TTL NAND gate circuitry. Open collector TTL. Three state output logic. TTL subfamilies. MOS & CMOS logic families. Realization of logic gates in RTL, DTL, ECL, C-MOS & MOSFET. Interfacing logic families to one another.
III	MINIMIZATION TECHNIQUES: Minterm, Maxterm, Karnaugh Map, K map upto 4 variables. Simplification of logic functions with K-map, conversion of truth tables in POS and SOP form. Incomplete specified functions. Variable mapping. Quinn-Mc Klusky minimization techniques.
IV	COMBINATIONAL SYSTEMS: Combinational logic circuit design, half and full adder, subtractor. Binary serial and parallel adders. BCD adder. Binary multiplier. Decoder: Binary to Gray decoder, BCD to decimal, BCD to 7-segment decoder. Multiplexer, demultiplexer, encoder. Octal to binary, BCD to excess-3 encoder. Diode switching matrix. Design of logic circuits by multiplexers, encoders, decoders and demultiplexers.
V	SEQUENTIAL SYSTEMS: Latches, flip-flops, R-S, D, J-K, Master Slave flip flops. Conversions of flip-flops. Counters : Asynchronous (ripple), synchronous and asynchronous decade counter, Modulus counter, skipping state counter, counter design. Ring counter. Counter applications. Registers: buffer register, shift register.

Text/References:

1. Digital integrated electronics, By Herbert Taub, Donald L. Schilling, TMH
2. Digital Logic and Computer Design By M. Morris Mano, Pearson

3. Modern Digital Electronics By R.P. Jain, TMH
4. Fundamentals of Digital circuits By A. Anand kumar, PHI
5. Digital circuit design By S. Salivahanan, Sarivazhagan, Vikas publications

3IT4A- OBJECT ORIENTED PROGRAMMING (Common to Computer Science and Engineering & Info. Tech)

Class: III Sem. B.Tech.	Evaluation
Branch: Information Technology Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction: Review of structures in C, accessing members of structures using structure variables, pointer to structures, passing structures to functions, structures as user defined data types.
II	Introduction to programming paradigms- (Process oriented and Object oriented). Concept of object, class, objects as variables of class data type, difference in structures and class in terms of access to members, private and public Basics of C++: Structure of C++ programs, introduction to defining member functions within and outside a class, keyword <i>using</i> , declaring class, creating objects, constructors & destructor functions, Initializing member values with and without use of constructors, simple programs to access & manipulate data members, <i>cin</i> and <i>cout</i> functions. Dangers of returning reference to a private data member, constant objects and members function, composition of classes, friend functions and classes, using <i>this</i> pointer, creating and destroying objects dynamically using <i>new</i> and <i>delete</i> operators. Static class members, container classes and iterators, proxy classes. members of a class, data & function members. Characteristics of OOP- Data hiding, Encapsulation, data security.
III	Operator overloading: Fundamentals, Restrictions, operator functions as class members v/s as friend functions. Overloading stream function, binary operators and unary operators. Converting between types.
IV	Inheritance: Base classes and derived classes, protected members, relationship between base class and derived classes, constructors and destructors in derived classes, public, private and protected inheritance, relationship among objects in an inheritance hierarchy, abstract classes, virtual functions and dynamic binding, virtual destructors.
V	Multiple inheritance, virtual base classes, pointers to classes and class members, multiple class members. Templates, exception handling.

Text/References:

1. How to Program C++, Dietel, Pearson
 2. Mastering C++ By K.R.Venugopal, TMH
 3. Object Oriented Programming in C++ By Robert Lafore, Pearson
- Object Oriented Design & Modelling, Rambaugh, Pearson

3IT5A- LINUX AND SHELL PROGRAMMING

Class: III Sem. B.Tech.	Evaluation
Branch: Information Technology Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction: Logging in, changing password (<i>passwd</i> command only), <i>man</i> , <i>xman</i> , <i>info</i> commands to access on line help. Simple commands like <i>ls</i> , <i>cp</i> , <i>mv</i> , <i>grep</i> , <i>head</i> , <i>tail</i> , <i>sort</i> , <i>uniq</i> , <i>diff</i> , <i>echo</i> , <i>date</i> , <i>which</i> , <i>whereis</i> , <i>whatis</i> , <i>who</i> , <i>finger</i> w (option and variations included). Directory commands, access permissions, changing access permissions for files and directories, hard & symbolic links. Environment and path setting.
II	vi editor: Creating and editing files, features of vi, insertion deletion, searching, substitution operations, yank, put, delete commands, reading & writing files, <i>exrc</i> file for setting parameters, advance editing techniques. vim(improved vi). Programming utilities: Compiling & linking C, C++ programs, <i>make</i> utility, debugging C programs using <i>gdb</i> , system call.
III	Introduction to X-window system: x-window as client/ server system, concept of window manager, remote computing & local displays, <i>xinitrc</i> file, customize X work environment and applications, customizing the <i>fvwm</i> window manager.
IV	Shell: Meaning and purpose of shell, Introduction to types of shell. The command line, standard input and standard output, redirection, pipes, filters special characters for searching files and pathnames. Bourne Again SHell: shell script-writing and executing, command separation & grouping, redirection, directory stack manipulation, processes, parameters & variables, keyword variables.
V	Shell Programming: Control structures, the <i>Here</i> document, expanding <i>NULL</i> or <i>USET</i> variables, Builtins, functions, history, aliases, job control, filename substitution. source code management- RCS and CVS. <i>awk</i> utility.

Text/References:

1. A practical Guide to Linux, Sobell, Pearson.
2. A Practical Guide to Linux Commands, Editors, and Shell Programming, Sobell, Pearson.
3. A Practical Guide to Fedora and Red Hat Enterprise Linux, Sobell, 5e, Pearson
4. Harley Hahn: Guide to Unix & Linux, TMH
5. Blum, Bresnahan, Linux Command and Shell Scripting Bible, Wiley India, 2nd Ed.

3IT6A- Advanced Engineering Mathematics (Common to Computer Science and Engineering & Info. Tech)

Class: III Sem. B.Tech.	Evaluation
Branch: Information Technology Schedule per Week Lectures: 3, Tutorial: 1 Engineering & Info. Tech)	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction: Engineering application of optimization, Statement and classification of optimization problem, single variable and multivariable optimization with and without constraints.
II	Linear Programming: Formulation of Linear Programming problem, Graphical Approach, General Linear Programming problem, Simplex Method. Duality in Linear Programming and Transportation Problems.
III	Elements of Number Theory: Divisibility and Euclid Algorithm, Primes and the Sieve of Eratosthenes, testing for primes, Prime Number Theorem, Euler's, Fermat's Little theorems, Congruences, Computing Inverse in Congruences, Legendre and Jacobi Symbols, Chinese Remainder Theorem, Algebraic Structures in Computing (Definitions, properties and Elementary Operations Only): Groups, subgroup, order of group, cyclic group, ring, field, division algorithm, polynomial over a field. Galois Field
IV	LAPLACE TRANSFORM: Laplace transform with its simple properties. Inverse Laplace transform, convolution theorem (without proof), solution of ordinary differential equation with constant coefficient, solution of partial differential equation having constant coefficient with special reference to diffusion, Heat conduction and wave equation. Boundary value problems
V	NUMERICAL ANALYSIS: Difference operators forward, backward, central, shift and average operators and relation between them. Newton's and Gauss forward and backward interpolation formula for equal interval, Stirling's formula for central difference. Lagrange's Interpolation formula and Inverse Interpolation. Numerical differentiation by Newton's, Gauss and Sterling's formula. Numerical Integration by Simpson's one third and there eight rule. Numerical Integration of ordinary differential equation of first order by Picard's method, Euler's and modified Euler's method, Milne's method and Runge-Kutta fourth order method. Solution of difference equation.

Text/References:

1. Elementary Number Theory with applications: Thomas Koshy, 2nd Ed., Elsevier.
2. Operation Research By Kanti Swaroop, P. K. Gupta & Manmohan, Sultan chand & sons
3. Integral Transform By Dr. R.K. Gupta, A.R. Vashishtha, Krishna Prakashan Mandir Meerut

4. Calculus of Finite Differences & Numerical Analysis By Dr. Gupta & Malik Krishna
Prakashan Mandir Meerut
5. Engineering Mathematics III By Jain and Rawat, CBC
6. Engineering Mathematics III By Prof. K.C. Sarangi and others, Genius publications

3IT7A- ELECTRONIC DEVICES LAB (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.	Evaluation
Branch: Information Technology Schedule per Week Practical Hrs : 3	Examination Time = Three (3) Hours Maximum Marks = 75 [Sessional/Mid-term (45) & End-term (30)]

S. No.	List of Experiments
1	Plot V-I characteristic of P-N junction diode & calculate cut-in voltage, reverse Saturation current and static & dynamic resistances.
2	Plot V-I characteristic of zener diode and study of zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.
3	Plot frequency response curve for single stage amplifier and to determine gain bandwidth product.
4	Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of I_{dss} & V_p
5	Application of Diode as clipper & clamper
6	Plot gain- frequency characteristic of two stages RC coupled amplifier & calculate its bandwidth and compare it with theoretical value.
7	Plot gain- frequency characteristic of emitter follower & find out its input and output resistances.
8	Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h-parameters.
9	Plot gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1kHz with and without negative feedback.
10	Plot and study the characteristics of small signal amplifier using FET.
11	Study Wein bridge oscillator and observe the effect of variation in R & C on oscillator frequency
12	Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.
13	To plot the characteristics of UJT and UJT as relaxation.
14	To plot the characteristics of MOSFET and CMOS.

3IT8A- DATA STRUCTURES LAB (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.		Evaluation
Branch: Information Technology Schedule per Week Practical Hrs : 3		Examination Time = Three (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]
S. No.	List of Experiments	
1	Write a simple C program on a 32 bit compiler to understand the concept of array storage, size of a word. The program shall be written illustrating the concept of row major and column major storage. Find the address of element and verify it with the theoretical value. Program may be written for arrays upto 4-dimensions.	
2	Simulate a stack, queue, circular queue and dequeue using a one dimensional array as storage element. The program should implement the basic addition, deletion and traversal operations.	
3	Represent a 2-variable polynomial using array. Use this representation to implement addition of polynomials.	
4	Represent a sparse matrix using array. Implement addition and transposition operations using the representation.	
5	Implement singly, doubly and circularly connected linked lists illustrating operations like addition at different locations, deletion from specified locations and traversal.	
6	Repeat exercises 2, 3 & 4 with linked structures.	
7	Implementation of binary tree with operations like addition, deletion, traversal.	
8	Depth first and breadth first traversal of graphs represented using adjacency matrix and list.	
9	Implementation of binary search in arrays and on linked Binary Search Tree.	
10	Implementation of insertion, quick, heap, topological and bubble sorting algorithms.	

3IT9A- DIGITAL ELECTRONICS LAB (Common to Computer Science and Engineering & Info. Tech)

Class: III Sem. B.Tech.	Evaluation
Branch: Information Technology Schedule per Week Practical Hrs : 2 Info. Tech)	Examination Time = Three (3) Hours Maximum Marks = 50 [Sessional/Mid-term (30) & End-term (20)]

S. No.	List of Experiments
1	To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR. Also to verify the truth table of Ex-OR, Ex-NOR (For 2, 3, & 4 inputs using gates with 2, 3, & 4 inputs).
2	To verify the truth table of OR, AND, NOR, Ex-OR, Ex-NOR realized using NAND & NOR gates.
3	To realize an SOP and POS expression.
4	To realize Half adder/ Subtractor & Full Adder/ Subtractor using NAND & NOR gates and to verify their truth tables.
5	To realize a 4-bit ripple adder/ Subtractor using basic Half adder/ Subtractor & basic Full Adder/ Subtractor.
6	To verify the truth table of 4-to-1 multiplexer and 1-to-4 demultiplexer. Realize the multiplexer using basic gates only. Also to construct and 8-to-1 multiplexer and 1-to-8 demultiplexer using blocks of 4-to-1 multiplexer and 1-to-4 demultiplexer
7	Design & Realize a combinational circuit that will accept a 2421 BCD code and drive a TIL -312 seven-segment display.
8	Using basic logic gates, realize the R-S, J-K and D-flip flops with and without clock signal and verify their truth table
9	Construct a divide by 2,4 & 8 asynchronous counter. Construct a 4-bit binary counter and ring counter for a particular output pattern using D flip flop.
10	Perform input/output operations on parallel in/Parallel out and Serial in/Serial out registers using clock. Also exercise loading only one of multiple values into the register using multiplexer. Note: As far as possible, the experiments shall be performed on bread board. However, experiment Nos. 1-4 are to be performed on bread board only.

3IT10A- C++ PROGRAMMING (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.		Evaluation
Branch: Information Technology Schedule per Week Practical Hrs.: 3		Examination Time = Three (4) Hours Maximum Marks = 100 [Sessional/Mid-term (45) & End-term (30)]
S. No.	List of Experiments	
1	To write a simple program for understanding of C++ program structure without any CLASS declaration. Program may be based on simple input output, understanding of keyword using.	

2	Write a C++ program to demonstrate concept of declaration of class with public & private member, constructors, object creation using constructors, access restrictions, defining member functions within and outside a class. Scope resolution operators, accessing an object's data members and functions through different type of object handle name of object, reference to object, pointer to object, assigning class objects to each other.
3	Program involving multiple classes (without inheritance) to accomplish a task. Demonstrate composition of class.
4	Demonstration Friend function friend classes and this pointer.
5	Demonstration dynamic memory management using new & delete & static class members.
6	Demonstration of restrictions an operator overloading, operator functions as member function and/ or friend function, overloading stream insertion and stream extraction, operators, overloading operators etc.
7	Demonstrator use of protected members, public & private protected classes, multi-level inheritance etc.
8	Demonstrating multiple inheritance, virtual functions, virtual base classes, abstract classes

3IT11A- UNIX SHELL PROGRAMMING (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.	Evaluation
Branch: Information Technology Schedule per Week Practical Hrs : 2	Examination Time = Four (3) Hours Maximum Marks = 50 [Sessional/Mid-term (30) & End-term (20)]

S. No.	List of Experiments
1.	Use of Basic Unix Shell Commands: ls, mkdir, rmdir, cd, cat, banner, touch, file, wc, sort, cut, grep, dd, dfspace, du, ulimit.
2.	Commands related to inode, I/O redirection and piping, process control commands, mails.
3.	Shell Programming: Shell script exercises based on following (i) Interactive shell scripts (ii) Positional parameters (iii) Arithmetic (iv) if-then-fi, if-then-else-fi, nested if-else (v) Logical operators (vi) else + if equals elif, case structure (vii) while, until, for loops, use of break (viii) Metacharacters (ix) System administration: disk management and daily administration
4.	Write a shell script to create a file in \$USER /class/batch directory. Follow the instructions (i) Input a page profile to yourself, copy it into other existing file; (ii) Start printing file at certain line (iii) Print all the difference between two file, copy the two files at \$USER/CSC/2007 directory. (iv) Print lines matching certain word pattern.
5.	Write shell script for- (i) Showing the count of users logged in, (ii) Printing Column list of files in your home directory (iii) Listing your job with below normal priority (iv) Continue running your job after logging out.
6.	Write a shell script to change data format .Show the time taken in execution of this script
7.	Write a shell script to print files names in a directory showing date of creation & serial number of the file.
8.	Write a shell script to count lines, words and characters in its input(do not use wc).

9.	Write a shell script to print end of a Glossary file in reverse order using Array. (Use awk tail)
10.	Write a shell script to check whether Ram logged in, Continue checking further after every 30 seconds till success.

4IT1A- MICROPROCESSOR AND INTERFACES (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	Evaluation
Branch: Information Technology Schedule per Week Lectures: 3 Engineering& Info. Tech)	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction to Microprocessors, microcontroller; 8085 Microprocessor Architecture, pin description, Bus concept and organization; concept of multiplexing and demultiplexing of buses; concept of static and dynamic RAM, type of ROM, memory map.
II	Software architecture registers and signals, Classification of instruction, Instruction set, addressing modes, Assembly Language Programming and Debugging, Programming Technique, instruction Format and timing.
III	Advance Assembly Language Programming, Counter and time delay; types of Interrupt and their uses, RST instructions and their uses, 8259 programmable interrupt controller; Macros, subroutine; Stack- implementation and uses with examples; Memory interfacing.
IV	8085 Microprocessor interfacing:, 8255 Programmable Peripheral Interface, 8254 programmable interval timer, interfacing of Input/output device, 8279 Key board/Display interface.
V	Microprocessor Application: Interfacing scanned multiplexed display and liquid crystal display, Interfacing and Matrix Keyboard, MPU Design; USART 8251, RS232C and RS422A, Parallel interface- Centronics and IEEE 488 .

Text/References:

1. Microprocessor architecture, programming, and applications with the 8085 By Ramesh S. Gaonkar
2. Introduction to Microprocessor By Aditya P. Mathur, TMH
3. Microprocessor & Interfaceing By Douglas V. Hall, TMH
4. Microprocessor & Peripheral By A.K.Ray, K.M. Bhurchandi, TMH

4IT2A- DISCRETE MATHEMATICAL STRUCTURES (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.		Evaluation
Branch: Information Technology Schedule per Week Lectures: 3, Tutorial:1		Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]
Units	Contents of the subject	
I	Sets: Definition and types, Set operations, Partition of set, Cardinality (Inclusion-Exclusion & Addition Principles), Recursive definition of set. Functions: Concept, Some Special Functions (Polynomial, Exponential & Logarithmic, Absolute Value, Floor & Ceiling, Mod & Div Functions), Properties of Functions, Cardinality of Infinite Set, Countable & Uncountable Sets, The Pigeonhole & Generalized Pigeonhole Principles, Composition of Functions.	
II	Relations: Boolean Matrices, Binary Relation, Adjacency Matrix of Relation, Properties of Relations, Operations on Relations, The Connectivity Relations, Transitive Closure-Warshall's Algorithm, Equivalence relations- Congruence Relations, Equivalence Class, Number of Partitions of a Finite Set, Partial & Total Orderings.	
III	Proof Methods: Vacuous, Trivial, Direct, Indirect by Contrapositive and Contradiction, Constructive & Non-constructive proof, Counter example. The Division Algorithm, Divisibility Properties (Prime Numbers & Composite Numbers), Principle of Mathematical Induction, The Second Principle of Mathematical Induction, Fundamental Theorem of Arithmetic. Algorithm Correctness: Partial Correctness, Loop Invariant. Testing the partial correctness of linear & binary search, bubble & selection sorting.	
IV	Graph Theory: Graphs – Directed, Undirected, Simple,. Adjacency & Incidence, Degree of Vertex, Subgraph, Complete graph, Cycle & Wheel Graph, Bipartite & Complete Bipartite Graph, Weighted Graph, Union of Simple Graphs. Complete Graphs. Isomorphic Graphs, Path, Cycles & Circuits Eulerian & Hamiltonian Graphs. Planar Graph: Kuratowski's Two Graphs, Euler's Formula, Kuratowski's Theorem. Trees: Spanning trees- Kruskal's Algo, Finding Spanning Tree using Depth First Search, Breadth First Search, Complexity of Graph, Minimal Spanning Tree.	
V	Language of Logic: Proposition, Compound Proposition, Conjunction, Disjunction, Implication, Converse, Inverse & Contrapositive, Biconditional Statements, tautology, Contradiction & Contingency, Logical Equivalences, Quantifiers, Arguments.	

Text/References:

1. Discrete Mathematics with Applications, Koshy, ELSEVIER

2. Discrete Mathematical Structures By Lipschutz & Lipson, TMH
3. Discrete Mathematical Structures, Kolman et.al, Pearson

4IT3A- STATISTICS & PROBABILITY THEORY (Common to Computer Science and Engineering & Info. Tech)

Units	Contents of the subject
Class: IV Sem. B.Tech.	Evaluation
Branch: Information Technology Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]
I	Introduction & Discrete random variables Sample space, events, algebra of events, Bernoulli's trials, Probability & Baye's theorem. Random variable & their event space, probability generating function, expectations, moments, computations of mean time to failure, Bernoulli & Poisson processes.
II	Discrete & continuous distributions Probability distribution & probability densities: Binomial, Poisson, normal rectangular and exponential distribution & their PDF's, moments and MGF's for above distributions.
III	Correlation & Regression Correlation & regression: Linear regression, Rank correlation, Method of least squares Fitting of straight lines & second degree parabola. Normal regression and correlation analysis.
IV	Queuing Theory Pure birth, pure death and birth-death processes. Mathematical models for M/M/1, M/M/N, M/M/S and M/M/S/N queues.
V	Discrete Parameter Markov chains: M/G/1 Queuing model, Discrete parameter birth-death process.

Text/References:

1. Probability, Statistics & Random Process By T. Veerajan, TMH
2. Fundamental of Mathematical Statistics By S.C.Gupta and V.K. Kapoor, Sultanchand & sons.
3. Statistics and Probability Theory By Jain & Rawat ,CBC
4. Statistics and Probability Theory By Schaum's, T.M.H.

4IT4A- SOFTWARE ENGINEERING (Common to Computer Science and Engineering & Info. Tech)

Class: IV Sem. B.Tech.	Evaluation
Branch: Information Technology Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	System Analysis: Characteristics, Problems in system Development, System Level project Planning, System Development Life cycle (SDLC), computer system engineering & system analysis, modeling the architecture, system specification.
II	Software & its characteristics: Software Development, Process Model, Prescriptive model, The water fall model, Incremental Process Modes, Evolutionary process model, specialized process model.
III	Requirement Analysis: Requirement analysis tasks, Analysis principles, Software prototyping and specification data dictionary finite state machine (FSM) models. Structured Analysis: Data and control flow diagrams, control and process specification behavioral modeling, extension for data intensive applications.
IV	Software Design: Design fundamentals, Effective modular design: Data architectural and procedural design, design documentation, coding – Programming style, Program quality, quantifying program quality, complete programming example
V	Object Oriented Analysis: Object oriented Analysis Modeling, Data modeling Object Oriented Design: OOD concepts and methods class and object definitions, refining operations, Class and object relationships, object modularization, Introduction to Unified Modeling Language

Text/References:

1. Software Engineering By Roger S. Pressman, TMH
2. Software Engineering Fundamental By Ali Behforooz, Frederick J Hudson, Oxford University Press
3. Software Engineering By Ian Sommerville
4. Software Engineering Concepts By **Richard E. Fairley** (Mcgraw-Hill)

4IT5A- PRINCIPLES OF COMMUNICATION (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.		Evaluation
Branch: Information Technology Schedule per Week Lectures: 3		Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]
Units	Contents of the subject	
I	ANALOG MODULATION: Concept of frequency translation. Amplitude Modulation: Description of full AM, DSBSC, SSB and VSB in time and frequency domains, methods of generation & demodulation, frequency division multiplexing (FDM). Angle Modulation: Phase and frequency modulation. Descriptions of FM signal in time and frequency domains, methods of generation & demodulation, pre-emphasis & de-emphasis, PLL.	
II	PULSE ANALOG MODULATION: Ideal sampling, Sampling theorem, aliasing, interpolation, natural and flat top sampling in time and frequency domains. Introduction to PAM, PWM, PPM modulation schemes. Time division multiplexing (TDM)	
III	PCM & DELTA MODULATION SYSTEMS: Uniform and Non-uniform quantization. PCM and delta modulation, Signal to quantization noise ratio in PCM and delta modulation. DPCM, ADM, T1 Carrier System, Matched filter detection. Error probability in PCM system.	
IV	DIGITAL MODULATION: Baseband transmission: Line coding (RZ, NRZ), inter symbol interference (ISI), pulse shaping, Nyquist criterion for distortion free base band transmission, raised cosine spectrum. Pass band transmission: Geometric interpretation of signals, orthogonalization. ASK, PSK, FSK, QPSK and MSK modulation techniques, coherent detection and calculation of error probabilities.	
V	SPREAD-SPECTRUM MODULATION: Introduction, Pseudo-Noise sequences, direct- sequence spread spectrum (DSSS) with coherent BPSK, processing gain, probability of error, frequency-hop spread spectrum (FHSS). Application of spread spectrum: CDMA.	

Text/References:

1. Principles of communication systems By Taub Schilling, T.M.H.
2. Fundamentals of communication systems By Proakis & Salehi, Pearson education
3. Communication Systems by Simon Haykin, John Wiley
4. Communication Systems (Analog and Digital) By R.P. Singh, S.D. Sapre, T.M.H.
5. Modern Digital & Analog Communication By B.P. Lathi, Oxford Publications
6. Digital & Analog Communication Systems By K.S. Shanmugam, John Wiley

4IT6A- PRINCIPLES OF PROGRAMMING LANGUAGES

(Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	Evaluation
Branch: Information Technology Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Programming Language: Definition, History, Features. Issues in Language Design: Structure and Operation of computer, Programming Paradigms. Efficiency, Regularity. Issues in Language Translation: Syntax and Semantics.
II	Specifications and Implementation of Elementary and Structured Data Types. Type equivalence, checking and conversion. Vectors and Arrays, Lists, Structures, Sets, Files.
III	Sequence control with Expressions, Conditional Statements, Loops, Exception handling. Subprogram definition and activation, simple and recursive subprogram, subprogram environment.
IV	Scope – Static and Dynamic, Block structures, Local Data and Shared Data, Parameters and Parameter Transmission. Local and Common Environments, Tasks and Shared Data.
V	Abstract Data type, information hiding, encapsulation, type definition. Static and Stack-Based Storage management. Fixed and Variable size heap storage management, Garbage Collection.

Text/References:

1. Programming languages: design and implementation, Terrence W. Pratt., Pearson
2. Programming languages: concepts and constructs, Ravi Sethi, ISBN 9780201590654.
3. Programming Language Pragmatics, Scott, ELSEVIER

4IT7A- MICROPROCESSOR LAB (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	Evaluation
Branch: Information Technology Schedule per Week Practical Hrs.: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]

S. No.	List of Experiments
1	Add the contents of memory locations XX00 &XX01 & place the result in memory location XX02.
2	Add the 16 bit numbers stored in memory location & store the result in another memory location.
3	Transfer a block of data from memory location XX00 to another memory location XX00 in forward & reverse order.
4	Write a program to Swap two blocks of data stored in memory.
5	Write a program to find the square of a number.
6	Write a main program & a conversion subroutine to convert Binary to its equivalent BCD.
7	Write a program to find largest & smallest number from a given array.
8	Write a program to Sort an array in ascending & descending order.
9	Write a program to multiply two 8 bit numbers whose result is 16 bit.
10	Write a program of division of two 8 bit numbers.
11	Generate square wave from SOD pin of 8085 & observe on CRO.
12	Write a program to perform traffic light control operation.
13	Write a program to control the speed of a motor.

4IT8A- COMMUNICATION LAB**(Common to Computer Science and Engineering& Info. Tech.**

Class: IV Sem. B.Tech.	Evaluation
Branch: Information Technology Schedule per Week Practical Hrs : 3 Tech)	Examination Time = Three (3) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]

S. No.	List of Experiments
1	Harmonic analysis of a square wave of modulated waveform Observe the amplitude modulated waveform and measures modulation index. Demodulation of the AM signal
2	To modulate a high frequency carrier with sinusoidal signal to obtain FM signal. Demodulation of the FM signal
3	To observe the following in a transmission line demonstrator kit : i. The propagation of pulse in non-reflecting Transmission line. ii. The effect of losses in Transmission line. iii. The resonance characteristics of a half wavelength long transmission line.
4	To study and observe the operation of a super heterodyne receiver
5	To modulate a pulse carrier with sinusoidal signal to obtain PWM signal and demodulate it.
6	To modulate a pulse carrier with sinusoidal signal to obtain PPM signal and demodulate it.
7	To observe pulse amplitude modulated waveform and its demodulation.
8	To observe the operation of a PCM encoder and decoder. To consider reason for using digital signal transmissions of analog signals.
9	Produce ASK signals, with and without carrier suppression. Examine the different processes required for demodulation in the two cases
10	To observe the FSK wave forms and demodulate the FSK signals based on the properties of (a) tuned circuits (b) on PLL.
11	To study & observe the amplitude response of automatic gain controller (AGC).

4IT9A- COMPUTER AIDED SOFTWARE ENGINEERING LAB
(Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	Evaluation
Branch: Information Technology Schedule per Week Practical Hrs : 3	Examination Time = Three (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]

For the instructor: Assign any two projects two a group of exactly two students covering all of the experiments from given experiment list. Each group is required to prepare the following documents for projects assigned to them and develop the software using software engineering methodology.

1. Problem Analysis and Project Planning Thorough study of the problem- identify project scope, infrastructure.
2. Software Requirement Analysis- Describe the individual Phases/modules of the project deliverables.
3. Data Modeling Use work products – data dictionary, use case diagrams and activity diagrams, build and test lass diagrams, sequence diagrams and add interface to class diagrams.
4. Software Developments and Debugging.
5. Software Testing – Prepare test plan, perform validation testing coverage analysis, memory leaks, develop test case hierarchy, Site check and site monitor.
6. Describe: Relevance of CASE tools, high – end and low – end CASE tools, automated support for data dictionaries, DFD, ER diagrams.

S. No.	List of Experiments	Software Recommended:
1	Course Registration System	Case Tools: Rational Suite, Win runner, Empirix Languages: C/C++/JDK, JSDK, INTERNET EXPLORER UML Front End: VB, VC++, Developer 2000, .NET Back End: Oracle, MS – Access, SQL Note: Open Source tools will be preferred.
2	Quiz System	
3	Online ticket reservation system	
4	Remote computer monitoring	
5	Students marks analyzing system	
6	Expert system to prescribe the medicines for the given symptoms	
7	Platform assignment system for the trains in a railway station	
8	Stock maintenance	
9	Student Marks Analyzing System	
10	Online Ticket Reservation System	
11	Payroll System	
12	Export System	

4IT10A- Business Entrepreneurship Development (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	Evaluation
Branch: Information Technology Schedule per Week Practical Hrs : 2	Examination Time = Three (3) Hours Maximum Marks = 50 [Sessional/Mid-term (30) & End-term (20)]

1. Introduction to Entrepreneurship- Concept and need, Entrepreneurship and innovation, Entrepreneurship and economic growth.
2. Entrepreneurial competencies, Leadership, Decision making, Motivation, Risk taking.
3. Business Enterprise Planning- Identification of business opportunity, Idea generation, Demand estimation, Preparation of project report, Feasibility analysis.
4. Intellectual Property rights, Patents, Taxation- Central excise & Sales tax, VAT.
5. Government Policies for Entrepreneurs, Entrepreneurial career opportunities for Engineers, case studies.

5IT1A- COMPUTER ARCHITECTURE (Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Lectures: 3, Tutorial: 0	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]
Units	Contents of the subject
I	Introduction to Computer Architecture and Organization. Von Neuman Architecture, Flynn Classification. Register Transfer and Micro operations: Register transfer language, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Bus and memory transfers. Computer Organization and Design: Instruction cycle, computer registers, common bus system, computer instructions, addressing modes, design of a basic computer
II	Central Processing Unit: General register organization, stack organization, Instruction formats, Data transfer and manipulation, program control. RISC, CISC characteristics. Pipeline and Vector processing: Pipeline structure, speedup, efficiency, throughput and bottlenecks. Arithmetic pipeline and Instruction pipeline.
III	Computer Arithmetic: Adder, Ripple carry Adder, carry look Ahead Adder, Multiplication: Add and Shift, Array multiplier and Booth Multiplier, Division: restoring and Non-restoring Techniques. Floating Point Arithmetic: Floating point representation, Add, Subtract, Multiplication, Division.
IV	Memory Organization: RAM, ROM, Memory Hierarchy, Organization, Associative memory, Cache memory, and Virtual memory: Paging and Segmentation.
V	Input-Output Organization: Input-Output Interface, Modes of Transfer, Priority Interrupt, DMA, IOP processor.

References:

1. Computer Organization and Architecture - William Stallings (Pearson Education Asia)

2. Computer Organization and Architecture -John P. Hayes (McGraw -Hill)
3. Computer Organization -V. Carl. Hamacher (McGraw-Hill)

5IT2A- Digital Signal Processing

Class: V Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	INTRODUCTION: Discrete time signals and systems, properties of discrete time systems, Linear time invariant systems - discrete time. Properties of LTI systems and their block diagrams. Convolution, Discrete time systems described by difference equations.
II	Fourier Transform: Discrete time Fourier transform for periodic and aperiodic signals. Properties of DTFT. Z-transform: The region of convergence for the Z-transform. The Inverse Z-transform. Properties of Z transform.
III	SAMPLING: Mathematical theory of sampling. Sampling theorem. Ideal & Practical sampling. Interpolation technique for the reconstruction of a signal from its samples. Aliasing. Sampling in freq. domain. Sampling of discrete time signals.
IV	THE DISCRETE FOURIER TRANSFORMS (DFT): Properties of the DFT, Linear Convolution using DFT. Efficient computation of the DFT: Decimation-in-Time and Decimation-in frequency FFT Algorithms.
V	FILTER DESIGN TECHNIQUES: Structures for discrete-time systems- Block diagram and signal flow graph representation of LCCD (LCCD – Linear Constant Coefficient Difference) equations, Basic structures for IIR and FIR systems, Transposed forms. Introduction to filter Design: Butterworth & Chebyshev. IIR filter design by impulse invariance & Bilinear transformation. Design of FIR filters by Windowing: Rectangular, Hamming & Kaiser.

References:

1. Oppenheim, Discrete-Time Signal Processing, 2/e, Pearson Education
2. Proakis, Digital Signal Processing, 4/e, Pearson Education
3. S.K.Mitra, Digital Signal Processing, 2/e, Tata McGraw Hill

5IT3A- TELECOMMUNICATION FUNDAMENTALS (Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: Info. Tech Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Data Transmission: Terminology, Frequency, spectrum, bandwidth, analog and digital transmission, Transmission impairments, channel capacity, Transmission Media. Wireless Transmission: Antenna and antenna gain. Network Reference Models (OSI/ISO and TCP/IP) Physical Layer: Line Encoding Schemes. Concept of bit period, effect of clock skew, Synchronous and Asynchronous communication. Data Link Layer: Functions of data link layer and design issues Flow Control: Flow control in loss less and lossy channels using stop-and-wait, sliding window protocols. Performance of protocols used for flow control.
II	Error Control Coding: Error Detection, Two Dimensional Parity Checks, and Internet Checksum. Polynomial Codes, Standardized polynomial codes, error detecting capability of a polynomial codes. Linear codes, performance of linear codes, error detection & correction using linear codes. Data Link Control: HDLC & PPP including frame structures. MAC sublayer: Channel Allocation Problem, Pure and slotted Aloha, CSMA, CSMA/CD, collision free multiple access. Throughput analysis of pure and slotted Aloha. Ethernet Performance.
III	Wireless LAN: Hidden node and Exposed node Problems, RTS/CTS based protocol, 802.11 Architecture, protocol stack, Physical layer, MAC Sublayer. Bluetooth Architecture and Protocol Stack Data Link Layer Switching: Bridges (Transparent, Learning and Spanning Tree), Virtual LANs
IV	Multiplexing: Frequency division, time division (Synchronous and statistical) multiplexing. ADSL, DS1 and DS3 carriers. Multiple Accesses: TDMA frame structure, TDMA Burst Structure, TDMA Frame efficiency, TDMA Superframe structure, Frame acquisition and synchronization, Slip rate in digital terrestrial networks. Switching: Qualitative description of Space division, time division and space-time-space division switching.
V	Spread Spectrum Techniques: Direct sequence(DSSS) & frequency hopping(FHSS); Performance consideration in DSSS & FHSS; Code division Multiple access (CDMA): frequency & channel specifications, forward & reverse CDMA channel, pseudo noise(PN) sequences, m-sequence, gold sequence, orthogonal code, gold sequences, Walsh codes, synchronization, power control, handoff, capacity of CDMA system, IMT-2000, WCDM

Text/References:

1. Stallings, Data and computer communication, 8th ed. Pearson
2. Tri.T.Ha, Digital Satellite Communications, 2/e, Tata McGraw Hill
3. Alberto Leon-Garcia, Indra Widjaja, COMMUNICATION NETWORKS, 2nd ed., TMH
4. Wireless Communications, 2/e, Rappaport, PHI
5. Analysis of Computer and Communication Networks, ISBN: 0387744363, Fayez Gebali, 2008, Springer-verlag, 1st Ed.

5IT4A- DATABASE MANAGEMENT SYSTEMS (Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	INTRODUCTION TO DATABASE SYSTEMS: Overview and History of DBMS. File System v/s DBMS .Advantage of DBMS Describing and Storing Data in a DBMS. Queries in DBMS. Structure of a DBMS.
II	ENTITY RELATIONSHIP MODEL: Overview of Data Design Entities, Attributes and Entity Sets, Relationship and Relationship Sets. Features of the ER Model- Key Constraints, Participation Constraints, Weak Entities, Class Hierarchies, Aggregation, Conceptual Data Base, Design with ER Model-Entity v/s Attribute, Entity vs Relationship Binary vs Ternary Relationship and Aggregation v/s ternary Relationship Conceptual Design for a Large Enterprise.
III	RELATIONSHIP ALGEBRA AND CALCULUS: Relationship Algebra Selection and Projection, Set Operations, Renaming, Joins, Division, Relation Calculus, Expressive Power of Algebra and Calculus.
IV	SQL QUERIES PROGRAMMING AND TRIGGERS: The Forms of a Basic SQL Query, Union, Intersection and Except, Nested Queries ,Correlated Nested Queries, Set-Comparison Operations, Aggregate Operators, Null Values and Embedded SQL, Dynamic SQL, ODBC and JDBC, Triggers and Active Databases.
V	SCHEMA REFINEMENT AND NORMAL FORMS: Introductions to Schema Refinement, Functional Dependencies, Boyce-Codd Normal Forms, Third Normal Form, Normalization-Decomposition into BCNF Decomposition into 3-NF.

References:

1. H.f. Korth and Silberschatz: Database Systems Concepts, McGraw Hill
2. Almasri and S.B. Navathe: Fundamentals of Database Systems,
3. C.J. Date: Data Base Design, Addison Wesley
4. Hansen and Hansen : DBM and Design, PHI

5IT5A- OPERATING SYSTEMS (Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction and need of operating system, layered architecture/logical structure of operating system, Type of OS, operating system as resource manager and virtual machine, OS services, BIOS, System Calls/Monitor Calls, Firmware- BIOS, Boot Strap Loader. Process management- Process model, creation, termination, states & transitions, hierarchy, context switching, process implementation, process control block, Basic System calls- Linux & Windows. Threads- processes versus threads, threading, concepts, models, kernel & user level threads, thread usage, benefits, multithreading models.
II	Interprocess communication- Introduction to message passing, Race condition, critical section problem, mutual exclusion with busy waiting- disabling interrupts, lock variables, strict alteration, Peterson's solution, TSL instructions, busy waiting, sleep and wakeup calls, semaphore, monitors, classical IPC problems. Process scheduling- Basic concepts, classification, CPU and I/O bound, CPU scheduler- short, medium, long-term, dispatcher, scheduling:- preemptive and non-preemptive, Static and Dynamic Priority, Co-operative & Non-cooperative, Criteria/Goals/Performance Metrics, scheduling algorithms- FCFS, SJFS, shortest remaining time, Round robin, Priority scheduling, multilevel queue scheduling, multilevel feedback queue scheduling, Fair share scheduling.
III	Deadlock- System model, resource types, deadlock problem, deadlock characterization, methods for deadlock handling, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock. Memory management- concepts, functions, logical and physical address space, address binding, degree of multiprogramming, swapping, static & dynamic loading-creating a load module, loading, static & dynamic linking, shared libraries, memory allocation schemes- first fit, next fit, best fit, worst fit, quick fit. Free space management- bitmap, link list/free list, buddy's system, memory protection and sharing, relocation and address translation.
IV	Virtual Memory- concept, virtual address space, paging scheme, pure segmentation and segmentation with paging scheme hardware support and implementation details, memory fragmentation, demand paging, pre-paging, working set model, page fault frequency, thrashing, page replacement algorithms- optimal, NRU, FIFO, second chance, LRU, LRU- approximation clock, WS clock; Belady's anomaly, distance string; design issues for paging system- local versus global allocation policies, load

	control, page size, separate instruction and data spaces, shared pages, cleaning policy, TLB (translation look aside buffer) reach, inverted page table, I/O interlock, program structure, page fault handling, Basic idea of MM in Linux & windows.
V	File System- concepts, naming, attributes, operations, types, structure, file organization & access(Sequential, Direct ,Index Sequential) methods, memory mapped files, directory structures- one level, two level, hierarchical/tree, acyclic graph, general graph, file system mounting, file sharing, path name, directory operations, overview of file system in Linux & windows. Input/Output subsystems- concepts, functions/goals, input/output devices- block and character, spooling, disk structure & operation, disk attachment, disk storage capacity, disk scheduling algorithm- FCFS, SSTF, scan scheduling, C-scan schedule.

Text/Reference Books:

1. A. Silberschatz and Peter B Galvin: Operating System Principals, Wiley India Pvt. Ltd.
2. Achyut S Godbole: Operating Systems, Tata McGraw Hill
3. Tanenbaum: Modern Operating System, Prentice Hall.
4. DM Dhamdhare: Operating Systems – A Concepts Based Approach, Tata McGraw Hill
5. Charles Crowly: Operating System A Design – Oriented Approach, Tata McGraw Hill.

5IT6.1A- ADVANCED DATA STRUCTURE (Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	ADVANCED TREES: Definitions, Operations on Weight Balanced Trees (Huffman Trees), 2-3 Trees and Red- Black Trees. Dynamic Order Statistics, Interval Tree; Dictionaries.
II	MERGEABLE HEAPS: Mergeable Heap Operations, Binomial Trees, Implementing Binomial Heaps and its Operations, 2-3-4. Trees and 2-3-4 Heaps. Amortization analysis and Potential Function of Fibonacci Heap, Implementing Fibonacci Heap.
III	GRAPH THEORY DEFINITIONS: Definitions of Isomorphic Components. Circuits, Fundamental Circuits, Cut-sets. Cut- Vertices Planer and Dual graphs, Spanning Trees, Kuratovski's two Graphs. GRAPH THEORY ALGORITHMS: Algorithms for Connectedness, Finding all Spanning Trees in a Weighted Graph, Breadth First and Depth First Search, Topological Sort, Strongly Connected Components and Articulation Point. Single Min-Cut Max-Flow theorem of Network Flows. Ford-Fulkerson Max Flow Algorithms.
IV	SORTING NETWORK: Comparison network, zero-one principle, bitonic sorting and merging network sorter. Priority Queues and Concatenable Queues using 2-3 Trees. Operations on Disjoint sets and its union-find problem, Implementing Sets.
V	NUMBER THEORETIC ALGORITHM: Number theoretic notions, Division theorem, GCD, recursion, Modular arithmetic, Solving Modular Linear equation, Chinese Remainder Theorem, power of an element, Computation of Discrete Logarithms, primality Testing and Integer Factorization.

References:

1. Cormen, Leiserson, Rivest: Introduction to Algorithms, Prentice Hall of India.
2. Horowitz and Sahani: Fundamental of Computer algorithms.
3. Aho A.V , J.D Ulman: Design and analysis of Algorithms, Addison Wesley
4. Brassard : Fundamental of Algorithmics, PHI.

5IT6. 2A- E-Commerce

Class: V Sem. B.Tech.		Evaluation
Branch: I.T. Schedule per Week Lectures: 3		Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]
Units	Contents of the subject	
I	Introduction: Motivation, Forces behind E commerce industry framework, brief history of ecommerce, inter organizational ecommerce, intra organizational ecommerce and consumer to business electronic commerce, architectural framework, Network infrastructure for ecommerce, market forces behind 1 way, component of 1 way access equipment, global information distribution network, broadband telecommunication.	
II	Mobile commerce: Introduction to mobile commerce, mobile computing application, wireless application protocols, WAP technology, mobile information devices, web security, introduction to web security, firewalls & transaction security, client server network, emerging client server security threats, firewalls and network security.	
III	Encryption: World wide web & security, encryption, transaction security, secret key encryption , public key encryption, virtual private network(VPN), implementation management issues.	
IV	Electronic payment: Overview of electronic payments, digital token based, electronic payment system, smart cards, credit card I, debit card based EPS, emerging financial instruments, home banking, online banking.	
V	Net commerce: EDA, EDI application in business, legal requirement in Ecommerce, introduction to supply chain management, CRM, issues in customer relationship management.	

References:

1. Electronic e-commerce II Edition: Pete Loshin, Paul A Murphy, Jaico book.
2. The Business of e-commerce: Paul May, Cambridge University Press.

5IT6.3A- SATELLITE & MICROWAVE COMMUNICATION

Class: V Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	WAVE GUIDES :Introduction of Microwaves and their applications. Rectangular Waveguides , Solution of Wave equation in TE and TM modes. Power transmission and Power losses. Excitation of modes in Rectangular waveguides, circular waveguides : Basic idea of TE and TM modes, field patterns, TEM mode of propagation.
II	WAVEGUIDE COMPONENTS : Scattering matrix representation of networks. Rectangular cavity and circular cavity resonators. Waveguide Tees, Magic Tees. Hybrid rings. Waveguide corners, Bends and twists. Directional couplers, Circulators and isolators. Broadband Wireless 802.16
III	Elements of satellite communication: Frequency bands, Transmission and multiplexing. Modulation, Multiple access techniques.
IV	Satellite orbit and description- orbital period and velocity, effects of orbital inclination, Azimuth and elevation, Coverage angle and slant range, Geostationary orbit,
V	Satellite description: Communications subsystems. Earth Station: Antenna, high-power amplifier, low-noise amplifier, up converter, down converter, monitoring and control, reliability. Satellite Link: basic link analysis.

References:

1. Liao, Microwave Devices and Circuits, 3/e, Pearson Education
2. Tri.T.Ha, Digital Satellite Communications, 2/e, Tata McGraw Hill
3. Communication Systems, Simon Haykin, John Wiley.

5IT7A- DATABASE LAB (Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Practical Hrs.: 3	Examination Time = Four (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]

Objectives: At the end of the semester, the students should have clearly understood and implemented the following:

1. Stating a database design problem.
2. Preparing ER diagram
3. Finding the data fields to be used in the database.
4. Selecting fields for keys.
5. Normalizing the database including analysis of functional dependencies.
6. Installing and configuring the database server and the front end tools.
7. Designing database and writing applications for manipulation of data for a stand alone and shared data base including concepts like concurrency control, transaction roll back, logging, report generation etc.
8. Get acquainted with SQL.

In order to achieve the above objectives, it is expected that each students will chose one problem. The implementation shall being with the statement of the objectives to be achieved, preparing ER diagram, designing of database, normalization and finally manipulation of the database including generation of reports, views etc. The problem may first be implemented for a standalone system to be used by a single user.

All the above steps may then be followed for development of a database application to be used by multiple users in a client server environment with access control. The application shall NOT use web techniques.

One exercise may be assigned on creation of table, manipulation of data and report generation using SQL.

Suggested Tools:

For standalone environment, Visual FoxPro or any similar database having both the database and manipulation language may be used.

For multi-user application, MYSql is suggested. However, any other database may also be used. For front end, VB.Net, Java, VB Script or any other convenient but currently used by industry may be chosen.

Indicative List of exercises:

1. Student information system for your college.
2. Student grievance registration and redressal system.
3. A video library management system for a shop.
4. Inventory management system for a hardware/ sanitary item shop.
5. Inventory management system for your college.
6. Guarantee management system for the equipments in your college.

5IT8A- ADVANCE COMMUNICATION LAB. (Info. Tech)

Class: V Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Practical Hrs : 3	Examination Time = Four (4) Hours Maximum Marks = 75 [Sessional/Mid-term (45) & End-term (30)]

S. No.	List of Experiments
1.	TDM of two band limited signals.
2.	ASK and FSK generation and detection
3.	PSK generation and detection
4.	DPSK generation and detection
5.	QPSK generation and detection
6.	PCM generation and detection using a CODEC Chip
7.	Measurement of losses in a given optical fiber (propagation loss, bending loss) and numerical aperture
8.	Analog and Digital (with TDM) communication link using optical fiber.
9.	Measurement of frequency, guide wavelength, power, VSWR and attenuation in a microwave test bench
10.	Measurement of directivity and gain of antennas: Standard dipole (or printed dipole), microstrip patch antenna and Yagi antenna (printed).
11	Determination of coupling and isolation characteristics of a stripline (or microstrip) directional coupler (a) Measurement of resonance characteristics of a microstrip ring resonator and determination of dielectric constant of the substrate. (b) Measurement of power division and isolation characteristics of a microstrip 3 dB power divider.

5IT9A- OPERATING SYSTEMS SIMULATION LAB(Common to CS & IT)

Class: V Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Practical Hrs : 3	Examination Time = Four (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]

Objectives:

- Understand the basic functions of operating systems.
- In depth knowledge of the algorithms used for implementing the tasks performed by the operating systems.
- Understand & simulate strategies used in Linux & Windows operating systems.
- Develop aptitude for carrying out research in the area of operating system.

Suggested Tools:

Operating system simulator- MOSS preferably on Linux platform. (Available for free download from <http://www.ontko.com/moss/>).

Recommended Exercises:

A. Exercises shall be given on simulation of algorithms used for the tasks performed by the operating systems. Following modules of the simulator may be used:

- Scheduling
- Deadlock
- Memory Management Systems
- File system simulator

Algorithms described in the text may be assigned. The simulation results such as average latency, hit & Miss Ratios or other performance parameters may be computed.

B. One exercise shall be on simulation of algorithms reported in the recent conferences/ journals and reproducing the results reported therein.

5IT10A- DIGITAL HARDWARE DESIGN LAB (Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Practical Hrs : 3	Examination Time = Four (4) Hours Maximum Marks = 75 [Sessional/Mid-term (45) & End-term (30)]

Tech)

Objectives: At the end of course, the students shall be able to

- Should be able to design datapath for digital systems
- Create a digital system using discrete digital ICs
- Design a hard wired / micro-programmed control circuit
- Simulate a digital datapath in Hardware Description Language
- Understand IC descriptions and select proper IC in a given circuit based on its timing characteristics

Suggested Methodology and tools: Hardware description language like verilog /VHDL can be used for simulation.

The exercise shall involve design of datapath, its simulation and finally realization on breadboard. Library of digital ICs have to be built. Similarly, manuals of Digital IC families have to be placed in the laboratories for reference by students.

Suggested Exercises

- Create a microprocessor from ALU 74181. For this, the students may design a small instruction set and attach necessary registers and suitable control unit to realize a microprocessor.
- Simulate and realize a Cordic calculator.
- Simulate & realize a Four bit Adder
 - Design and simulation of a 4-bit Adder
 - VHDL/verilog HDL (Hardware description language)
 - Interfacing 7-segment decoder
- Combinational Multiplier
 - 4x4-bit multiplier
 - Binary-to-BCD conversion
 - Timing Constraints
- CRC checksum generator & verifier
- Realizing a carry look ahead adder

6IT1A- COMPUTER NETWORKS (Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: Info. Tech Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]
Units	Contents of the subject
I	Network layer-design issue, routing algorithms: Distance vector, link state, hierarchical, Broadcast routing. Congestion control: congestion prevention policies, congestion control in Datagram subnets, load shedding, jitter control, Leaky bucket and token bucket algorithms.

NOTE: The first 2 lectures shall be devoted to review of the basis architectures and responsibilities of different layers.

II	Internetworking: Differences in networks, Tunneling, Internetwork routing, Fragmentation Network layer in the Internet: IPv4 classful and classless addressing, subnetting Network layer protocols(only working and purpose; packet headers etc. not included), Differences in IPV6 over IPV4. Routing to Mobile Hosts and Mobile IP
III	Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and demultiplexing, crash recovery, introduction to UDP protocol. Principles of Reliable Data Transfer: Reliable data transfer over a perfectly reliable channel, Channel with bit errors and Lossy Channel with bit errors.
IV	Transport Layer in the Internet: Introduction to TCP, TCP service Model, TCP Header and segment structure, TCP connection establishment and release, transmission policy, timer management, Transactional TCP. Mobile TCP TCP Congestion Control: Fairness, TCP delay modeling.
V	Application Layer: World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Introduction to Network security. P2P File Sharing: Centralized Directory, Query flooding, exploiting heterogeneity.

Text/References:

1. Tanenbaum; Computer Network, 4th Ed., Pearson.
2. Kurose; Computer Networking, 3rd Ed., Pearson.
3. Peterson, Davie; Computer Networks, 4rd Ed., ELSEVIER

6IT2A- DESIGN AND ANALYSIS OF ALGORITHMS (Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: Info. Tech Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	BACKGROUND: Review of Algorithm Complexity, Order Notations: definitions and calculating complexity. DIVIDE AND CONQUER METHOD: Binary Search, Merge Sort, Quick sort and strassen's matrix multiplication algorithms. GREEDY METHOD: Knapsack Problem, Job Sequencing, Optimal Merge Patterns and Minimal Spanning Trees.
II	DYNAMIC PROGRAMMING: Matrix Chain Multiplication. Longest Common Subsequence and 0/1 Knapsack Problem. BRANCH AND BOUND: Traveling Salesman Problem and Lower Bound Theory. Backtracking Algorithms and queens problem.
III	PATTERN MATCHING ALGORITHMS: Naïve and Rabin Karp string matching algorithms, KMP Matcher and Boyer Moore Algorithms. ASSIGNMENT PROBLEMS: Formulation of Assignment and Quadratic Assignment Problem.
IV	RANDOMIZED ALGORITHMS. Las Vegas algorithms, Monte Carlo algorithms, randomized algorithm for Min-Cut, randomized algorithm for 2-SAT. Problem definition of Multicommodity flow, Flow shop scheduling and Network capacity assignment problems.
V	PROBLEM CLASSES NP, NP-HARD AND NP-COMPLETE: Definitions of P, NP-Hard and NP-Complete Problems. Decision Problems. Cook's Theorem. Proving NP-Complete Problems - Satisfiability problem and Vertex Cover Problem. Approximation Algorithms for Vertex Cover and Set Cover Problem.

References:

1. Cormen, Leiserson, Rivest: Introduction to Algorithms, Prentice Hall of India.
2. Horowitz and Sahani: Fundamental of Computer algorithms.
3. Aho A.V , J.D Ulman: Design and analysis of Algorithms, AddisonWesley
4. Brassard : Fundamental of Algorithmics, PHI.

6IT3A- THEORY OF COMPUTATION (Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Lectures: 3, Tutorial:1	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Finite Automata & Regular Expression: Basic Concepts of finite state system, Deterministic and non-deterministic finite automation and designing regular expressions, relationship between regular expression & Finite automata minimization of finite automation mealy & Moore Machines.
II	Regular Sets of Regular Grammars: Basic Definition of Formal Language and Grammars. Regular Sets and Regular Grammars, closure proportion of regular sets, Pumping lemma for regular sets, decision Algorithms for regular sets, Myhill_Nerod Theory & Organization of Finite Automata.
III	Context Free Languages& Pushdown Automata: Context Free Grammars – Derivations and Languages – Relationship between derivation and derivation trees – ambiguity – simplification of CEG – Greiback Normal form – Chomsky normal forms – Problems related to CNF and GNF Pushdown Automata: Definitions – Moves – Instantaneous descriptions – Deterministic pushdown automata – Pushdown automata and CFL - pumping lemma for CFL - Applications of pumping Lemma.
IV	Turing Machines: Turing machines – Computable Languages and functions – Turing Machine constructions – Storage in finite control – multiple tracks – checking of symbols – subroutines – two way infinite tape. Undecidability: Properties of recursive and Recursively enumerable languages – Universal Turing Machines as an undecidable problem – Universal Languages – Rice's Theorems.
V	Linear bounded Automata Context Sensitive Language: Chomsky Hierarchy of Languages and automata, Basic Definition & descriptions of Theory & Organization of Linear bounded Automata Properties of context-sensitive languages

References

1. Aho, Hopcroft and Ullman, Introduction to Automata Theory, Formal Languages and Computation, Narosa
2. Cohen, Introduction to Computer Theory, Addison Wesley.
3. Papadimitriou, Introduction to Theory of Computing, Prentice Hall.

6IT4A- PROGRAMMING IN JAVA

Class: VI Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	JAVA: Introduction to Object Orientated Programming, Abstraction, Object Oriented Programming Principles, Features of JAVA, Introduction to Java byte code, Java Virtual machine. PROGRAM ELEMENTS: Primitive data types, variables, assignment, arithmetic, short circuit logical operators, Arithmetic operators, bit wise operators, relational operators, Boolean logic operators, the assignment operators, operator precedence, Decision and control statements, arrays.
II	CONTROL STATEMENTS: Java's Selection Statements, if statement, switch statement, Iteration Statements, while, do-while, for, for-each, Nested Loops, Jump Statements, Using break, Using continue, return. OBJECTS AND CLASSES: Objects, constructors, returning and passing objects as parameter, Nested and inner classes, Single and Multilevel Inheritance, Extended classes, Access Control, usage of super, Overloading and overriding methods, Abstract classes, Using final with inheritance.
III	PACKAGE AND INTERFACES: Defining package, concept of CLASSPATH, access modifiers, importing package, Defining and implementing interfaces. STRING HANDLING: String constructors, special string operations, character extraction, searching and comparing strings, string Buffer class.
IV	EXCEPTION HANDLING: Exception handling fundamentals, Exception types, uncaught exceptions, try, catch and multiple catch statements. Usage of throw, throws and finally FILE HANDLING: I/O streams, File I/O.
V	CONCURRENCY: Processes and Threads, Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Interrupts, Joins, Synchronization. APPLET: Applet Fundamentals, using paint method and drawing polygons.

References

1. Herbert Schildt: JAVA 2 - The Complete Reference, TMH, Delhi
2. U.K. Chakraborty and D.G. Dastidar: Software and Systems – An Introduction, Wheeler Publishing, Delhi.
3. Joseph O'Neil and Herb Schildt: Teach Yourself JAVA, TMH, Delhi.

6IT5A- INFORMATION THEORY & CODING

Units	Contents of the subject
I	Introduction to information theory. Uncertainty, Information and Entropy, Information measures for continuous random variables, source coding theorem. Discrete Memory less channels, Mutual information, Conditional entropy.
II	Source coding schemes for data compaction: Prefix code, Huffman code, Shanon-Fane code & Hempel-Ziv coding channel capacity. Channel coding theorem. Shannon limit.
III	Linear Block Code: Introduction to error correcting codes, coding & decoding of linear block code, minimum distance consideration, conversion of non systematic form of matrices into systematic form.
IV	Cyclic Code: Code Algebra, Basic properties of Galois fields (GF) polynomial operations over Galois fields, generating cyclic code by generating polynomial, parity check polynomial. Encoder & decoder for cyclic codes.
V	Convolutional Code: Convolutional encoders of different rates. Code Tree, Trllis and state diagram. Maximum likelihood decoding of convolutional code: The viterbi Algorithm fee distance of a convolutional code.

References

1. Digital Communication, Simon Haykin,

6IT6.1A- ADVANCE TOPICS IN OPERATING SYSTEMS (Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Operating system structures – policies & mechanism, Structures- monolithic, layered, virtual machines, micro kernel, exokernels, client- server model. Examples from Linux & Windows. Threads Advance Concepts– Libraries- Pthreads, win32 threads, Java threads, Introduction to threading issues, system calls, cancellation, signal handling, thread pool, thread specific data, window threads, Linux threads, Solaris Threads. Message Passing System – Need of Message Passing Systems, design issues, naming, synchronization, Implementation–buffering and delivery; mailboxes; RPC & RMI. Examples Systems – Linux, Windows.
II	File System- file system layouts, file system implementation, contiguous allocation, link list allocation, indexed allocation, file allocation table, virtual file system, directory implementation- linear list and hash table. File System reliability and integrity. I/O system: device drivers/ controllers, busses and interfaces- USB, IDE, SCSI, IEEE1394, RAID system, disk caching and buffering, disk management-disk formatting, RAID Structure, boot block, bad block, swap-space management. System Security: Security Problems, Program Threats, System Network Threats, Cryptography as a Security Tool, User Authentication, Implementing Security Defenses, Firewalling to Protect Systems and Network, Computer Security Classifications. Overview of security in Windows. [4]
III	The Linux OS: Unix Vs Linux, Design Principles, Kernel Structure, components Kernel Modules, Shell- usage, types; An overview of- Process Management, Thread Management and Scheduling, Memory Management, Process Scheduling in Linux, File System structure & implementation, I/O Management, Network File System, Inter-process Communications, Booting and login process, security.[3]
IV	The Window OS: Design Principles, System Components- Hardware Abstraction layer, Kernel, Executives; Environmental Subsystems- MS-DOS Environment, 16-bit Windows Environment, Win32 API, POSIX subsystem; Exception and Interrupts; An overview of-memory management, process management and thread; Process Scheduling in Windows; File Systems: Internal Layout, recovery, Volume Management and Fault Tolerance, FAT and NTFS, Security features, window registry, OS organizations.[3]

V	Multiprocessor Operating Systems: Architecture of Multiprocessor Systems, Overview of Multiprocessor OS, Kernel Structure and Multiprocessing support in Linux & Windows, Process Synchronization- Queued Lock, Spin Lock, Sleep Lock; Process Scheduling. Multimedia Operating System- Introduction to Multimedia & Data Compression- concepts, common graphics file formats, common audio file formats; Video server, Process management- real time scheduling; Multimedia file systems, Multimedia file storage mechanisms, Video server organization.[2] Mobile Operating System- Windows CE, Palm OS, Symbian OS, JAVA card, Multos.

Text/Reference Books:

1. DM Dhamdhere: Operating Systems – A Concepts Based Approach, Tata McGraw Hill
2. Achyut S Godbole: Operating Systems, Tata McGraw Hill
3. Tanenbaum: Modern Operating System, Prentice Hall
4. A. Silberschatz and Peter B Galvin: Operating System Principals, Wiley India Pvt. Ltd.
5. Charles Crowly: Operating System A Design – Oriented Approach, Tata McGraw Hill.
6. Bach, Design of Unix Operating Systems.

6IT6.2A- BIO INFORMATICS

Class: VI Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Principles of mass and energy conservation. Thermodynamic properties of pure substances. Equations of state. Correlations for physical and transport properties. Material and energy balances for steady state processes involving single and multiphase systems. Reactive and non-reactive processes.
II	Energy flow in biological systems. Energetic of metabolic path ways. Coupled reactions, microbial growth kinetics, Stoichiometry and energetic analysis of cell growth and product formation. Yield and maintenance coefficients. Oxygen consumption and heat evolution in aerobic cultures. Thermodynamic efficiency of growth.
III	Introduction to fermentation, Design of a an industrial fermented, Process calculations for design of typical industrial fermentation processes. Medium formulation. Batch and continuous heat sterilisation of liquid media. Requirements for process utilities (compressed air, cooling water, steam etc.). Material and energy balances for downstream processing and waste water treatment processes, Bioremediation.
IV	Introduction to industrial bio-process: A historical overview of industrial fermentation processes and products. Role of a bio-process engineer in the biotechnology industry. Outline of the various unit operations involved in an integrated bio-process. Process flow sheeting. A brief survey of organisms, processes products and market economics relating to modern industrial bio-technology. Raw materials for fermentation process: Isolation, preservation and improvement of industrial micro-organisms for overproduction of primary and secondary metabolites. Medium requirements for fermentation process carbon, nitrogen, minerals, vitamins and other nutrients. Examples of simple and complex media. Production of primary metabolites: A brief outline of processes for the production of some commercially important organic acids (e.g. citric acid, itaconic acid, lactic acid, acetic acid, gluconic acid etc.), amino acids (glutamic acid, lysine, aspartic acid, phenylalanine etc.) and alcohols (ethanol 2,3, butanediol etc.)
V	Production of secondary metabolites: Study of production processes for various classes of low molecular weight secondary metabolites. Antibiotics-beta-lactams (penicillins, cephalosporins etc.), aminoglycosides (streptomycin, kanamycin etc.), macrolides (erythromycin), quinines, aromatics etc. Vitamins and steroids. Production of commercially important enzymes and recombinant proteins: Proteases, amylases, lipases, cellulases, pectinases, isomerases and other commercially important enzymes for the food and pharmaceutical industries. Production of recombinant proteins having therapeutic and diagnostic applications. Production of vaccines.

References

1. Bryan Bergerson, Bioinformatics Computing, Pearson Education.
2. Pierre Baldi, Bioinformatics: The Machine Learning Approach, Second Edition (Adaptive Computation and Machine Learning), MIT Press
3. David W. Mount, Bioinformatics: Sequence and Genome Analysis, Cold Spring Harbor Laboratory
4. Warren J. Ewens & Gregory R. Grant, Statistical Methods in Bioinformatics, Springer Verlag
5. Andreas D. Baxevanis & B. F. Francis Ouellette, Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Wiley Interscience

6IT6.3A- HUMAN COMPUTER INTERFACE (Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	The Human: input-output channels, Human memory, thinking, emotions, individual differences, psychology and the design of interactive systems. The Computer: Text entry devices with focus on the design of key boards, positioning, pointing and drawing, display devices. The Interaction: Models of interaction, ergonomics, interaction styles, elements of WIMP interfaces, interactivity, experience, engagement and fun. Paradigms for Interaction.
II	Design Process: The process of design, user focus, scenarios, navigation design screen design and layout, iteration & prototyping. Usability Engineering Design rules: Principles to support usability, standards, guidelines, rules and heuristics, HCI patterns.
III	Evaluation Techniques: Definition and goals of evaluation, evaluation through expert analysis and user participation, choosing an evaluation method. User support, requirement, approaches, adaptive help systems, designing user support systems
IV	Cognitive methods: Goals and task hierarchies, linguistic models, challenges of display based systems, physical and device models, cognitive architectures.
V	Communications and collaborations models: Face to Face communication, conversations, Text based communication, group working. Task Analysis: Differences between task analysis and other techniques, task decomposition, knowledge based analysis, ER based analysis, sources of information and data collection, use of task analysis.

References:

1. Human Computer Interaction; Alan Dix et.al, 3rd ed., Pearson

6IT7A- JAVA PROGRAMMING LAB (Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Practical Hrs.: 3	Examination Time = Five (4) Hours Maximum Marks = 75 [Sessional/Mid-term (60) & End-term (40)]

Objectives: At the end of the semester, the students should have clearly understood and implemented the following:

1. **Develop an in depth understanding of programming in Java:** data types, variables, operators, operator precedence, Decision and control statements, arrays, switch statement, Iteration Statements, Jump Statements, Using break, Using continue, return.
2. **Write Object Oriented programs in Java:** Objects, Classes constructors, returning and passing objects as parameter, Inheritance, Access Control, Using super, final with inheritance Overloading and overriding methods, Abstract classes, Extended classes.
3. **Develop understanding to developing packages & Interfaces in Java:** Package, concept of CLASSPATH, access modifiers, importing package, Defining and implementing interfaces.
4. **Develop understanding to developing Strings and exception handling:** String constructors, special string operations, character extraction, searching and comparing strings, string Buffer class. Exception handling fundamentals, Exception types, uncaught exceptions, try, catch and multiple catch statements. Usage of throw, throws and finally.
5. **Develop applications involving file handling:** I/O streams, File I/O.
6. **Develop applications involving concurrency:** Processes and Threads, Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Interrupts, Joins, and Synchronization.
7. **Develop applications involving Applet:** Applet Fundamentals, using paint method and drawing polygons.

It is expected that each laboratory assignments to given to the students with an aim to In order to achieve the above objectives

Indicative List of exercises:

1. Programs to demonstrate basic concepts e.g. operators, classes, constructors, control & iteration statements, recursion etc. such as complex arithmetic, matrix arithmetic, tower of Hanoi problem etc.
2. Development of programs/projects to demonstrate concepts like inheritance, exception handling, packages, interfaces etc. such as application for electricity department, library management, ticket reservation system, payroll system etc.
3. Development of a project to demonstrate various file handling concepts.
4. Development of a project to demonstrate various applet concepts.

6IT8A- GUI DESIGN LAB

Class: VI Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Practical Hrs : 3	Examination Time = Four (4) Hours Maximum Marks =75 [Sessional/Mid-term (60) & End-term (40)]

S. No.	List of Experiments
1.	Adding buttons, edit fields, and other child-window components
2.	Implement the CObject debugging ability and Common MFC problems
3.	Implement GDI Functions, and the CDC class (Text, Drawing shapes, Bitmaps)
4.	Implementing View class functions I. Interacting with the user II. Event Handling III. Responding to events from different control types
5.	Implementing View class functions I. GDI Functions, and the CDC class II. Text III. Drawing shapes IV. Bitmaps
6.	Implementing Dialog Block class Creating a Dialog box Invoking and displaying Setting and retrieving values from a dialog box
7.	Implementing Dialog Boxes, Completion Database Classes I. ODBC vs. DAO II. Databases and Record sets III. Queries (filtering and ordering)
8.	Printing and Print Preview I. Database-style reports II Common Dialog interface

6IT9A- UML LAB

Class: VI Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Practical Hrs : 2	Examination Time = Four (4) Hours Maximum Marks = 50 [Sessional/Mid-term (30) & End-term (20)]

Objectives:

1. The students shall be able to use following modules of UML for system description, implementation and finally for product development.
 - Capture a business process model.
 - The User Interaction or Use Case Model - describes the boundary and interaction between the system and users. Corresponds in some respects to a requirements model.
 - The Interaction or Communication Model - describes how objects in the system will interact with each other to get work done.
 - The State or Dynamic Model - State charts describe the states or conditions that classes assume over time. Activity graphs describe the workflows the system will implement.
 - The Logical or Class Model - describes the classes and objects that will make up the system.
 - The Physical Component Model - describes the software (and sometimes hardware components) that make up the system.
 - The Physical Deployment Model - describes the physical architecture and the deployment of components on that hardware architecture.

The students are expected to use the UML models, prepare necessary documents using UML and implement a system. Some hardware products like digital clock, digital camera, washing machine controller, air conditioner controller, an electronic fan regulator, an elementary mobile phone etc. may also be chosen.

The students shall be assigned one problem on software based systems and another involving software as well as hardware

6IT10A- DESIGN AND ANALYSIS OF ALGORITHMS Lab (Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Practical Hrs : 3	Examination Time = Four (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]

Objectives: Upon successful completion of this course, students should be able to:

- Prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains;
- Apply the algorithms and design techniques to solve problems;
- Analyze the complexities of various problems in different domains.

Suggested Tools: For implementation and estimation of running time on various sizes of input(s) or output(s) as the case may be, Linux platform is suggested.

Suggested Exercises:

- A. It is expected that teachers will assign algorithms to the students for estimation of time & space complexity. Algorithms reported in various research journals may be chosen by the teachers.
- B. Problem on designing algorithms to meet complexity constraints may be assigned. For example, a problem on design, analysis and implementation for transposing a sparse matrix requiring not more than one pass from the original matrix may be assigned.
- C. A guide to such problems is given below:
 1. **Exploring a Binary Heap:** Consider a binary heap containing n numbers (the root stores the greatest number). You are given a positive integer $k < n$ and a number x . You have to determine whether the k^{th} largest element of the heap is greater than x or not. Your algorithm must take $O(k)$ time. You may use $O(k)$ extra storage.
 2. **Merging two search trees:** You are given two height balanced binary search trees T and T' , storing m and n elements respectively. Every element of tree T is smaller than every element of tree T' . Every node u also stores height of the subtree rooted at it. Using this extra information how can you merge the two trees in time $O(\log m + \log n)$ (preserving both the height balance and the order)?
 3. **Complete binary tree as an efficient data-structure:**
You are given an array of size n (n being a power of two). All the entries of the array are initialized to zero. You have to perform a sequence of the following online operations :
 1. (i) **Add(i, x)** which adds x to the entry $A[i]$.

2. (ii) Report $sum(i,j)$ = sum of the entries in the array from indices i to j for any $0 < i < j \leq n$.

It can be seen easily that we can perform the first operation in $O(1)$ time whereas the second operation may cost $O(n)$ in worst case. Your objective is to perform these operations efficiently. Give a data-structure which will guarantee $O(\log n)$ time per operation.

4. Problems on Amortized Analysis

- a. Delete-min in constant time !!! Consider a binary heap of size n , the root storing the smallest element. We know that the cost of insertion of an element in the heap is $O(\log n)$ and the cost of deleting the smallest element is also $O(\log n)$. Suggest a valid potential function so that the amortized cost of insertion is $O(\log n)$ whereas amortized cost of deleting the smallest element is $O(1)$.
- b. Implementing a queue by two stack
- c. Show how to implement a queue with two ordinary stacks so that the amortized cost of each Enqueue and each Dequeue operation is $O(1)$.

5. **Computing a spanning tree having smallest value of largest edge weight:** Describe an efficient algorithm that, given an undirected graph G , determines a spanning tree of G whose largest edge weight is minimum over all spanning trees of G .

6. Shortest Path Problems:

i. From a subset of vertices to another subset of vertices

- a. Given a directed graph $G(V,E)$, where edges have nonnegative weights. S and D are two disjoint subsets of the set of vertices. Give an $O(|V| \log |V| + |E|)$ time algorithm to find the shortest path among the set of paths possible from any node in S to any node in D .

ii. Paths in Directed Acyclic Graph

a. Counting the number of paths

Given two nodes u, v in a directed acyclic graph $G(V,E)$. Give an $O(|E|)$ time algorithm to count all the paths from u to v .

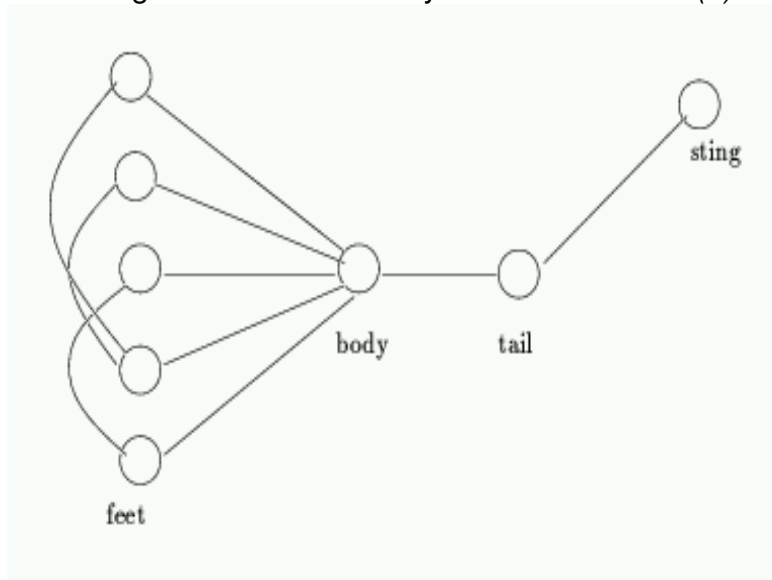
b. Path passing through a subset of nodes

Given two nodes u, v and a set of vertices $w_1, w_2, \dots, w_k$ in a directed acyclic graph $G(V,E)$. Give an $O(|E|)$ time algorithm to output a path (if exists) from u to v which passes through each of the nodes $w_1, \dots, w_k$. If there is no such path then your algorithm must report that "no such path exists".

7. Searching for a friend:

You are standing at a crossing from where there emerge four roads extending to infinity. Your friend is somewhere on one of the four roads. You do not know on which road he is and how far he is from you. You have to walk to your friend and the total distance traveled by you must be at most a constant times the actual distance of your friend from you. In terminology of algorithms, you should traverse $O(d)$ distance, where d is the distance of your friend from you.

8. **A simple problem on sorted array:** Design an $O(n)$ -time algorithm that, given a real number x and a sorted array S of n numbers, determines whether or not there exist two elements in S whose sum is exactly x .
9. **Finding the decimal dominant in linear time:** You are given n real numbers in an array. A number in the array is called a decimal dominant if it occurs more than $n/10$ times in the array. Give an $O(n)$ time algorithm to determine if the given array has a decimal dominant.
10. **Finding the first one:** You are given an array of infinite length containing zeros followed by ones. How fast can you locate the first one in the array?
11. **Searching for the Celebrity:** Celebrity is a person whom everybody knows but he knows nobody. You have gone to a party. There are total n persons in the party. Your job is to find the celebrity in the party. You can ask questions of the form Does Mr. X know Mr. Y ?. You will get a binary answer for each such question asked. Find the celebrity by asking only $O(n)$ questions.
12. **Checking the Scorpion:** An n -vertex graph is a *scorpion* if it has a vertex of degree 1 (the sting) connected to a vertex of degree two (the tail) connected to a vertex of degree $n-2$ (the body) connected to the other $n-3$ (the feet). Some of the feet may be connected to other feet. Design an algorithm that decides whether a given adjacency matrix represents a scorpion by examining only $O(n)$ entries.



13. **Endless list:** You are having a pointer to the head of singly linked list. The list either terminates at null pointer or it loops back to some previous location (not necessarily to the head of the list). You have to determine whether the list loops back or ends at a null location in time proportional to the length of the list. You can use at most a constant amount of extra storage.

14. Nearest Common Ancestor:

Given a rooted tree of size n . You receive a series of online queries: "Give nearest common ancestor of u, v ". Your objective is to preprocess the tree in $O(n)$ time to get a data structure of size $O(n)$ so that you can answer any such query in $O(\log n)$ time.

6IT11A- Humanities and Social Sciences (Common to CS & IT)

Class: VI Sem. B.Tech.	Evaluation
Branch: Information Technology	Examination Time = Three (3) Hours
Schedule per Week	Maximum Marks = 50
Practical: 2	[Sessional/Mid-term (30) & End-term (20)]

Units	Contents of the subject
I	India-brief history of Indian constitution ,framing-features fundamental rights, duties,directive principles of states, History of Indian National movement,Socio economic growth after independence.
II	Society-Social groups-concepts and types,socialization-concept theory, social control:concept,social problem in contemporary India,status and role.
III	The fundamental of Economics-meaning, definition and importance of economics, Logic of choice, central economic problems, positive and normative approaches, economic systems-socialism and capitalism.
IV	Microeconomics-Law of demand and supply, utility approach, indifference curves, elasticity of demand & supply and applications, consumer surplus, Law of returns to factors and returns to scale.
V	Macroeconomics- concept relating to National product National income and its measurement,simple Keynesian theory, simple multiplier, money and banking. Meaning, concept of international trade, determination of exchange rate, Balance of payments.

References:

1. Economics-Lipsey & Chrystal, Oxford Univ.Press,2010
2. Nordhaus, William, Samuelson,Paul-2009-10

7IT1 A- SOFTWARE PROJECT MANAGEMENT

Class: VII Sem. B.Tech.	Evaluation
Branch: Info. Tech Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Project Management: The management spectrum, the people, the product, the process, the project, the W ⁵ HH principle, critical practices Metrics for Process and Project: Metrics in the process and project Domains, software measurements, metrics for software quality, integrating metrics within software process, metrics for small organizations, establishing a software metrics program.
II	Estimation: Observations, Project planning Process, software scope and feasibility, resources, software project estimation, decomposition techniques, empirical estimation models, estimation for object oriented projects, estimation for Agile development and web engineering projects, the make/buy decision.
III	Project Scheduling: Basic concepts, project scheduling, defining a task set and task network, scheduling, earned value analysis. Risk Management: Reactive V/S proactive Risk Strategies, software risks, Risk identification, Risk projection, risk refinement, risk mitigation, monitoring and management, the RMMM plan Quality Planning.: Quality Concepts, Procedural Approach to Quality Management, Quantitative Approaches to Quality Management, Quantitative Quality Management Planning, Setting the Quality Goal, Estimating Defects for Other Stages, Quality Process Planning, Defect Prevention Planning.
IV	Quality Management: Quality Concepts, Software Quality assurances, software reviews, formal technical reviews, Formal approaches to SQA, Statistical Software Quality assurances, Change Management: software Configuration Management, The SCM repository, SCM Process, Configuration Management for Web Engineering
V	Project Execution And Closure: Reviews. The Review Process, Planning, Overview and Preparation, Group Review Meeting, Rework and Follow-up, One-Person Review, Guidelines for Reviews in Projects, Data Collection, Analysis and Control Guidelines, Introduction of Reviews and the NAH Syndrome. Project Monitoring and Control: Project Tracking, Activities Tracking, Defect Tracking, Issues Tracking, Status Reports, Milestone Analysis, Actual Versus Estimated Analysis of Effort and Schedule, Monitoring Quality, Risk-Related Monitoring. Project Closure: Project Closure Analysis, The Role of Closure Analysis, Performing Closure Analysis.

References:

1. R. S. Pressman, Software Engineering
2. Pankaj Jalote, Software project management in practice, Addison-Wesley
3. B. Hughest & M. Cotterell, Software Project Management.

7 IT 2 A- INFORMATION SYSTEM SECURITY (Common to CS & IT)

Class: VII Sem. B.Tech.	Evaluation
Branch: Info. Tech Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction to security attacks, services and mechanism, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, stream and block ciphers. Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion and diffusion, fiestal structure, data encryption standard(DES), differential and linear cryptanalysis of DES, block cipher modes of operations, triple DES.
II	AES, RC6, random number generation. S-box theory: Boolean Function, S-box design criteria, Bent functions, Propagation and nonlinearity, construction of balanced functions, S-box design.
III	Public Key Cryptosystems: Principles of Public Key Cryptosystems, RSA Algorithm, security analysis of RSA, Exponentiation in Modular Arithmetic. Key Management in Public Key Cryptosystems: Distribution of Public Keys, Distribution of Secret keys using Public Key Cryptosystems. X.509 Discrete Logarithms, Diffie-Hellman Key Exchange.
IV	Message Authentication and Hash Function: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MAC, MD5 message digest algorithm, Secure hash algorithm(SHA). Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm. Remote user Authentication using symmetric and Asymmetric Authentication
V	Pretty Good Privacy. IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulation Security Payload in Transport and Tunnel mode with multiple security associations (Key Management not Included). Strong Password Protocols: Lamport's Hash, Encrypted Key Exchange.

Text/References:

1. Stalling Williams: Cryptography and Network Security: Principles and Practices, 4th Edition, Pearson Education, 2006.
2. Kaufman Charlie et.al; Network Security: Private Communication in a Public World, 2nd Ed., PHI/Pearson.
3. Pieprzyk Josef and et.al; Fundamentals of Computer Security, Springer-Verlag, 2008.
4. Trappe & Washington, Introduction to Cryptography, 2nd Ed. Pearson.

7IT3 A- DATA MINING & WARE HOUSING (Common to CS & IT)

Class: VII Sem. B.Tech.	Evaluation
Branch: Info. Tech Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Overview, Motivation(for Data Mining),Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.
II	Concept Description: Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases– Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi- Dimensional Association rules from Relational Databases.
III	What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods K-nearest neighbour classifiers, Genetic Algorithm. Cluster Analysis: Data types in cluster analysis, Categories of clustering methods, Partitioning methods. Hierarchical Clustering- CURE and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method –Statistical Approach, Neural Network approach, Outlier Analysis
IV	Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Mining.
V	Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.

Text Books & References:

1. Data Warehousing in the Real World – Anahory and Murray, Pearson Education.
2. Data Mining – Concepts and Techniques – Jiawei Han and Micheline Kamber.
3. Building the Data Warehouse – WH Inmon, Wiley.

7 IT 4 A- INTERNET PROGRAMMING

Class: VII Sem. B.Tech.	Evaluation
Branch: Info. Tech Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction , Editing XHTML , First XHTML Example , W3C XHTML Validation service , Headings, Linking , Images , Special Characters and horizontal rules, Lists, Tables, forms, Internet linking, web resources. Cascading Style Sheets Introduction , Inline Styles, Embedded Style Sheets, Conflicting Styles , Linking External Style Sheets, Positioning Elements , Backgrounds , Element Dimensions , Box Model and Text Flow Media types, Building a CSS drop-down menu, User Style Sheets ,CSS3, Web Resources
II	JavaScript: Introduction to Scripting, Control Structures, Functions, Arrays, Objects, and Document object model (DOM): Objects and Collections, Events. XML and RSS: Introduction, XML basics, structuring data, XML namespaces, document type definitions (DTDs), W3C XML schema documents ,XML vocabularies, Extensible style sheet language and XSL transformations, Document object model(DOM),RSS
III	Ajax-enabled rich internet applications: introduction , traditional web applications vs Ajax application , rich internet application (RIAs)with Ajax, history of Ajax, “Raw” Ajax example using the XMLHttpRequest object , using XML and the DOM, creating a full-scale Ajax –enabled application ,dojo toolkit Web Servers (IIS and Apache): introduction, HTTP transactions , multi tier application architecture ,client-side scripting versus server-side scripting ,accessing web servers, Microsoft internet information services(IIS), Apache HTTP server, requesting documents.
IV	PHP: Introduction, PHP basics, string processors and regular expressions , form processing and business logic, connecting to a database, using cookies, dynamic content, operator precedence chart ASP.NET 2.0 and ASP.NET Ajax: introduction, creating and running a simple web form example, web controls, session tracking case study : connecting to a database in ASP.NET
V	Java Server Faces Web applications: introduction, java web technologies, creating and running a simple application in NetBeans, JSF components , session tracking

References

1. Internet & WWW, How to program, DEITEL P.J., H.M., Prentice Hall

7 IT 5 A- COMPUTER GRAPHICS & MULTIMEDIA TECHNIQUES

Class: VII Sem. B.Tech.		Evaluation
Branch: Info. Tech Schedule per Week Lectures: 3		Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]
Units	Contents of the subject	
I	Introduction to Raster scan displays, Storage tube displays, refreshing, flicking, interlacing, color monitors, display processors, resolution, Introduction to Interactive. Computer Graphics: Picture analysis, Overview of programmer's model of interactive graphics, Fundamental problems in geometry. Scan Conversion: point, line, circle, ellipse polygon, Aliasing, and introduction to Anti Aliasing (No anti aliasing algorithm).	
II	2D & 3D Co-ordinate system: Homogeneous Co-ordinates, Translation, Rotation, Scaling, Reflection, Inverse transformation, Composite transformation. Polygon Representation, Flood Filling, Boundary filling. Point Clipping, Cohen-Sutherland Line Clipping Algorithm, Polygon Clipping algorithms.	
III	Hidden Lines & Surfaces: Image and Object space, Depth Buffer Methods, Hidden Facets removal, Scan line algorithm, Area based algorithms. Curves and Splines: Parametric and Non parametric Representations, Bezier curve, B-Spline Curves.	
IV	Rendering: Basic illumination model, diffuse reflection, specular reflection, phong shading, Gourand shading, ray tracing, color models like RGB, YIQ, CMY, HSV	
V	Multimedia components, Multimedia Input/Output Technologies: Storage and retrieval technologies, Architectural and telecommunication considerations. Animation: Introduction, Rules, problems and Animation techniques.	

References

1. J. Foley, A. Van Dam, S. Feiner, J. Hughes: Computer Graphics- Principles and Practice, Addison Wesley.
2. D. Hearn and Baker: Computer Graphics, PHI
3. Multimedia Systems Design, Prabhat Andleigh and Thakkar, PHI.
4. Multimedia Information Networking, N.K.Sharda, PHI.

7 IT 6.1 A- ADVANCED DATA BASE MANAGEMENT SYSTEMS

Class: VII Sem. B.Tech.		Evaluation
Branch: Info. Tech Schedule per Week Lectures: 3		Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]
Units	Contents of the subject	
I	Query Processing and Optimization – Measures of query cost, Implementation of database operations, External Sorting, Materialization vs. Pipelining, Size Estimations of various database operations, Evaluation plans, Cost-based vs. Heuristic optimization, Materialized views.	
II	Transaction Processing and Serializability – Database Transaction and its processing, Transaction properties, Concurrent Transactions, Need of Serializability, Conflict vs. View Serializability.	
III	Concurrency and Recovery – Implementation of Concurrency: Lock-based protocols and Timestamp-based protocols, Deadlock handling, Database Failures, Recovery Schemes: Shadow Paging and Log-based Recovery, Recovery with Concurrent transactions.	
IV	Database Security and Advanced SQL – Database Integrity Constraints, Assertions and Triggers in SQL, Authorization and Authentication in SQL, Nested Subqueries, Views, and Embedded SQL.	
V	Distributed Database Systems – Data Storage in Distributed systems, Local vs. Global Transactions, Transaction processing, Concurrency and Recovery in Distributed database systems, Distributed Query processing.	

References

1. Elmasri R and Navathe SB, Fundamentals of Database Systems, 3rd Edition, Addison Wesley, 2000.
2. Connolly T, Begg C and Strachan A, Database Systems, 2nd Edition, Addison Wesley, 1999
3. Ceri Pelagatti, Distributed Database: Principles and System - (McGraw Hill)
4. Simon AR, Strategic Database Technology: Management for the Year 2000, Morgan Kaufmann, 1995
5. Gray J and Reuter A, Transaction Processing: Concepts and Techniques, Morgan Kaufmann, 1993

7 IT 6.2 A- Intelligent Systems

Class: VIII Sem. B.Tech.		Evaluation
Branch: Info. Tech Schedule per Week Lectures: 3		Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]
Units	Contents of the subject	
I	Introduction to AI: knowledge Importance of AI, Knowledge Base System, Knowledge organization & manipulation, LISP and other AI programming Languages.	
II	Knowledge Representation: Syntax Semantics, Inference Rules, Non-deductive Inference methods, representations using rules, Fuzzy Logic & Natural language computations. Probabilistic Reasoning. Object Oriented Representations.	
III	Knowledge Organization & Manipulation: Search & control strategies, matching techniques, knowledge organization & management.	
IV	Knowledge Systems Architecture: Rule based, non-production, uncertainty knowledge system building tools.	
V	Knowledge Acquisition: General concepts, learning by induction.	

References:

1. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-Graw Hill.
2. Introduction to AI & Expert System: Dan W. Patterson, PHI.
3. Artificial Intelligence by Luger (Pearson Education)
4. Russel & Norvig, Artificial Intelligence: A Modern Approach, Prentice-Hall

7IT 6.3 A- SPEECH PROCESSING

Class: VII Sem. B.Tech.	Evaluation
Branch: Info. Tech Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	The speech chain: current capabilities in synthesis and recognition. Acoustic phonetics. Vocal tract physiology: voiced excitation, unvoiced excitation (bursts, frication). Acoustics of uniform tubes, of two- and three-tube models. Comparison to speech data.
II	Synthesis: Formant synthesis (series, parallel), Articulatory synthesis, Concatenative Synthesis, Text-to-Speech (normalisation, linguistic units, rules). Articulatory parameters, shape-to-sound transformation, vocal tract imaging, revising the acoustic model.
III	Letter-sound relations , phonology; prosody, intelligibility, quality assessment. Ear physiology. Auditory perception. Speech perception.
IV	Recognition: Template matching. (Training, distance measures, dynamic time warping), Stochastic models. (Hidden Markov models, Baum-Welch and Forward-Backward algorithms). Large-Vocabulary Recognition. (Phonemic baseforms, language models), Artificial Neural Networks. (Overview, hybrid systems).
V	Assessing recognition performance; improving recognition performance; Knowledge-based approaches, auditory models.

References:

1. J N Holmes and W. Holmes, Speech Synthesis and Recognition, 2nd ed., Taylor and Francis, 2001.
2. B. Gold and N. Morgan, Speech and Audio Signal Processing, Wiley and Sons, 2000.
3. G. Childers, Speech Processing and Synthesis Toolboxes, Wiley and Sons, 2000.
4. J. R. Deller, J. R. Proakis, J. H. L. Hansen, Discrete-Time Processing of Speech Signals, Prentice-Hall 1993.
5. P. B. Denes and E. N. Pinson, The Speech Chain, W. H. Freeman & Co 1993.
6. S Furui, Digital Speech Processing, Synthesis and Recognition, Marcel Dekker Inc 1989.
7. D O'Shaughnessy, Speech Communications: Human & Machine, IEEE Press 1999.
8. L R Rabiner and R W Schafer, Digital Processing of Speech Signals, Prentice-Hall 1978.
9. K. N. Stevens, Acoustic Phonetics, MIT

7IT7A- COMPUTER GRAPHICS & MULTIMEDIA LAB

Class: VII Sem. B.Tech.	Evaluation
Branch: Info. Tech. Schedule per Week Practical Hrs.: 2	Examination Time = Four (4) Hours Maximum Marks = 50 [Sessional /Mid-term (30) & End-term (20)]

Objectives:

At the end of the semester, the students should have clearly understood and implemented the following:

1. To produce a single pixel and pre specified pattern on screen:
2. To implement features like changing background color, foreground color, resizing of window, repositioning of window:
3. To implement mid point algorithm to draw circle and ellipse:
4. Use the line drawing & circle drawing programs to draw composite objects containing only circle & lines. You can take shapes like a cart, car etc.
5. To Implement Clipping (various algorithms).
6. Simple fonts, graphical fonts, scalable fonts.
7. Input a polynomial by drawing lines, use appropriate methods for filling and filling convex & concave polynomials.

It is expected that each laboratory assignments to given to the students with an aim to In order to achieve the above objectives

Suggested Platform/Tools:

1. For this lab, the students can choose any platform either Microsoft Windows or Linux.
2. Compilers & Libraries: Microsoft Platform- Visual Studio.Net, Linux – Xlib.
3. No turbo C/C++. No library function except the one required to put a single pixel on the screen.

Indicative List of Experiments:

1. Programs to produce a single pixel produce a pre specified pattern with features like changing background color, foreground color, resizing of window, repositioning of window must be demonstrated.
2. Use Mid Point algorithm to draw line between two points. The program must be independent of the slope i.e. lines of all slopes must be drawn.
3. Use Mid Point algorithm to draw ellipse. Implement circle drawing as a special case of ellipse. Extend this to draw arcs between points.
4. Programs to draw composite objects containing circles & lines, drawing lines thicker than one pixel, you can take shapes like a cart, car etc.
5. Programs to demonstrate text generation e.g. simple fonts, graphical fonts, and scalable fonts.
6. Programs to demonstrate filling algorithms eg. filling convex & concave polynomials. The program must be able to (i) input a polynomial by drawing lines (ii) determine whether convex or concave (iii) use appropriate methods for filling.
7. Programs to demonstrate clipping algorithms eg. program to clip a (i) line and (ii) polygon using Cohen-Sutherland Clipping algorithm(s), clipping lines, circles against a rectangular clip area.
8. Programs to demonstrate presentation of geometrical objects e.g.circle and rectangle with audio description i.e. size, color of boundary and interior etc. played synchronously one after another.

7 IT 8 A- DMW Lab

Class: VII Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Practical Hrs : 3	Examination Time = Four (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]

Objectives:

1. The students shall be able to use following modules of UML for system description, implementation and finally for product development.
 - Capture a business process model.
 - The User Interaction or Use Case Model - describes the boundary and interaction between the system and users. Corresponds in some respects to a requirements model.
 - The Interaction or Communication Model - describes how objects in the system will interact with each other to get work done.
 - The State or Dynamic Model - State charts describe the states or conditions that classes assume over time. Activity graphs describe the workflows the system will implement.
 - The Logical or Class Model - describes the classes and objects that will make up the system.
 - The Physical Component Model - describes the software (and sometimes hardware components) that make up the system.
 - The Physical Deployment Model - describes the physical architecture and the deployment of components on that hardware architecture.

The students are expected to use the UML models, prepare necessary documents using UML and implement a system. Some hardware products like digital clock, digital camera, washing machine controller, air conditioner controller, an electronic fan regulator, an elementary mobile phone etc. may also be chosen.

The students shall be assigned one problem on software based systems and another involving software as well as hardware.

7 IT 9 A- INTERNET PROGRAMMING LAB

Class: VII Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Practical Hrs : 2	Examination Time = Four (4) Hours Maximum Marks = 50 [Sessional/Mid-term (30) & End-term (20)]

Objectives: At the end of the semester, the students should have clearly understood and implemented the following:

1. Develop basic understanding of HTML script: overview of HTML, basic HTML tags, title, head and body.
2. Write web pages in HTML: formatting text in HTML, inserting photographs on the page, drawing tables, creating hyperlinks-internal and external, creating hyperlinks of external web sites.
3. Develop understanding of creating standard view of web site: displaying multiple pages over a single page, displaying it as standard view like header and footer, creating standard text formatting over the web site.
4. Develop understanding common formation over a web site: creating and using css, understanding importance of common text formatting over a website.
5. Develop understanding of server side scripting language: basic concepts of scripting language, client side and server side scripting, introduction to php, variable, control statements, loops .
6. Develop applications using php and MySQL: using php to access database, mysql database selection, create, update and delete script in php.

It is expected that each laboratory assignments to given to the students with an aim to In order to achieve the above objectives

Indicative List of Experiments:

1. Develop a static html page using style sheet to show your own profile. Add pages one by one to show 5 photos, to show your academics in tabular format, a page containing 5 links to your favorite website, navigational links to all above pages (menu), header, footer, left-sidebar, right sidebar etc.
2. Use Cascading Style Sheets to format your all pages in a common format.
3. Write a simple "hello word" program using php.
4. Write a program to accept two strings (name and age) from user. Print welcome statement e.g. "Hi Ram, your age is 24."
5. Write a program to create a calculator, which can support addition, subtraction, multiply and division operations.
6. Write a program to take input parameters for a table (no. of rows and no. of columns) and create the desired table.
7. Create a "Contact Me" page -Ask user to enter his name, email ID, Use Java-Script to verify entered email address. Store submitted value in a MySql database. Display latest 5 submitted records in contact me page. Display above record with navigation support. e.g. (next, previous, first, last)

8 IT 1 A- Software Testing & Validation

Class: VIII Sem. B.Tech.	Evaluation
Branch: Information Technology Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Software verification and validation -introduction, verification, methods of verification, validation, level of validation, principle of testing, context of testing in producing software, white box testing- definition, static testing, structural testing, black box testing
II	Integration Testing -Scenario Testing, defect bash, system and acceptance testing, functional, non-functional testing, performance testing, methodology, tools and process
III	Regression Testing, internationalization -Introduction, test phases of internationalization testing, enabling testing, locale testing, language testing ,localization testing ,ad-hoc testing-overview, buddy testing, pair testing, explanatory testing, iterative testing agile and extreme testing.
IV	Testing of object oriented systems - Introduction, primer on object-oriented software, Differences in OO testing. Usability and Accessibility Testing - what is usability testing, approach to usability,when to do usability testing, how to achieve usability, quality factors for usability, accessibility testing, tools for usability.
V	Test planning, Test management, Test process and reporting,Software test automation, design and architecture of automation, process model for automation, test matrices and measurement- type of metrics, project metrics, productivity metrics, progress metrics, release metrics

8IT2 A- Digital Image Processing (Common to CS & IT)

Class: VIII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Introduction to Image Processing: Digital Image representation, Sampling & Quantization, Steps in image Processing, Image acquisition, color image representation
II	Image Transformation & Filtering: Intensity transform functions, histogram processing, Spatial filtering, Fourier transforms and its properties, frequency domain filters, colour models, Pseudo colouring, colour transforms, Basics of Wavelet Transforms
III	Image Restoration: Image degradation and restoration process, Noise Models, Noise Filters, degradation function, Inverse Filtering, Homomorphism Filtering
IV	Image Compression: Coding redundancy, Interpixel redundancy, Psychovisual redundancy, Huffman Coding, Arithmetic coding, Lossy compression techniques, JPEG Compression
V	Image Segmentation & Representation: Point, Line and Edge Detection, Thresholding, Edge and Boundary linking, Hough transforms, Region Based Segmentation, Boundary representation, Boundary Descriptors, Regional

Suggested Readings/Books

1. Gonzalez and Woods: Digital Image Processing ISDN 0-201-600- 781, Addison Wesley 1992.

Boyle and Thomas: Computer Vision - A First Course 2nd Edition, ISBN 0-632-028-67X, Blackwell

Science 1995.

2. Gonzalez and Woods: Digital Image Processing ISDN 0-201-600- 781, Addison Wesley 1992.

3. Pakhera Malay K: Digital Image Processing and Pattern Recognition, PHI.

4. Trucco&Verri: Introductory Techniques for 3-D Computer Vision, Prentice Hall, Latest Edition

5. Low: Introductory Computer Vision and Image Processing, McGraw-Hill 1991, ISBN 0-07-707403-3.

8 IT3A- Data Compression Techniques

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Compression Techniques: Lossless, lossy, measure of performance, modeling & coding. Lossless compression: Derivation of average information, data models, uniquely decodable codes with tests, prefix codes, Kraft-Mc Millan inequality. Huffman coding: Algorithms, minimum variance Huffman codes, optimality, length extended codes, adaptive coding, Rice codes, using Huffman codes for lossless image compression.
II	Arithmetic coding with application to lossless compression. Dictionary Techniques: LZ77, LZ78, LZW Predictive coding: Burrows-Wheeler Transform and move-to-front coding, JPEG-LS Facsimile Encoding: Run length, T.4 and T.6
III	Lossy coding- Mathematical preliminaries: Distortion criteria, conditional entropy, average mutual information, differential entropy, rate distortion theory, probability and linear system models. Scalar quantization: The quantization problem, uniform quantizer, Forward adaptive quantization, non-uniform quantization-Formal adopting quantization, companded Quantization Vector quantization: Introduction, advantages, The Linde-Ruzo-Grey algorithm, lattice vector quantization.
IV	Differential encoding – Introduction, Basic algorithm, Adaptive DPCM, Delta modulation, speech and image coding using delta modulation. Sampling in frequency and time domain, z-transform, DCT, DST, DWHT, quantization and coding of transform coefficient.
V	Sub band coding: Introduction, Filters, Basic algorithm, Design of Filter banks, G.722, MPEG. Wavelet based compression: Introduction, wavelets multi-resolution analysis and the scaling function implementation using filters.

Text Books & References:

1. Sayood K: Introduction to Data Compression: ELSEVIER 2005.

8 IT 4.1 A- MOBILE COMPUTING (Common to CS & IT)

Class: VIII Sem. B.Tech.		Evaluation
Branch: Info. Tech Schedule per Week Lectures: 3		Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]
Units	Contents of the subject	
I	Mobile computing: Definitions, adaptability issues (transparency, Environmental Constraints, application aware adaptation), mechanisms for adaptation and incorporating adaptations. Mobility management: mobility management, location management principle and techniques, PCS location management Scheme.	
II	Data dissemination and management: challenges, Data dissemination, bandwidth allocation for publishing, broadcast disk scheduling, mobile cache maintenance schemes, Mobile Web Caching. Introduction to mobile middleware.	
III	Middleware for application development: adaptation, Mobile agents. Service Discovery Middleware: Service Discovery & standardization Methods (universally Unique Identifiers, Textual Description & using interfaces), unicast Discovery, Multicast Discovery & advertisement, service catalogs, Garbage Collection, Eventing.	
IV	Mobile IP, Mobile TCP, Database systems in mobile environments, World Wide Web and mobility	
V	Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.	

References:

1. Frank Adelstein, Sandeep Gupta, Golden Richard III, Loren Schwiebert, Fundamentals of Mobile and Pervasive Computing, TMH.
2. Principles of mobile computing Hansmann & Merk., Springer
3. Mobile communications Jochen Schiller , Pearson
4. 802.11 wireless networks Matthew S.Gast, O'REILLY.
5. Wireless LANs: Davis & McGuffin, McGraw Hill
6. Mobile Communications Handbook by Jerry D. Gybson
7. Mobile Communications Handbook by Raymond Steel

8 IT 4.2 A- Information Retrieval (Common to CS & IT)

Class: VIII Sem. B.Tech.	Evaluation
Branch: Info. Tech Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the subject
I	Knowledge Representation: Knowledge representation, Basics of Propositional logic, Predicate logic, reasoning using first order logic, unification, forward chaining, backward chaining, resolution Production rules, frames, semantic networks scripts.
II	Ontology Development: Description logic-taxonomies, Topic maps Ontology, Definition expressing ontology, logically ontology representations, – XML, RDF, RDFS, OWL, OIL, ontology development for specific domain, ontology engineering, Semantic web services.
III	Information Retrieval Modeling: Information retrieval, taxonomy, formal characterization, classic information retrieval, set theoretic model, algebraic model, probabilistic model, structured text, retrieval models, models for browsing, retrieval performance evaluation, keyword based querying, pattern matching, structural queries, query operations.
IV	Text and Multimedia Languages and Properties: Introduction, metadata, markup languages, multimedia. Text operations: document preprocessing, document clustering text Compressionbasic concepts - statistical methods. Indexing and searching: inverted files, suffix trees, signature file, Booleanqueries, sequential searching, pattern matching.
V	Recent Trends in IR: Parallel and distributed IR, multimedia IR, data modeling, query languages, A generic Multimedia indexing Approach, one dimensional time series, two dimensional color

	images, Automatic feature extraction. Web Searching, Characterizing the Web, Search Engines, Browsing, Meta searchers, Searching using hyperlinks

TEXT BOOKS

1. Stuart Russell and Peter Norvig, “Artificial Intelligence – A Modern Approach”, Pearson Education, Second edition, 2003. (UNIT I)
2. Michael C. Daconta, Leo J. Obart and Kevin J. Smith,”Semantic Web – A Guide to the Future of XML, Web Services and Knowledge Management”, Wiley Publishers, 2003 (UNIT II)
3. Ricardo Baeza-Yates, BerthierRibeiro-Neto, “Modern Information Retrieval”, Addison Wesley, 1999. (UNITs III, IV & V)

REFERENCES

1. Elain Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-Hill, Third edition, 2003
2. Christopher D. Manning, PrabhakarRaghavan and HinrichSchutze, “Introduction to Information Retrieval”, Cambridge University Press, 2008.

8 IT 4.3A- Robotics

Class: VIII Sem. B.Tech.	Evaluation
Branch: Info. Tech Schedule per Week Lectures: 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Unit	Contents
I	Introduction -- brief history, types, classification and usage, Science and Technology of robots, Some useful websites, textbooks and research journals.
II	Elements of robots -- joints, links, actuators, and sensors Position and orientation of a rigid body, Homogeneous transformations, Representation of joints, link representation using D-H parameters, Examples of D-H parameters and link transforms, different kinds of actuators – stepper, DC servo and brushless motors, model of a DC servo motor, Types of transmissions, Purpose of sensors, internal and external sensors, common sensors – encoders, tachometers, strain gauge based force-torque sensors
III	Introduction, Direct and inverse kinematics problems, Examples of kinematics of common serial manipulators, workspace of a serial robot, Inverse kinematics of constrained and redundant robots, Tractrix based approach for fixed and free robots and multi-body systems, simulations and experiments, Solution procedures using theory of elimination, Inverse kinematics solution for the general 6R serial manipulator.
IV	Degrees-of-freedom of parallel mechanisms and manipulators, Active and passive joints, Constraint and loop-closure equations, Direct kinematics problem, Mobility of parallel manipulators, Closed-form and numerical solution, Inverse kinematics of parallel manipulators and mechanisms, Direct kinematics of Gough-Stewart platform.
V	Linear and angular velocity of links, Velocity propagation, Manipulator Jacobians for serial and parallel manipulators, Velocity ellipse and ellipsoids, Singularity analysis for serial and parallel manipulators, Loss and gain of degree of freedom, Statics of serial and parallel manipulators, Statics and force transformation matrix of a Gough-Stewart platform, Singularity analysis and statics.

TEXT BOOKS

1. Mittal and Nagrath, Robotics and Control, Tata McGraw-Hill Education, 2003.
2. Fred G. Martin, Robotic Explorations: A Hands On Introduction to Engineering, Pearson Education, 2001.

8IT5A- Software Testing Lab

Class: VIII Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Practical Hrs.: 3	Examination Time = Four (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]

S. No.	List of Experiments
1	Hands on Software Engineering principles Infrastructure.
2.	usage of Front-end and Back-end technologies and packages Prepare the following documents for three of the experiments listed below using software engineering methodology. 1. Program Analysis and Project Planning. 2. Thorough study of the problem – Identify project scope, Objectives, 3. Software requirement Analysis
3	Describe the individual Phases / Modules of the project, Identify deliverables
4	Software Design a. Use work products – Data dictionary, Use case diagrams and activity diagrams, build and test class diagrams, b. Sequence diagrams and add interface to class diagrams, DFD, ER diagrams c. Software Development and Debugging using any Front end and Back end tool d. Software Verification and Validation procedures

8IT6A- Digital Image Processing lab (Common to CS & IT)

Class: VIII Sem. B.Tech.	Evaluation
Branch: Info. Tech Schedule per Week Practical Hrs:2	Examination Time = Three (3) Hours Maximum Marks =50 [Mid-term (30) & End-term (20)]

S. No.	List of Experiment
1	Color image segmentation algorithm development
2	Wavelet/vector quantization compression
3	Deformable templates applied to skin tumor border finding
4	Helicopter image enhancement
5	High-speed film image enhancement
6	Computer vision for skin tumor image evaluation
7	New Border Images

8IT7A- Advance Web Programming

Class: VIII Sem. B.Tech.	Evaluation
Branch: Info. Tech Schedule per Week Practical Hrs: 2	Examination Time = Three (3) Hours Maximum Marks = 50 [Mid-term (60) & End-term (40)]

S. No.	List of Experiment
1	. Creation of HTML Files
2	Working with Client Side Scripting : VBScript, JavaScript
3	Configuration of web servers: Apache Web Server, Internet Information Server (IIS)
4	Working with ActiveX Controls in web documents
5	Experiments in Java Server Pages: Implementing MVC Architecture using Servlets, Data Access Programming (using ADO), Session and Application objects, File System Management
6	Working with other Server Side Scripting: Active Server Pages, Java Servlets, PHP
7	Experiments in Ajax Programming
8	Developing Web Services
9	Developing any E-commerce application (Mini Project)
10	Application Development in cloud computing Environment
11	Experiment Using Open Source Tool e.g. ANEKA

8IT8A- MOBILE APPLICATION DEVELOPMENT LAB

Class: VIII Sem. B.Tech.	Evaluation
Branch: Info. Tech Schedule per Week Practical Hrs:2	Examination Time = Three (3) Hours Maximum Marks = 50 [Mid-term (30) & End-term (20)]

S. No.	List of Experiment
1	Installation of Java wireless toolkit (J2ME)
2	Working with J2ME Features
3	Threads and High Level UI
4	Working on drawing and images
5	Developing Networked Applications using the wireless toolkit
6	Authentication with a web server

Scheme and Syllabus
Rajasthan Technical University, Kota
B. Tech. in Mechanical
Engineering
(Session 2017-18)

Rajasthan Technical University, Kota
B.Tech. (Mechanical Engineering Scheme)

							Code	ME
Course	BOS Mechanical				70			
SEMESTER III	3	3	Contact Hrs. / Week			IA	Exam	Total
Subject Code	Title		L	T	P			
3ME1A	Mechanics of Solids-I		3	1	Theory Subjects	20	80	100
3ME2A	Material Science and Engineering		3			20	80	100
3ME3A	Engineering Thermodynamics		3	1		20	80	100
3ME4A	Manufacturing Processes		3			20	80	100
3ME5A	Object Oriented Programming in C ++		2			20	80	100
3ME6A	Advanced Engineering Mathematics		3	1		20	80	100
	Practicals and Sessionals							
3ME7A	Material Science and Testing Lab				2	45	30	75
3ME8A	Basic Mechanical Engineering Lab				2	45	30	75
3ME9A	Production Practice - I				3	45	30	75
3ME10A	Computer Programming Lab				2	30	20	50
3ME11A	Mechanical Engineering Drawing				3	45	30	75
3MEDC	Discipline & Extra Curricular Activity							50
	Total		17	3	12			1000
SEMESTER IV	4	4	Hrs. / Week			IA	Exam	Total
Subject Code	Title		L	T	P			
4ME1A	Kinematics of Machines		3	1	Theory Subjects	20	80	100
4ME2A	Fluid Mechanics & Machines		3	1		20	80	100
4ME3A	Machining & Machine Tools		3			20	80	100
4ME4A	Design of Machine Elements - I		3			20	80	100
4ME5A	Industrial Engineering		3			20	80	100
4ME6A	I.C. Engines		3			20	80	100
	Practicals and Sessionals							
4ME7A	Kinematics of Machine Lab		Lab courses		2	45	30	75
4ME8A	Fluid Mechanics Lab				2	30	20	50
4ME9A	Production Practice-II				3	45	30	75
4ME10A	Machine Design Sessional - I				3	45	30	75
4ME11A	Thermal Engineering Lab-I				2	45	30	75
4MEDC	Discipline & Extra Curricular Activity							50
	Total		18	2	12			1000

Applicable from Academic Session 2012-13

Rajasthan Technical University, Kota
B.Tech. (Mechanical Engineering Scheme)

SEMESTER V	5	5	Hrs. / Week			IA	Exam	Total
Subject Code	Title		L	T	P			
5ME1A	Heat Transfer		3	1	Theory Subjects	20	80	100
5ME2A	Dynamics of Machines		3	1		20	80	100
5ME3A	Measurement & Metrology		3			20	80	100
5ME4A	Quality Assurance and Reliability		3			20	80	100
5ME5A	Sociology and Economics for Engineers		3			20	80	100
5ME6.1A	Computer Aided Design and Graphics		3			20	80	100
5ME6.2A	Automobile Engg.							
5ME6.3A	Statistics for Decision Making							
	Practicals and Sessionals							
5ME7A	Heat Transfer Lab		Lab courses		3	75	50	125
5ME8A	Dynamics of Machines Lab				2	45	30	75
5ME9A	Production Engineering Lab				3	60	40	100
5ME10A	Professional Ethics and Disaster Management				2	30	20	50
5MEDC	Discipline & Extra Curricular Activity		50					
	Total		18	2	10			1000
SEMESTER VI	6	6	Hrs. / Week			IA	Exam	Total
Subject Code	Title		L	T	P			
6ME1A	Design of Machine Elements - II		3		Theory Subjects	20	80	100
6ME2A	Newer Machining Methods		3			20	80	100
6ME3A	Mechatronics		3			20	80	100
6ME4A	Vibration Engineering		3	1		20	80	100
6ME5A	Steam Engineering		3	1		20	80	100
6ME6.1A	Non Destructive Evaluation and Testing		3			20	80	100
6ME6.2A	Design and Manufacture of Plastic Products							
6ME6.3A	Maintenance Management							
	Practicals and Sessionals							
6ME7A	Machine Design Sessional -II		Lab courses		3	75	50	125
6ME8A	Industrial Engineering Lab-I				2	45	30	75
6ME9A	Mechatronics Lab				2	45	30	75
6ME10A	Vibration Engineering Lab				2	45	30	75
6MEDC	Discipline & Extra Curricular Activity		50					
	Total		18	2	9			1000
SEMESTER VII	7	7	Hrs. / Week			IA	Exam	Total

Applicable from Academic Session 2012-13

Rajasthan Technical University, Kota
B.Tech. (Mechanical Engineering Scheme)

Subject Code	Title		L	T	P			
7ME1A	Finite Element Methods		3		Theory Subjects	20	80	100
7ME2A	Refrigeration & Air-conditioning		3	1		20	80	100
7ME3A	Operations Research		3	1		20	80	100
7ME4A	Turbomachines		3			20	80	100
7ME5A	Operations Management		3			20	80	100
7ME6.1A	Micro and Nano Manufacturing		3			20	80	100
7ME6.2A	Robotics							
7ME6.3A	CNC Machines and Programming							
	Practicals and Sessionals							
7ME7A	Thermal Engineering Lab-II		Lab courses		3	60	40	100
7ME8A	FEM Lab				3	60	40	100
7METR	Practical Training & Industrial visit				2		100	100
7MEPR	Project-1				2	50		50
7MEDC	Discipline & Extra Curricular Activity							50
	Total		18	2	10			1000
SEMESTER VIII	8	8	Hrs. / Week			IA	Exam	Total
Subject Code	Title		L	T	P			
8ME1A	Computer Integrated Manufacturing Systems		3		Theory Subjects	20	80	100
8ME2A	Laws for Engineers		3			20	80	100
8ME3A	Power Generation		3	1		20	80	100
8ME4.1A	Product Development and Launching		3			20	80	100
8ME4.2A	Computational Fluid Dynamics							
8ME4.3A	Total Quality Management							
	Practicals and Sessionals							
8ME5A	CAM Lab		Lab courses		2	45	30	75
8ME6A	CAD Lab				3	60	40	100
8ME7A	Industrial Engineering Lab - II				2	45	30	75
8MEPR	Project-2				4	120	80	200
8MESM	Seminar				2	60	40	100
8MEDC	Discipline & Extra Curricular Activity							50
	Total		12	1	13			1000

Index

3ME1A: MECHANICS OF SOLIDS.....	3
3ME2A: MATERIAL SCIENCE AND ENGINEERING	4
3ME3A: ENGINEERING THERMODYNAMICS.....	5
3ME4A: MANUFACTURING PROCESSES.....	6
3ME5A: OBJECT ORIENTED PROGRAMMING IN C ++.....	7
3ME6A: ADVANCED ENGINEERING MATHEMATICS.....	8
3ME7A: MATERIAL SCIENCE AND TESTING LAB.....	9
3ME8A: BASIC MECHANICAL ENGINEERING LAB.....	10
3ME9A: PRODUCTION PRACTICE-I.....	10
3ME10A: COMPUTER PROGRAMMING LAB.....	10
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3ME1A: MECHANICS OF SOLIDS

B.Tech. (Mechanical) 3rd semester
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Stress and Strain: Elementary definition of stress and strain, stress-strain relationship, elastic, plastic and visco-elastic behavior of common materials in tension and compression test, stress-strain curves, Hooke's law, Poisson's ratio, elastic constants and their relations for an isotropic hookean material, anisotropic and orthotropic materials.	3
	Tension, compression, shearing stress and strain, thermal stresses, composite bars, equations of static equilibrium, concept of free body diagram. Strain energy due to axial loading.	5
II	Members Subjected to Flexural Loads: Theory of simple bending, bending moment and shear force diagrams for different types of static loading and support conditions on beams.	4
	bending stresses, section modulus and transverse shear stress distribution in circular, hollow circular, I, Box, T, angle sections etc. Strain energy due to bending.	5
III	Principal Planes, Stresses and Strains: Members subjected to combined axial, bending and torsional loads, maximum normal and shear stresses, concept of equivalent bending and equivalent twisting moments, Mohr's circle of stress and strain.	5
	Theories of Elastic Failures: The necessity for a theory, different theories, significance and comparison, applications.	2
IV	Torsion: Torsional shear stress in solid, hollow and stepped circular shafts, angular deflection and power transmission capacity. Strain energy due to torsional loads.	4
	Stability of Equilibrium: Instability and elastic stability, long and short columns, ideal strut, Euler's formula for crippling load for columns of different ends, concept of equivalent length, eccentric loading, Rankine formulae and other empirical relations.	4
V	Transverse Deflection of Beams: Relation between deflection, bending moment, shear force and load, transverse deflection of beams and shaft under static loading, area moment method, direct integration method.	6
	Thin-walled Pressure Vessels: Stresses in cylindrical and spherical vessels	2
TOTAL		40

TEXT BOOK		
1	Bansal, R. K., "A Textbook of Strength of Materials Laxmi Publications.	2010
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Timoshenko, S.P., and Gere, J.M., "Mechanics of Materials", 2nd Ed., CBS Publishers	2002
2	Crandall, S.H., Dahl, N.C., and Lardner, T.J., "An Introduction to the Mechanics of Solids", Tata McGraw-Hill	1999
3	Pytel and Kiusalaas, "Mechanics of Materials" Cengage Learning	2011
4	Punmia, Jain and Jain, "Mechanics of Materials", Laxmi Publication	2002
5	Popov, E.P., Nagarajan, S., and Lu, Z. A., "Mechanics of Materials", 2 nd Ed., Prentice-Hall of India	2002

3ME2A: MATERIAL SCIENCE AND ENGINEERING**B.Tech. (Mechanical) 3rd semester
3L+0T****Max. Marks: 100****Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	Crystal structure – BCC, FCC and HCP, unit cell, crystallographic planes and directions, miller indices. Crystal imperfections, point, line, surface and volume defects.	4
	Frank Reed source of dislocation, Elastic & plastic modes of deformation, Bauschinger's effect, slip & twinning, strain hardening, cold/hot working recovery, re-crystallization and grain growth.	4
II	Classification of Engineering Materials: Solidification of metals and of some typical alloys, mechanism of crystallization (i) nuclear formation (ii) crystal growth, general principles of phase transformation in alloys, phase rule and equilibrium diagrams, equilibrium diagram of binary system having complete mutual solubility in liquid state and limited solubility in solid state, binary isomorphous alloy system, Hume-Rothery rule, binary system with limited solid solubility of terminal phase and in which solubility decreases with temperature and also alloy with a peritectic transformation, equilibrium diagram of a system whose components are subject to allotropic change.	5
	Iron carbon equilibrium diagram, phase transformation in the iron carbon diagram, eutectic, peritectic, eutectoid and peritectoid reactions and microstructures.	3
III	Isothermal transformation diagrams –cooling curves superimposed on Isothermal Transformation diagram, critical cooling rate. (i) Formation of Austenite from Pearlite (ii) Transformation of Austenite into Pearlite.	4
	Full annealing, stress relief, spheroidizing – normalizing, hardening and tempering of steel. Hardenability, Jominey end quench test – Austempering, martempering. Case hardening, carburising, nitriding, cyaniding, carbonitriding. Flame and Induction hardening.	4
IV	Non-Metallic Materials- Polymers – types of polymer, commodity and engineering polymers – Properties and applications of PE, PP, PS, PVC, PMMA, PET, PC, PA, ABS, PI, PAI, PPO,PPS, PEEK, PTFE Polymers. Urea and Phenol formaldehydes.	4
	Constitution of alloys: Solid solutions - substitutional and interstitial. Ferrous and Non Ferrous Metals- Effect of alloying additions on steel (Mn, Si, Cr, Mo, V, Ti & W) - stainless and tool steels – HSLA steel.	4
V	Mechanical Properties and Testing: Types of fracture, testing of materials under tension, compression and shear loads – hardness tests (Brinell, Vickers and Rockwell) Impact test Izod and charpy, fatigue and creep test.	4
	Classification of steels and cast iron constitution and properties. BIS standards. Engineering Ceramics – Properties and applications of Al ₂ O ₃ , SiC, Si ₃ N ₄ , PSZ etc. Fiber and particulate reinforced composites and resin plastics. Introduction to Nano materials- Nano structured materials. Nano clusters & Nano crystals.	4
		40

TEXT BOOK

1	Material Science and Engineering An Introduction, William D.Callister, John Wiley and Sons.	2003

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Pub.
1	Material Science, Raghvan V., Prentice Hall India	2012

2	Principles of Material Science and Engineering, William F.Smith, Tata McGraw-Hill Publications.	2008
3	Engineering Physical Metallurgy, Lakhtin Y., Mir Publisher.	
4	Introduction to Engineering materials Tata McGraw-Hill Publications.	2011
5	Engineering materials properties and selection Budinski and Budinski, PHI	2003

3ME3A: ENGINEERING THERMODYNAMICS

B.Tech. (Mechanical) 3rd semester
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Basic Concepts and definitions of Thermodynamics: System, Surroundings, Property, Energy, Thermodynamic Equilibrium, Process, work and modes of work.	2
	Zeroth and First Law of Thermodynamics: Zeroth of Thermodynamics, Temperature scale, First law of thermodynamics, First law analysis of some elementary processes. Steady and unsteady flow energy equations.	5
II	Second Law of Thermodynamics: Heat engine, Heat pump and refrigerator, Second law of thermodynamics, Equivalence of the Kelvin-Planck and Clausius statements. Reversible and Irreversible Processes, Carnot engine, Efficiency of a Carnot engine, Carnot principle, thermodynamic temperature scale, Clausius Inequality.	4
	Entropy: Entropy, Calculation of Entropy change, Principle of entropy increase. Temperature-Entropy diagram, Second law analysis of a control volume.	3
	Availability: Available energy, Loss in available energy, Availability Function, Irreversibility.	3
III	Thermodynamic Properties of Fluids: Pure substance, Concept of Phase, Graphical representation of p-v-T data, Properties of steam. Steam tables, Mollier chart	4
	Ideal Gas and Real Gas: Ideal gas, Real gas, Internal energy, enthalpy and specific heats of an ideal gas, equations of state, Dalton's law of partial pressures, Gibbs Dalton law, Thermodynamic properties of gas mixtures.	4
IV	Thermodynamic Relations: Thermodynamic variables, Independent and dependent variables, Maxwell's thermodynamic relations, Thermodynamic relations involving entropy, Thermodynamic relations involving enthalpy and internal energy, Joule-Thomson coefficient, Clapeyron equation.	4
	Power Cycles: Otto cycle, Diesel cycle, Dual cycle, Brayton cycle and Ericsson cycle.	5
V	Vapour power cycle: Rankine cycle, effect of operating conditions on its efficiency, properties of ideal working fluid in vapour power cycle	3
	Reheat cycle, regenerative cycle, bleeding extraction cycle, feed water heating co-generation cycle.	3
TOTAL		40

TEXT BOOK		
1	Nag P.K., Engineering Thermodynamics, Tata Mc-Graw Hill	
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Chattopadhyay P., Engineering Thermodynamics, Oxford University Press.	2011
2	Van G.J. Wylen and Sonntag R.E., Fundamental of Thermodynamics,	2003

	John Wiley & Sons	
3	Cengel Y.A. and. Boles M.A, Thermodynamics-An Engineering Approach, McGraw Hill	2011
4	Jones J.B.& Dugan R.E, Engineering Thermodynamics, Prentice Hall of India.	1996
5	Rao Y.V.C., An Introduction to Thermodynamics, Wiley Eastern Ltd.	1993
6	Moran M.J and H.N. Shapiro, Fundamentals of Engineering Thermodynamics, John Wiley and Sons	1996
7	Rogers, Gordon., Engineering Thermodynamics, Pearson Education	1996

3ME4A: MANUFACTURING PROCESSES

B.Tech. (Mechanical) 3rd semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	General Classification and Introduction to Manufacturing processes. Foundry Technology: Casting: Definition and major classification; Casting materials, Patterns: types, material and pattern allowances. Moulding sands; composition, preparation, properties and testing; Grain fineness; moisture content, clay content and permeability test. Core & core prints; Gating system: types, pouring basin, sprue, runner and risers; Melting, pouring and solidification.	4
	Principles and method of floor mould casting, shell mould casting, pit mould and loam mould casting; centrifugal casting, investment casting; Permanent mould casting. Die casting; Slush casting. Casting defects; types, causes and remedy	5
II	Forming Processes: Classification; Hot working and cold working; principle, advantages, disadvantages and applications. Forging: Classification, drop forging and press forging methods and use; Forging dies; types, materials.	3
	Rolling: Characteristics and applications of hot rolling and cold rolling; Extrusion; Work materials and products; Press tool works; Basic principles, system, operations and applications. Shearing; Parting, notching, trimming, nibbling, blanking and piercing, Drawing: wire drawing, tube drawing and deep drawing.	4
	Design of blanks for blanking, piercing and drawing operations. Estimation of forces and power required for shearing and drawing operations. Introduction to Spinning, Bulging, Coining, embossing, cold heading and riveting process; Metal working defects.	4
III	Metal Joining Processes: Welding, Brazing and soldering, classification of welding process, Principle, characteristics and applications of gas welding, thermit welding, electrical arc welding; Submerged arc welding; TIG and MIG welding; Resistance welding; Spot welding; Butt welding; Seam welding; Projection welding. Laser beam welding.	4
	Principles and process details of Forge welding; Friction welding; Diffusion welding; Ultrasonic welding. Explosive welding. Welding defects; Types, causes, effects and remedy. Electrodes and Electrode Coatings	4
IV	Powder Metallurgy: Properties of Powder processed materials, Powder manufacturing, mechanical pulverization, sintering, Electrolytic Process, chemical reduction, atomization, properties of metal powders, compacting of powders sintering, advantages and applications of Powder metallurgy.	3
	Rapid Prototyping Operations: Introduction, subtractive processes, additive processes, Virtual Prototyping and applications	3
V	Plastic Technology: Classification of Plastics, Ingredients of Moulding	3

	compounds, General Properties of Plastics,	
	Plastic part manufacturing processes such as compression moulding, transfer moulding, injection moulding, extrusion moulding, blow moulding, calendaring, thermoforming, slush moulding, laminating.	3
	TOTAL	40

TEXT BOOK		
1	Rao.P.N., Manufacturing Technology, Vol. 1,2 and 3, Tata McGraw Hill	2013
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Ghosh, A., & Mallik, A. K. 1986. Manufacturing Science: Ellis Horwood.	
2	Schey, Introduction to Manufacturing Processes, Tata McGraw Hill	1999
3	Kalpajian, S., & Schmid, S. R., Manufacturing processes for engineering materials, Pearson Education.	2000
4	Campbell, J. S. Principles of manufacturing materials and processes: Tata McGraw-Hill	2008
5	Heine, R.W., Loper, C.R., and Rosenthal, P.C., "Principles of Metal casting", Tata McGraw Hill.	1999
6	Groover, M.P., Fundamentals of Modern Manufacturing: Materials, Processes and systems, Prentice Hall, New Jersey	1976
7	Kalpajian, S. & Schmid S.R, Manufacturing Engineering and Technology, Addison Wesley Longman	2007
8	Little, R.L., Welding and welding technology Tata McGraw-Hill Education	2000
9	Shan, H.S., Manufacturing Process, Pearson Education.	1973

3ME5A: OBJECT ORIENTED PROGRAMMING IN C ++

B.Tech. (Mechanical) 3rd semester
2L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction to Object Oriented Programming: Basic concepts: Class, Object, Method, Message passing, Inheritance, Encapsulation, Abstraction, Polymorphism.	2
	Basics of C++ Environment: Variables; Operators; Functions; user defined, passing by reference, passing an array to the function, inline function, scope, overloading;	3
II	Pointers: objects and lvalue, arrays and pointers, the new and delete operators, dynamic arrays, arrays of pointers and pointers to arrays, pointers to pointers and functions;	3
	Strings: String I/O, character functions in ctype.h, string functions in string.h.	2
III	Object oriented concepts using C++: Classes: Member functions, Friend functions, Constructors, Access functions, Private member functions, class destructor, static data and function members;	2
	Overloading: inline functions, this operator, overloading various types of operators, conversion operators; the String Class; Composition and Inheritance: Hierarchy and types of inheritance, protected class members, private versus protected access, virtual functions and polymorphism, virtual destructors, abstract base classes.	3
IV	Templates and Iterators: function and class templates, container classes, subclass templates, iterator classes;	3
	Libraries: standard C++ library, contents of a standard C headers, string streams, file processing: Files and streams classes, text files, binary files, classification of files, the standard template library.	2
V	Data Structures Using C++: Linked lists – Singly linked list, Doubly linked lists, Circular lists,	3

	Stacks and Queues priority Queues, Stacks, Queues.	2
	TOTAL	25

TEXT BOOK		
1	Balaguruswamy E.: Object Oriented Programming in C++ , McGraw Hill Education (India)	2007
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Sahay: OBJECT ORIENTED PROGRAMMING WITH C++ , Oxford	2006
2	Hubbard, John., Programming with C++ , McGraw Hill Education (India)	2006
3	Ramabhaugh James et al, "Object Oriented Design and Modelling", PHI.	
4	Budd, Timothy, "An Introduction to Object Oriented Programming", Pearson Education	2008
5	Venugopal, K.R., Mastering C++, McGraw Hill Education (India)	1997
6	Ravichandra, D., Programming with C++, McGraw Hill Education (India)	2007

3ME6A: ADVANCED ENGINEERING MATHEMATICS

B.Tech. (Mechanical) 3rd semester
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Fourier transform: Discrete and Fast Fourier transforms, Complex form of Fourier transform and its inverse, Fourier sine and cosine transform and their inversion. Properties of F-transform, Convolution theorem for F-transform, Parse Val's identity for F-transforms.	5
	Applications of Fourier transform: Applications of Fourier transform for the solution of partial differential equations having constant coefficients with special reference to heat equation and wave equation.	3
II	Laplace Transform: Laplace transform, Inverse transform, properties, Transforms of derivatives and integrals, Unit step function, Dirac's delta function, Differentiation and integration of transforms.	5
	Applications of Laplace Transform: Applications of Laplace Transform to the solution of ordinary and partial differential equations having constant coefficients with special reference to the wave and diffusion equations.	4
III	Probability: Basic Concepts of probability, Conditional Probability, Baye's Theorem.	4
	Random Variable and distributions: Discrete and continuous random variable, Moments, Expectation, Moment generating function, Binomial, Poisson and Normal distribution.	6
IV	Numerical Analysis –I: Finite differences, Difference operators: forward, Backward, central and average operators. Newton's forward and backward interpolation formula, Stirling's central difference formula Lagrange's interpolation formula for unequal interval.	6
V	Numerical Analysis –II: Numerical differentiation, Numerical integration trapezoidal rule, Simpson's one third and three eight rule. Numerical solution of ordinary differential equation of first order: Picard's method, Euler's, and modified Euler's, method, Milne's methods and Runge Kutta fourth order method.	7
	TOTAL	40

TEXT BOOK		
1	Y. N.Gaur and C.L. Koul , Advanced Engineering Mathematics, Jaipur Publishing House, Jaipur.	2003
2	Keyszig E., Advanced Engineering Mathematics, Wiley Eastern Publication	2006

REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Chandrika Prasad, Mathematics for Engineers, Prasad Mudralaya	
2	Jeffrey, Advanced Engineering Mathematics , ELSEVIER	2001
3	Grewal B. S., Higher engineering Mathematics, Khanna Publication, New Delhi	2000
4	Peter V. O. Neil, Advanced Engineering mathematics, Thomson Publication	2011
5	Gerald, C.F., and Wheatley, P.O., Applied Numerical Analysis, Addison Wesley.	1980
6	Jain, M.K., Iyengar, S.R. and Jain, R.K., Numerical Methods for Scientific and Engineering Computation, Wiley Eastern.	2004
7	Kandasamy, P., Thilagavathy, K., and Gunavathy, S., Numerical Methods, S Chand and Company.	1999
8	J. Douglas Faires, Richard L. Burden, Numerical Methods, Cengage Learning.	2013
9	Dr. Gokhroo, Higher Engineering Mathematics III, Unique Books, Ajmer	

3ME7A: MATERIAL SCIENCE AND TESTING LAB.

B.Tech. (Mechanical) 3rd Semester
OL+OT+2P

Max. Marks: 75
Exam Hours: 2

SN	NAME OF EXPERIMENT	CONTACT HOURS
1	(a) Study of various crystals structures through models BCC, FCC, HCP, tetrahedral and octahedral voids. (b) Material identification of, say, 50 common items kept in a box.	
2	Specimen preparation for metallographic examination /micro structural examination-cutting, grinding, polishing, etching.	
3	Comparative study of microstructures of different given specimens (mild steel, gray C.I., brass, copper etc.)	
4	Heat treatment experiments such as annealing, normalizing, quenching, case hardening and comparison of hardness before and after.	
5	Study of Microstructure and hardness of steel at different rates of cooling. Microstructure examination of white cast iron.	
6	To perform Tensile/Compressive/Shear/torsion test on a given material and to determine its various mechanical properties under tensile/compression/Shear/torsional loading	
7	To determine Rockwell/ Vickers/Brinell hardness of a given material	
8	To perform Impact test on a given material and to determine its resilience.	
9	To study and perform Fatigue test on a given material and to determine fatigue strength of the material	
10	To perform Bending test and to determine the Young's Modulus of Elasticity via deflection of beam.	
11	Creep testing on creep testing machine	

REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Vander Voort, Metallography: Principles and Practice, McGraw-Hill, 1984	
2	Prabhudev K.H., Handbook of Heat Treatment of Steels, Tata McGraw-Hill, 2000	
3	Suryanarayanan, A.V.K. "Testing of Metallic materials" TataMcGraw Hill,1993	

3ME8A: BASIC MECHANICAL ENGINEERING LAB		
B.Tech. (Mechanical) 3rd Semester		Max. Marks: 75
OL+OT+2P		Exam Hours: 2
SN	LABORATORY WORK	CONTACT HOURS
	Exposure to a wide range of applications of mechanical engineering through a variety of activities, including hands-on assembly and disassembly of machines, such as, bicycle, sewing machine, pumps, engines, air-conditioners, machine-tools, amongst others; observational study of complex systems via cut sections, visits, videos and computer simulations; design of simple machines/systems including specifications formulation; visits to industries.	
	Note: Student will be required to submit written report indicating the learning achieved by Hands on assembly/Disassembly.	

3ME9A: PRODUCTION PRACTICE-I		
B.Tech. (Mechanical) 3rd Semester		Max. Marks: 75
OL+OT+3P		Exam Hours: 3
SN	NAME OF EXPERIMENT	CONTACT HOURS
	Machine Shop	
1	To study lathe machine construction and various parts including attachments, lathe tools cutting speed, feed and depth of cut.	
2	To perform step turning, knurling and chamfering on lathe machine as per drawing.	
3	To perform taper turning (a) by tailstock offset method as per drawing (b) Using compound rest.	
4	To prepare the job by eccentric turning on lathe machine.	
5	To study shaper machine, its mechanism and calculate quick return ratio. To prepare a job on shaper from given mild steel rod.	
	Foundry Shop	
6	To prepare mould of a given pattern requiring core and to cast it in aluminium.	
7	To perform moisture test and clay content test.	
8	Strength Test (compressive, Tensile, Shear Transverse etc. in green and dry conditions) and Hardness Test (Mould and Core).	
9	To perform permeability test	
10	A.F.S. Sieve analysis test.	
	Welding Shop	
11	Hands-on practice on spot welding.	
12	Hands-on practice on submerged arc welding	
13	Hands-on practice on metal inert gas welding (MIG) and tungsten inert gas welding (TIG).	

3ME10A: COMPUTER PROGRAMMING LAB.		
B.Tech. (Mechanical) 3rd Semester		Max. Marks: 50
OL+OT+2P		Exam Hours: 2
SN	LABORATORY WORK	CONTACT HOURS
	List of Programs in C++	
1	Program using basic I/O and control statements.	

2	Program using class, objects, objects as function parameters.	
3	Program using functions and passing reference to a function, inline functions. Program using	
4	Inheritance and virtual base class.	
5	Program using pointers, arrays, dynamic arrays. Program using functions defined in ctype.h and string.h.	
6	Program using constructors, destructors. Program using function and operator over Loading	
	List of program in C++ implementing Data Structures.	
7	Creating and managing (add, delete, print, insert) nodes of a Linked list	
8	Creating and managing (create, pop, push etc.) stacks and queues.	
	Note: Students should submit and present a minor project at the end of the lab.	

3ME11A: MECHANICAL ENGINEERING DRAWING

B.Tech. (Mechanical) 3rd semester
OL+OT+3P

Max. Marks: 75
Exam Hours: 3

SN	CONTENTS	CONTACT HOURS
	Review of sectioning, Review of BIS Standard (SP 46), Fasteners – screws, bolts and nuts, riveted joints, pins, locking devices, welded joints, pipe joints, unions and valves. Assemblies involving machine elements like shafts, couplings, bearing, pulleys, gears, belts, brackets. Tool drawings including jigs and fixtures. Engine mechanisms-assembly and disassembly. Production drawings - limits, fits and tolerances, dimensional and geometric tolerances, surface finish symbols. Layout drawings. Schematics, process and instrumentation diagrams, piping drawings. Structural drawings - examples for reading and interpretation. Computer aided design and use of software packages for engineering drawings	
	Assembly Drawing with sectioning and bill of materials Universal Coupling, Forming punch and die, Jigs for inspecting shaft etc.(1 drawing sheet of any assembly) Lathe tail stock, shaper tool head, steam stop valve, feed check-valve, swivel machine vice etc (1 drawing sheet of any assembly)	
	Detailed part drawings from assembly drawing indicating fits, tolerances and surface finish symbols by referring BIS codes (1 drawing sheet) Check-valve, Junction Valve etc.	
	Computer Aided Drafting (4 drawings) Introduction, input, output devices, introduction to software like AutoCAD/ProE/ Creo/Solidworks, basic commands and development of 2D and 3D drawings of simple parts	
	Free Hand Sketches: Connecting rod, crank shaft, Pipes and Pipe fittings, machine arbor and cutter, universal dividing head, jigs and fixtures, Step less drive, sliding gear box, safety valve, three way stop valve, blow-off cock, Swivel bearing, Turret Tool Post, drill-press vice, screw jack	

TEXT BOOK		
1	Laxminarayan and M.L. Mathur, Machine Drawing ,Jain Brothers	
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Gill P S, Machine Drawing, Kataria & Sons	2009
2	Basudeb Bhattacharya, Machine Drawing, Oxford University Press	2011
3	Dhawan, R.K., A Text Book of Machine Drawing, S. Chand & Company, 1996.	1998

4	Ostrowsky, O., Engineering Drawing with CAD Applications, ELBS, 1995.	1995
5	Siddeshwar N., P Kannaiah, VVS Shastry, Machine Drawing, Tata McGraw Hill	

4ME1A: KINEMATICS OF MACHINES

B.Tech. (Mechanical) 4th semester
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Kinematics: Elements, pairs, mechanisms, four bar chain and its inversions,	3
	velocity and acceleration, Klein's construction, coriolis component, instantaneous center method	5
II	Synthesis of mechanisms, pantograph, Scott-Russell, Tchebicheff straight line, indicator diagram mechanisms	5
	Automotive vehicle mechanisms: Overhead valve mechanism, Davis and Ackerman steering mechanism, Trifler suspension and Hooke's joint.	3
III	Power transmission: Belts and ropes, effect of centrifugal force, creep, chain drive	4
	Friction: Laws of static, dynamic and rolling friction, dry and viscous friction, inclined plane and screw jack, pivots and friction axis, bearing, Theory of film lubrication.	4
IV	Brakes: Band, block and band & block brakes, braking action, braking system of automobiles. Clutches	6
	Dynamometers: absorption and transmission type dynamometers, prony, rope and hydraulic dynamometers	2
V	Cams: Type of cams, displacement, velocity and acceleration curves for different cam followers consideration of pressure angle and wear, analysis of motion of followers for cams with specified contours.	8
	TOTAL	40

TEXT BOOK		
1	Rattan, S.S., "Theory of Machines", 2nd Ed., Tata McGraw Hill	2006
REFERENCE BOOKS		
SN	Name of Authors / Books / Publisher	Year of Pub.
1	Bevan, T., "Theory of Machines", Pearson Education.	2013
2	Uicker, J.J., Pennock, G.R. and Shigley, J.E., "Theory of Machines and Mechanisms", 3rd Ed., Oxford University Press.	2009
3	Ambekar, A. G., "Mechanism And Machine Theory", Prentice-hall Of India	2007
4	Ghosh, A., "Theory of Mechanisms and Machines", Affiliated East West Press.	
5	Singh, S., "Theory of Machines", Pearson Education	2013

4ME2A: FLUID MECHANICS & MACHINES

B.Tech. (Mechanical) 4th Semester
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Fluid Properties: Definition of a fluid, Viscosity-dynamic and kinematic, Surface Tension.	3
	Fluid Statics: Basic equation of fluid statics, Manometers, Force on plane areas and curved surfaces, center of pressure, Buoyant force,	5

	Stability of floating and submerged bodies.	
II	Fluid flow concepts and Basic control volume equations: General control equation, conservation of mass, energy equation and its application, Momentum equation and its applications	4
	Basic governing differential equation: Reynolds transport equation, continuity equation, momentum equation, energy equation, Bernoulli's equation.	4
III	Viscous flow: Laminar flow through pipe and between parallel plate.	4
	Turbulent flow: Relation, Prandtl mixing length, Losses in open and closed conduit	4
IV	Measurements: Pressure, velocity, flow measurement-orifices, venturimeter, orificemeter, nozzle meter, notches and weirs.	3
	Flow through pipe: Major and minor Losses in pipe, Hydraulic and energy gradient line, Network of pipes-series and parallel.	5
V	Hydraulic Turbines: Classification of hydraulic turbines, work done and efficiencies of Pelton, Francis and Kaplan turbines, Draft tube, Specific speed and unit quantities	5
	Hydraulic systems: Hydraulic press, Hydraulic accumulator, Hydraulic Intensifier, Hydraulic Ram, Hydraulic lift, Hydraulic coupling, Hydraulic torque convertor Gear pump.	3
	TOTAL	40

TEXT BOOK		
1	Yunus A. Cengel and Cimbala, Fluid Mechanics, Tata McGrawHill,	2006
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Streeter V.L., K.W. Bedford and E.B.Wylie , Fluid Mechanics , Tata McGraw Hill	2010
2	Robert W. Fox and Alan T. McDonald, Introduction to Fluid Mechanics, John Wiley & Sons.	2009
3	Potter, Mechanics of Fluids, Cengage Learning.	2012
4	Frank M. White, Fluid Mechanics, Tata McGraw Hill.	2003
5	John F. Douglas, Fluid Mechanics, Pearson Education.	2007
6	Munson, B. R., Young, D. F., & Okiishi, T. H. Fundamentals of Fluid Mechanics, Wiley	
7	Som, S. K., & Biswas, G. Introduction to fluid mechanics and fluid machines, Tata McGraw Hill.	2010
8	K.Subramaanya, Hydraulic Machines, McGrawhill,	2013
9	Modi and Seth, Fluid Mechanics and Hydraulic Machinery, Standard Book House	1991

4ME3A: MACHINING AND MACHINE TOOLS

B.Tech. (Mechanical) 4th semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Classification of metal removal process and machines: Concept of generatrix and directrix Geometry of single point cutting tool and tool angles, tool nomenclature in ASA, ORS, NRS and interrelationship. Concept of orthogonal and oblique cutting.	4
	Mechanism of Chip Formation: Type of chips. Mechanics of metal cutting; interrelationships between cutting force, shear angle, strain and strain rate. Various theories of metal cutting. Thermal aspects of machining and measurement of chip tool interface temperature. Friction in metal cutting. Introduction to tool geometry of milling	4

	cutters and drills.	
II	Concept of machinability, machinability index, factors affecting machinability, Different mechanism of tool wear. Types of tool wear (crater, flank etc), Measurement and control of tool wear, Concept of tool life,	4
	Taylor's tool life equation (including modified version). Different tool materials and their applications including effect of tool coating. Introduction to economics of machining. Cutting fluids: Types, properties, selection and application methods	4
III	Basic machine tools: Constructional configuration, specifications and estimation of machining time on lathe, drilling, shaping, milling, grinding and broaching machine.	4
	Special Purpose Machine Tools: Automatic lathes, capstan and turret lathe machines, operational planning and turret tool layout, sequence of operations.	4
IV	Introduction to Grinding-Need and different methods of grinding, Abrasives; natural and synthetic, manufacturing and selection of grinding wheels, Wheel specifications, mounting and dressing. Surface finishing: Honing, lapping, super-finishing, polishing and buffing.	6
	Thread Manufacturing: casting; thread chasing; thread cutting on lathe; thread rolling, die threading and tapping; thread milling and thread grinding.	3
V	Gear Manufacturing Processes: hot rolling; stamping; powder metallurgy; extruding etc. Gear generating processes: gear hobbling, gear shaping. Gear finishing processes: shaving, grinding, lapping, shot blasting, phosphate coating, Gear testing.	4
	High Velocity Forming Methods: Definition; Hydraulic forming, Explosive forming, Electro-hydraulic forming, Magnetic pulse forming.	3
	TOTAL	40

TEXT BOOK		
1	Rao. P.N., Manufacturing Technology, Vol. 1,2 and 3, Tata McGraw Hill	2013
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Lal G.K., Introduction to Machining Science, New Age international Publishers.	2007
2	Ghosh, A., & Mallik, A. K. 1986. Manufacturing Science: East West Press Private Limited.	1999
3	Schey, Introduction to Manufacturing Processes, Tata McGraw Hill	2000
4	Kalpakjian, S., & Schmid, S. R., Manufacturing processes for engineering materials, Pearson Education.	2008
5	Pandey & Singh, Production Engineering Science, Standard Publishers Distributer, Delhi.	1999
6	Stephenson, D. A., & Agapiou, J. S. Metal cutting theory and practice: CRC Taylor & Francis.	2006
7	Karl H.Heller, All About Machine Tools, Wiley Eastern Ltd., New Delhi	1972
8	Kalpakjian, S. & Schmid S.R, Manufacturing Engineering and Technology, Addison Wesley Pub. Co.	2000
9	Sen, G. C., & Bhattacharyya, A. Principles of Machine Tools: New Central Book Agency	1988
10	Bhattacharyya A, Theory & Practice of Metal Cutting, New Central Book Agency	2006
11	Shan, H.S., Manufacturing Process, Pearson Education.	2012
12	Boothroyd, G., & Knight, W. A. Fundamentals of machining and machine tools: Taylor and Francis.	2006
13	Milton C. Shaw, Metal Cutting Principles, CBS Publishers.	2005

14	Trent, E. M. Metal cutting: Butterworth Heinemann	2000

4ME4A: DESIGN OF MACHINE ELEMENTS – I

B.Tech. (Mechanical) 4th semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Materials: Mechanical Properties and IS coding of various materials, Selection of material from properties and economic aspects.	3
	Manufacturing Considerations in Design: Standardization, Interchangeability, limits, fits tolerances and surface roughness, BIS codes, Design consideration for cast, forged and machined parts. Design for assembly.	4
II	Design for Strength: Modes of failure, Strength and Stiffness considerations, Allowable stresses, factor of safety, Stress concentration: causes and mitigation, fatigue failures.	4
	Design of Members subjected to direct stress: pin, cotter and keyed joints.	5
III	Design of Members in Bending: Beams, levers and laminated springs. Design for stiffness of beam: Use of maximum deflection formula for various end conditions for beam design	7
IV	Design of Members in Torsion Shaft and Keys: Design for strength, rigidity. Solid and hollow shafts. Shafts under combined loading. Sunk keys.	5
	Couplings: Design of muff coupling, flanged couplings: rigid and flexible	3
V	Design of Threaded fasteners: Bolt of uniform strength, Preloading of bolts: Effect of initial tension and applied loads, Eccentric loading	4
	Power screws like lead screw, screw jack	2
	Design of members which are curved like crane hook, body of C-clamp, machine frame etc.	3
TOTAL		40

TEXT BOOK

1	Bhandari, V. B., Introduction to Machine Design, McGraw Hill Education (India)	2013

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher	Year of Pub.
1	Bahl and Goel, Mechanical Machine Design, Standard Publishers Distributors	2002
2	Shigley, Joseph E., Mechanical Engineering Design, McGraw Hill Education (India)	2002
3	Sharma and Aggarwal, Machine Design, S.K.Kataria and Sons, Delhi.	1997
4	Sharma and Purohit, Design of Machine Elements, Prentice Hall India.	2002
5	Jindal U C, Machine Design, Pearson Education India	2010

4ME5A: INDUSTRIAL ENGINEERING

B.Tech. (Mechanical) 4th semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Concept and definition of Industrial Engineering, Historical development of IE, Role of Industrial Engineer, Applications of IE. Concept of Productivity, Work Study and Productivity,	3

	Techniques of work study, basic procedure, approach to method study, method study charts and diagrams, principles of motion economy,	4
II	Work measurement; basic procedure, techniques: Stop watch time study and work sampling, rating, determination of standard time	4
	Evolution of Management Theory, scientific management, Contributions of Taylor, Fayol, Mayo to scientific management, Levels of Management Administration and Management, fundamental functions of management, Decision making.	4
III	Business Forms and Organization: Forms of Business: Single proprietorship, partnership, joint stock company, co-operative society, State undertakings. Formation of Joint Stock Companies: Registration, issue of Prospectus, Commencement Certificate. Organization: meaning, Types of organization; Line, Functional, Line Staff organization and line Staff Committee organization, span of control.	5
	Finance & Financial Statements: Introduction, Needs of Finance, Kinds of Capital, Sources of fixed capital, Shares. Borrow capital, surplus profits.	3
IV	Sources of working capital and its management, Profit & Loss Statement, Balance Sheet, Financial ratios: Liquidity ratio, Profits investment ratio, equity ratio, inventory ratio.	5
	Time value of money: Simple and compound interest, Time value equivalence, Compound interest factors, Cash flow diagrams, Calculation of time –value equivalences. Present worth comparisons, Comparisons of assets with equal, unequal life, comparison of deferred investments,	4
	Time value of money II: Future worth comparison, payback period comparison. Rate of return, internal rate of return, comparison of IRR with other methods	3
V	Depreciation: Causes, Basic methods of computing depreciation charges; Straight line, Sinking fund, Declining Balance and Sum of year's digits method.	3
	Breakeven analysis: Basic concepts, Linear Breakeven analysis for single product, Breakeven charts, Dumping.	2
TOTAL		40

TEXT BOOK		
1	Motion and Time Study and Measurement of Work, Ralph, M Barnes , John Wiley and Sons.	2001
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Introduction to Work Study, George Kanawaty, ILO.	2002
2	Prasad, L.M., Principles and practice of Management, Sultan Chand & Sons.	
3	Sushil Kumar Basu, K. C. Sahu, N. K. Datta, Works Organisation & Management, Oxford & IBH.	
4	Dexter S. Kimball, Principles of Industrial Organization, Read Books.	
5	Leon Pratt Alford, Henry Russell Beatty, Principles of Industrial Management, Revised Edition, Ronald Press Co.	
6	Essentials of Industrial Management, McGraw-Hill Industrial organization and management series, Lawrence L. Bethel, McGraw-Hill.	
7	Riggs, J.L., Bedworth, D.J., Randhawa, S.U., Engineering Economics, Tata McGraw-Hill.	

4ME6A: I.C. ENGINES

B.Tech. (Mechanical) 4th Semester

Max. Marks: 100

UNIT	CONTENTS	CONTACT HOURS
I	History of IC engines: Nomenclature, Classification & Comparison, SI & CI, 4stroke- 2 stroke, First Law analysis, Energy Balance. Fuel-air cycles, Actual cycles..	4
	Testing & Performance: Performance parameters, Measurement of operating parameters e.g. speed, fuel & air consumption, Powers, IHP, BHP, FHP, Efficiencies Thermal, Mechanical, Volumetric, Emission Measurement, Indian & International standards of Testing, Emission.	4
II	Fuel & Combustion: Combustion in CI & SI engines, Ignition Limits, Stages of combustion, Combustion parameters. Delay period and Ignition Lag, Turbulence and Swirl, Effects of engine variables on combustion parameters, abnormal combustion in CI & SI engines, Detonation & knocking, Theories of detonation, Control of abnormal combustion, Combustion chamber design principles, Types of combustion chamber.	4
	Fuel: Conventional Petroleum, structure, Refining Fuels for SI & CI engines, Knock rating, Additives, Fuels for Turbine & Jet Propulsion.	2
	Alternative Fuels: Methanol, Ethanol, Comparison with gasoline, Manufacturing, Engine performance with pure Methanol, Ethanol & blends, Alcohols with diesel engine, Vegetable oils, Bio gas.	2
III	Engine Systems & Components: Fuel System (SI Engine), Carburetion & Injection, process & parameters, properties of A/F mixture, Requirements of A/F ratios as per different operating conditions, Carburetors, types, Aircraft carburettor, comparison of carburetion & injection, F/A ratio calculations.	3
	CI engine: Mixture requirements & constraints, Method of injection, Injection systems, CRDI etc. system components, pumps injectors.	2
	Ignition system: Conventional & Modern ignition systems Magneto v/s Battery, CB point v/s Electronic ignition, Fuel Ignition Energy requirements. Spark advance, centrifugal, vacuum Firing order, spark plugs.	3
IV	Engine Friction & Lubrication : Determination of friction, Lubrication principles, Types of lubrication, Places of lubrication Bearings and piston rings etc., Functions of Lubrication, Properties, Rating and Classification of lubricating oil, Additives, Lubrication systems. Engine Cooling: Requirements of cooling, Areas of heat flow, High temperature regions of combustion chamber. Heat Balance, Cooling Systems, Air, Water Cooling, Cooling system components.	5
	Supercharging: Objectives, Thermodynamic cycle & performance of super charged SI & CI engines, Methods of super charging, Limitations, Two stroke engines: Comparison of 4s & 2s engines construction & valve lining scavenging. Process parameters, systems, supercharging of 2 stroke engines.	3
V	Dual & Multi fuel engines: Principle, fuels, Combustion, performance Advantages, Modification in fuel system.	4
	Special Engines: Working principles of Rotary, Stratified charge, Free piston, Variable compression ratio engines.	4
		40

TEXT BOOK		
1	Mathur & Sharma, Internal Combustion Engines, Dhanpat Rai & Sons	
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Gupta H.N., Fundamentals of Internal Combustion Engines, Prentice Hall	

	of India	
2	F. Edward Obert, Internal Combustion Engines, Harper and Row Publisher.	
3	John B. Heywood, Internal Combustion Engines Fundamentals, McGraw Hill	
4	Lichty, Internal Combustion Engines, McGraw Hill.	
5	Gill, Smith, Ziurs, Fundamentals of Internal Combustion Engine, Oxford & IBH Publishing	
6	Rogowsky, IC Engines, International Book Co.	
7	Ganeshan, V., Internal Combustion Engine, Tata Mc Graw Hill.	
8	R. Yadav, I.C Engine, Central Publishing House, Allahabad	

4ME7A: KINEMATICS OF MACHINES LAB

B.Tech. (Mechanical) 4th Semester
OL+OT+2P

Max. Marks: 75
Exam Hours: 2

SN	NAME OF EXPERIMENT	CONTACT HOURS
1	To study inversions of four bar chain: Coupling Rod, Beam Engine	
2	To study Steering Mechanisms; Davis and Ackerman.	
3	Study of quick return mechanism and draw velocity and acceleration diagram.	
4	Study of inversion of Double slider chain Oldham Coupling, Scotch Yoke and Elliptical Trammel.	
5	Study of various cam-follower arrangements.	
6	To plot displacement v/s angle of rotation curve for various cams	
7	To determine co-efficient of friction using two roller oscillating arrangement.	
8	Study of various types of dynamometers, Brakes and Clutches.	
9	To determine moment of inertia of the given object using of Trifler suspension.	
10	Perform study of the following using Virtual Lab http://www.vlab.co.in/	
11	Position, velocity and acceleration analysis of Grashof four bar mechanism	
12	Position, velocity and acceleration analysis of Slider Crank mechanism	

4ME8A: FLUID MECHANICS LAB

B.Tech. (Mechanical) 4th Semester
OL+OT+2P

Max. Marks: 50
Exam Hours: 2

SN	NAME OF EXPERIMENT	CONTACT HOURS
1	Determination of Meta-centric height of a given body.	
2	Determination of Cd, Cv & Cc for given orifice.	
3	Calibration of contracted Rectangular Notch and / Triangular Notch and determination of flow rate.	
4	Determination of velocity of water by Pitot tube.	
5	Verification of Bernoulli's theorem.	
6	Calibration and flow rate determination using Venturimeter & Orifice meter and Nozzle meter	
7	Determination of head loss in given length of pipe.	
8	Determination of the Reynold's number for laminar, turbulent and transient flow in pipe.	
9	Determination of Coefficient for minor losses in pipes.	
10	To study the velocity distribution in a pipe and also to compute the discharge by integrating the velocity profile.	

11	To study the boundary layer velocity profile over a flat plate and to determine the boundary layer thickness.	

4ME9A: PRODUCTION PRACTICE-II

B.Tech. (Mechanical) 4th semester
OL+OT +3P

Max. Marks: 75
Exam Hours: 3

UNIT	NAME OF EXPERIMENT	CONTACT HOURS
1	To study of single point cutting tool geometry and to grind the tool as per given tool geometry.	
2	To study the milling machine, milling cutters, indexing heads and indexing methods and to prepare a gear on milling machine.	
3	To machine a hexagonal / octagonal nut using indexing head on milling machine.	
4	To cut BSW/Metric internal threads on lathe machine.	
5	a) To cut multi-start Square/Metric threads on lathe machine. b) Boring using a boring bar in a centre lathe.	
6	Study of capstan lathe and its tooling and prepare a tool layout & job as per given drawing.	
7	Demonstration on milling machine for generation of plane surfaces and use of end milling cutters.	
8	Grinding of milling cutters and drills.	
9	Exercise on cylindrical and surface grinders to machine surfaces as per drawing.	
10	Cylindrical grinding using grinding attachment in a centre lathe	

4ME10A: MACHINE DESIGN SESSIONAL-I

B.Tech. (Mechanical) 4th Semester
OL+OT+3P

Max. Marks: 75
Exam Hours: 3

SN	SESSIONAL WORK	CONTACT HOURS
1	Material selection and relevant BIS nomenclature	
2	Selecting fit and assigning tolerances	
3	Examples of Production considerations	
4	Problems on:	
	(a) Knuckle & Cotter joints	
	(b) Torque: Keyed joints and shaft couplings	
	(c) Design of screw fastening	
	(d) Bending: Beams, Levers etc.	
	(e) Combined stresses: Shafts, brackets, eccentric loading.	

TEXT BOOK

- Design Data Book, PSG College of Technology

4ME11A: THERMAL ENGINEERING LAB-1

B.Tech. (Mechanical) 4th semester
OL+OT +2P

Max. Marks: 75
Exam Hours: 2

UNIT	NAME OF EXPERIMENT	CONTACT HOURS
1	Study of working of four stroke petrol engine and four stroke diesel	

	engine with the help of cut section models	
2	Study of working of two stroke petrol and two stroke diesel engine with the help of cut section models.	
3	To draw valve timing diagram for a single cylinder diesel engine.	
4	Study of various types of boilers.	
5	Study of various types of mountings and accessories.	
6	Demonstration of steering system and measurement of steering geometry angles and their impact on vehicle performance.	
7	Study of braking system with specific reference to types of braking system, master cylinder, brake shoes.	
8	Study of transmission system including clutches, gear box assembly and differential.	
9	Study of fuel supply system of a petrol engine (fuel pump and simple carburetor)	
10	Study of fuel supply system of a Diesel engine (fuel pump and fuel injector)	
11	Study of Ignition systems of an IC Engine (Battery and Magneto ignition system) and Electronic ignition system.	
12	Study of Lubrication system of an IC Engine (mist, splash and pressure lubrication)	
13	Study of cooling systems of an IC Engine (air cooling and water cooling)	

5ME1A: HEAT TRANSFER

B.Tech. (Mechanical) 5th Semester
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction: Heat transfer processes, conduction and radiation. Fourier's law of heat conduction, thermal conductivity, thermal conductivity of solids, liquids and gases, effect of temperature on thermal conductivity. Newton's law of cooling, definition of overall heat transfer coefficient. General parameters influence the value of heat transfer coefficient.	4
	Conduction: General 3-Dimensional conduction equation in Cartesian, cylindrical and spherical coordinates; different kinds of boundary conditions; nature of differential equations; one dimensional heat conduction with and without heat generation; electrical analogy; heat conduction through composite walls; critical thickness of insulation	3
II	Heat transfer from extended surfaces: Governing differential equation of fin, fin efficiency and effectiveness for different boundary conditions.	3
	Unsteady state heat conduction for slab, cylinder and sphere, Heisler chart.	2
	Convection: Review of Navier – Stokes and energy equation, hydrodynamic and thermal boundary layers; laminar boundary layer equations; forced convection appropriate non dimensional members; effect of Prandtl number; empirical relations for flow over a flat plate and flow through pipes.	4
III	Natural convection: Dimensional analysis, Grashoff number, boundary layers in external flows (flow over a flat plate only), boundary layer equations and their solutions, heat transfer correlations.	4
	Heat transfer with change of phase: Nature of vaporization phenomena; different regimes of boiling heat transfer; correlations for saturated liquid vaporization; condensation on flat plates; correlation of experimental results, drop wise condensation.	4

IV	Heat exchanger: Types of heat exchangers, arithmetic and logarithmic mean temperature differences, heat transfer coefficient for parallel, counter and cross flow type heat exchanger; effectiveness of heat exchanger, N.T.U. method, fouling factor. Constructional and manufacturing aspects of Heat Exchangers.	8
V	Thermal Radiation: Plank distribution law, Krichoff's law; radiation properties, diffuse radiations; Lambert's law. Radiation intensity, heat exchange between two black bodies heat exchanger between gray bodies. Shape factor; electrical analogy; reradiating surfaces heat transfer in presence of reradiating surfaces.	8
		40

TEXT BOOK		
1	J.P. Halman, Heat Transfer, Mc Graw Hill	
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Incropera and Dewitt, Fundamental of Heat and Mass transfer, John Wiley	2007
2	Cengel, Heat and Mass transfer, Mc Graw Hill	2011
3	M.Thirumaleshwar, Fundamental of Heat and Mass Transfer, Pearson Education	2006
4	Ozisik, Heat and Mass Transfer, Mc Graw Hill	2009

5ME2A: DYNAMICS OF MACHINES

B.Tech. (Mechanical) 5th semester
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Governors: Comparison between flywheel and governor, Types of governor, Watt, Porter, Proell, Hartnell and spring controlled governors, sensitiveness of governors, stability of governors, isochronous and hunting, governor effort, power, controlling force diagram.	8
II	Gyroscope: Principle of gyroscopic couple, effect of gyroscopic couple and centrifugal force on aeroplanes, ships and vehicle taking a turn, stabilization of sea vessels, stability of four wheeled vehicle moving in a curved path, curved path with banking, stability of two wheeled vehicle, gyroscopic effect on inclined rotating disc	5
	Inertia force analysis: Velocity and acceleration of slider crank and four bar mechanism, inertia force, piston thrust and forces on connecting rod, turning moment diagram, flywheel.	3
III	Gears: Classification, terminology, law of gearing, velocity of sliding, gear tooth profile, comparison of cycloidal and involute tooth profile, standard interchangeable tooth profile, length of path of contact, arc of contact, contact ratio, interference, undercutting, minimum number of teeth on pinion in contact with gear or rack, bevel, helical and spiral gears.	9
IV	Gear Trains: Simple, compound, reverted and epicyclic gear trains, analytical, tabular, graphical and vector methods for finding velocity ratio, gear boxes- sliding and constant mesh, synchromesh and differential gear box.	7
V	Balancing: Need of balancing, Balancing of rotating masses, single plane, different planes, balancing of reciprocating masses, single cylinder engine, multi-cylinder inline engines, V-engines, concept of direct and reverse cranks, partial balancing of locomotives, IC engines, V engines and balancing machines.	8
	TOTAL	40

TEXT BOOK		
1	Rattan, S.S., "Theory of Machines", 2nd Ed., Tata McGraw Hill.	2006
REFERENCE BOOKS		
SN	Name of Authors / Books / Publisher	Year of Pub.
1	Bevan, T., "Theory of Machines", Pearson Education.	2013
2	Uicker, J.J., Pennocle, G.R, and Shigley, J.E, "Theory of Machines and Mechanisms", 3 rd Ed., Oxford University Press.	2009
3	Ambekar , A. G., "Mechanism And Machine Theory", Prentice-hall Of India	2007
4	Ghosh, A., "Theory of Mechanisms and Machines", Affiliated East West Press.	
5	Singh, S., "Theory of Machines", Pearson Education	2013

5ME3A: MEASUREMENT & METROLOGY

B.Tech. (Mechanical) 5th semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Concept of measurement: General concept of measurement, Need for measurement, Generalized measuring system, Units, Standards, Sensitivity, Readability, Range of accuracy, Precision, Accuracy Vs precision, Uncertainty.	4
	Repeatability and reproducibility, Errors in measurement, Types of error, Systematic and random error, Comparison between systematic error and random error, Correction, Calibration, Interchangeability.	3
II	Linear and angular measurements: Linear measuring instruments: Vernier caliper, Micrometer, Interval measurements:- Slip gauges, Checking of slip gauges for surface quality, Optical flat, Limit gauges:- Gauge design, Problems on gauge design, Application of limit gauges;	3
	Comparators:- Mechanical comparators, Electrical comparator, Optical comparator, Pneumatic comparator;	2
	Sine bar, Use of sine bar, Limitations of sine bars, Sources of error in sine bars, Bevel protractor, Applications of bevel protractor , Autocollimator, Angle dekkor	4
III	Form measurement: Introduction, Screw thread measurement, Thread gauges, Measurement of gears: Gear errors, Spur gear measurement, Parkinson gear tester, Problems on gear measurement.	4
	Surface finish measurement:-Introduction, Elements of surface texture, Analysis of surface finish, Methods of measuring surface finish, Straightness measurement, Flatness testing, Roundness measurements	4
IV	Laser and advances in metrology: Laser metrology, Laser telemetric system, Laser and led based distance measuring instruments, pattern formed in a laser, Principle of laser, Interferometry, Use of laser in interferometry, Laser interferometry.	3
	Machine tool metrology: Various geometrical checks on machine tool, Laser equipment for alignment testing, Machine tools tests, Alignment tests on lathe, milling machine, pillar type drilling machine, Acceptance tests for surface grinders, Coordinate measuring machine (CMM):- Types of CMM, Features of CMM, Computer based inspection, Computer aided inspection using robots.	5
V	Measurement of power, flow and temperature related properties Measurement of force, Direct methods, Indirect methods:- Accelerometer, Load cells, Bourdon tube. Torque measurement: Prony brake, Torque measurement using strain gauges, Torque measurement using torsion bars,	4

	Measurement of power: Mechanical dynamometers, D.C. dynamometer, Eddy current or inductor dynamometers	
	Measurement of flow: Orifice meter, Venturimeter, Flow nozzle, Variable area meters – rotameter, Hot wire anemometer, Pitot tube. Temperature measurement, Bimetallic strip, Calibration of temperature measuring devices, Thermocouples (Thermo electric effects), Thermistors, Pyrometers	4
	TOTAL	40

TEXT BOOK		
1	G.K. Vijayaraghavan & R. Rajappan, Engineering Metrology and Measurements, A.R.S. Publications, Chennai, Fourth Edition June	2009
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Mechanical Measurements , Beckwith T.G. ,N.L. Buck, and R.D. Marangoni , Addison Wesley	
2	Dimensional Metrology . Khare & Vajpayee, Oxford & IBH	
3	Engineering Metrology, Jain R.K., Khanna Publishers	
4	Metrology & Precision Engineering , Scarr, McGraw Hill	
5	Handbook of Industrial Metrology, ASTM	
6		

5ME4A: QUALITY ASSURANCE AND RELIABILITY

B.Tech. (Mechanical) 5th semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	The meaning of Quality and quality improvement, dimensions of quality, history of quality methodology, quality control, Quality of design and quality of conformance, Quality policy and objectives, Economics of quality.	5
	Modeling process quality: Describing variation, frequency distribution, continuous and discrete, probability distributions, pattern of variation, Inferences about process quality: sampling distributions and estimation of process parameters. Analysis of variance.	4
II	Statistical Quality Control: Concept of SQC, Chance and assignable causes of variation, statistical basis of control chart, basic principles, choice of control limits, sample size and sampling frequency, analysis of patterns on control charts. The magnificent seven.	4
	Control chart for variables,: X-bar and R charts, X-bar and S charts, control chart for individual measurement. Application of variable control charts.	4
III	Control chart for attributes: control chart for fraction non conforming P-chart, np-chart, c-chart and u-chart. Demerit systems, choice between attribute and variable control chart. SPC for short production runs. Process capability analysis using histogram and probability plot, capability ratios and concept of six sigma.	7
IV	Quality Assurance: Concept, advantages, field complaints, quality rating, quality audit.	2
	Acceptance Sampling: Fundamental concepts in acceptance sampling, operating characteristics curve. Acceptance sampling plans, single, double and multiple sampling plans, LTPD, AOQL, AOQ.	4
	Introduction to Quality systems like ISO 9000 and ISO 14000.	2

V	Reliability and Life Testing- Failure models of components, definition of reliability, MTBF, Failure rate, common failure rate curve, types of failure, reliability evaluation in simple cases of exponential failures in series, paralleled and series-parallel device configurations, Redundancy and improvement factors evaluations. Introduction to Availability and Maintainability	4
	Introduction to Taguchi Method of Design of Experiments, Quality loss function.	4
TOTAL		40

TEXT BOOK		
1	Introduction to Statistical Quality Control, Douglas C. Montgomery, 2nd Edition, Wiley.	1991
2	Charles E. Ebeling, An introduction to reliability and maintainability engineering, Tata McGraw-Hill Education.	2004
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Quality Planning and Analysis, J.M.Juran and F.M. Gryna, McGraw Hill	
2	Quality Control, Dale H. Besterfield, 8th Edition, Pearson/Prentice Hall	2008
3	Statistical Quality Control, E. L. Grant and Richard S. Leavenworth, Tata McGraw-Hill	2000
4	Fundamentals of Quality Control and Improvement, Amitava Mitra, 2nd Edition, Prentice Hall	1998
5	Design and Analysis of Experiments, 5th Edition, Douglas C. Montgomery, Wiley-India	2007

5ME5A: SOCIOLOGY AND ELEMENTS OF ECONOMICS FOR ENGINEERS

B.Tech. (Mechanical) 5th semester

Max. Marks: 100

3L+0T

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction to sociological concepts-structure, system, organization, social institutions, Culture social stratification (caste, class, gender, power). State & civil society.	4
	Social change in contemporary India: Modernization and globalization, Secularism and communalism, Nature of development,	4
II	Processes of social exclusion and inclusion, Changing nature of work and organization.	4
	Political economy of Indian society. Industrial, Urban, Agrarian and Tribal society; Caste, Class, Ethnicity and Gender; Ecology and Environment.	5
III	Basic Principles and Methodology of Economics. Demand/Supply – elasticity – Theory of the Firm and Market Structure.	4
	Basic Macroeconomic Concepts (including GDP/GNP/NI/Disposable Income) and Identities for both closed and open economies. Aggregate demand and Supply (IS/LM). Price Indices (WPI/CPI), Interest rates, Direct and Indirect Taxes.	4
IV	Public Sector Economics –Welfare, Externalities, Labour Market. Components of Monetary and Financial System, Central Bank – Monetary Aggregates; Commercial Banks & their functions; Capital and Debt Markets.	4
	Monetary and Fiscal Policy Tools & their impact on the economy – Inflation and Phillips Curve	4
	Indian economy Brief overview of post independence period – plans.	4

V	Post reform Growth, Structure of productive activity. Issues of Inclusion – Sectors, States/Regions, Groups of people (M/F), Urbanization.	
	Employment–Informal, Organized, Unorganized, Public, Private. Challenges and Policy Debates in Monetary, Fiscal, Social, External sectors.	4
		40

TEXT BOOK		
1	Mankiw Gregory N., Principles of Economics, Thompson Asia	2002
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Giddens, A, Sociology, Polity, 6th edn.	2009
2	Haralambos M, RM Heald, M Holborn, Sociology, Collins	2000
3	Xaxa, V, State, Society and Tribes Pearson	2008
4	Chandoke, Neera & Praveen Priyadarshi , Contemporary India: Economy, Society and Politics, Pearson	2009
5	Mohanty, M, Class, Caste & Gender- Volume 5, Sage	2004
6	Ramaswamy, E.A. and Ramaswamy,U., Industry and Labour, OU Press	1981
7	Bhowmik, S (ed.) Street Vendors in the Global Urban Economy, Routledge	2010
8	Rao, M.S.A. (ed.) Urban Sociology, Orient Longmans	1974
9	V. Mote, S. Paul, G. Gupta, Managerial Economics, Tata McGraw Hill	2004
10	Misra, S.K. and Puri , Indian Economy, Himalaya	2009
11	Pareek Saroj , Textbook of Business Economics, Sunrise Publishers	2003

5ME6.1A: COMPUTER AIDED DESIGN AND GRAPHICS

B.Tech. (Mechanical) 5th semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Overview of Computer Graphics: Picture representation, Coordinate Systems, Raster Scan Display, DDA for line generation and Bresenham's algorithm for line and circle generation; Graphics standards: GKS, IGES, STEP, DXF. Different types of models.	5
	Parametric representation of plane curves: line, circle, ellipse, parabola and hyperbola.	4
II	Parametric representation of Space Curves: Cubic spline curve, Bezier Curve and B Spline Curves. Blending of Curves.	4
	Parametric representation of Surfaces: Hermite Bicubic surfaces, Bezier surfaces and Bspline surfaces.	4
III	Solid Representation: B-rep. and CSG. Comparison between three types of models.	7
IV	Two and Three Dimensional Transformation of Geometric Models: Translation, Scaling Reflection, Rotation and Shearing, Homogeneous Representation, Combined Transformation.	4
	Projection of Geometric models: Parallel and Perspective Projection.	4
V	Clipping: Point clipping, Line clipping, Cohen- Sutherland algorithm etc., Viewing transformation.	4
	Hidden line and surface removal: Techniques and Algorithms. Shading and Rendering.	4
	TOTAL	40

TEXT BOOK

1	Zeid and Sivasubramanian, CAD/CAM: Theory and Practice, Tata McGraw Hill	
2	Rogers and Adams, Mathematical Elements for Computer Graphics, Tata McGraw Hill	
REFERENCE BOOKS		
SN	Name of Authors / Books / Publisher	Year of Pub.
1	Rao P.N., CAD / CAM Principles and Applications, McGraw Hill.	2004
2	Pao Y.C., Elements of Computer Aided Design and Manufacturing, John Wiley and Sons.	1984
3	Alavala C.R., CAD/CAM: Concepts and Applications, Prentice Hall of India.	2008
4	Xiang and Plastock, Computer Graphics, Schaum's Outlines, Tata McGraw Hill.	2007

5ME6.2A: AUTOMOBILE ENGINEERING

B.Tech. (Mechanical) 5th semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Frame & Body: Layout of chassis, types of chassis frames and bodies, their constructional features and materials.	3
	Clutches: single plate, multi-plate, cone clutch, semi centrifugal, electromagnetic, vacuum and hydraulic clutches. Fluid coupling. Brakes: Classification and function; Mechanical, hydraulic, vacuum air and self engineering brakes; Brake shoes and lining materials.	5
II	Gear Boxes: Sliding mesh, constant mesh, synchromesh and epicyclic gear boxes, Automatic transmission system; Hydraulic torque converter;	4
	Drives: Overdrive, Propeller shaft, Universal joints, Differential; Rear axle drives. Hotchkiss and torque tube drives; Rear axle types; Front wheel and All wheel drive.	4
III	Wheels and Tyres: Tyre types, Tyre construction; Tyre inflation pressure, Tyre wear and their causes; Re-treading of the tyre,	2
	Steering system: steering gear boxes, Steering linkages, Steering mechanism, Under and Over steering. Steering Geometry, Effect of camber, caster, king pin inclination, toe in and toe out; Power steering; Integral and linkage types	3
	Suspension system: objective and requirements, Suspension spring, front and rear suspension systems, Independent suspension system Shock absorbers.	3
IV	Automotive Electrical System: Battery construction, Charging and testing, battery types, Starting and Battery Charging System: Starter motor construction, types of drive, Alternator construction, regulation and rectification.	4
	Ignition System: Magneto and coil ignition systems, System components and requirements, Automotive lighting: Wiring systems Electrical instruments; head lamp, electric horn, fuel level indicator.	4
V	Automotive Air Conditioning: Introduction, Loads, Air conditioning system Components, Refrigerants, Fault Diagnosis.	4
	Automotive Safety: Safety requirements, Safety Devices, Air bags, belts, radio ranging, NVS (Night Vision System) GPS (Global Positioning	4

	System)	
	TOTAL	40

TEXT BOOK		
1	RP SHARMA,A Course in Automobile Engineering,Dhanpat Rai & Sons	
2	P S Gill,A Text book of Automobile Engineering,KATSON Books VOL 1&2	2010
3	Kirpal Singh,Automobile Engineering, Standard	2003
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	R K Rajpoot,A Text book of Automobile Engineering,Laxmi Publications	2007
2	Jornsen Reimpell, Helmut Stoll,The Automotive Chassis: Engineering Principles,Jurgen Betzler (P) Ltd,	2001

5ME6.3A: STATISTICS FOR DECISION MAKING

B.Tech. (Mechanical) 5th semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction - Statistical Terminology: Descriptive statistics or exploratory data analysis, inferential statistics, population, sample, variable, parameter, statistic, random sample.	3
	Collecting Data: Historical data, types of studies (comparative, descriptive or noncomparative, observational, experimental), sample surveys, sampling and nonsampling errors, bias, representative sample, judgment sampling, quota sampling, simple random samples, sampling rate, sampling frame, stratified random sampling, multistage cluster sampling, probability-proportional-to-size sampling, systematic sampling.	4
II	Summarizing and Exploring Data: Variable types (categorical, qualitative, nominal, ordinal, numerical, continuous, discrete, interval, ratio), summarizing categorical data (frequency table, bar chart, Pareto chart, pie chart), summarizing numerical data (mean, median), skewness, outliers, measures of dispersion (quantiles, range, variance, standard deviation, interquartile range, coefficient of variation) s tandardized z-scores, histogram, bivariate numerical data (scatter plot, simple correlation coefficient, sample covariance), straight line regression, summarizing time-series data, data smoothing, forecasting techniques.	4
	Basic Concepts of Inference: Estimation, hypothesis testing, point estimation, confidence interval estimation, estimator, estimate, bias and variance of estimator, mean square error, precision and standard error, confidence level and limits, null and alternative hypothesis, type I and II error, probabilities of type I and II error, acceptance sampling, simple and composite hypothesis, P-value, one-sided and two -sided tests.	4
III	Inference for Single Samples: Inference for the mean (large samples), confidence intervals for the mean, test for the mean, sample size determination for the z-interval, one-sided and two -sided z-test, inference for the mean (small samples), t distribution.	4
	Inference for Two Samples: Independent sample design, matched pair design, pros and cons of each design, side by side box plots, comparing means of two populations, large sample confidence interval for the difference of two means, large sample test of hypothesis for the difference of two means, inference for small samples (confidence	4

	intervals and tests of hypothesis).	
IV	Inference for Proportions and Count Data: Large sample confidence interval for proportion, sample size determination for a confidence interval for proportion,	3
	Large sample hypothesis test on proportion, comparing two proportions in the independent sample design (confidence interval and test of hypothesis), chi-square statistic	4
V	Simple Linear Regression and Correlation: Dependent and independent variables, probability model for simple linear regression, least squares fit, goodness of fit of the LS line, sums of squares, analysis of variance, prediction of future observation, confidence and prediction intervals,	4
	Multiple Linear Regression: Probability model for multiple linear regression, least squares fit, sums of squares. Use Excel, R, and MATLAB® in the class.	4
	TOTAL	40

TEXT BOOK		
1	Ajit Tamhane and Dorothy Dunlop "Statistics and Data Analysis: From Elementary to Intermediate" Prentice Hall	1999
REFERENCE BOOKS		
SN	Name of Authors / Books / Publisher	Year of Pub.
1	Richard Ivor Levin, David S. Rubin, Statistics for Managements, Prentice Hall International	1988
2	J. K. Sharma, Statistics for Management, Pearson Education India	

5ME7A: HEAT TRANSFER LAB.

B.Tech. (Mechanical) 5th Semester
OL+OT+3P

Max. Marks: 125
Exam Hours: 3

SN	NAME OF EXPERIMENT	CONTACT HOURS
1	To Determine Thermal Conductivity of Insulating Powders.	
2	To Determine Thermal Conductivity of a Good Conductor of Heat (Metal Rod).	
3	To determine the transfer Rate and Temperature Distribution for a Pin Fin.	
4	To Measure the Emissivity of the Test plate Surface.	
5	To Determine Stefan Boltzmann Constant of Radiation Heat Transfer.	
6	To Determine the Surface Heat Transfer Coefficient For Heated Vertical Cylinder in Natural Convection.	
7	Determination of Heat Transfer Coefficient in Drop Wise and Film Wise condensation.	
8	To Determine Critical Heat Flux in Saturated Pool Boiling.	
9	To Study and Compare LMTD and Effectiveness in Parallel and Counter Flow Heat Exchangers.	
10	To Find the Heat transfer Coefficient in Forced Convection in a tube.	
11	To study the rates of heat transfer for different materials and geometries	
12	To understand the importance and validity of engineering assumptions through the lumped heat capacity method.	

5ME8A: DYNAMICS OF MACHINES LAB. – II

B.Tech. (Mechanical) 5th Semester

Max. Marks: 75

OL+OT+2P**Exam Hours: 2**

SN	NAME OF EXPERIMENT	CONTACT HOURS
1	To verify the torque relation for gyroscope.	
2	To plot force vs. radius and lift vs. speed curves for governors.	
3	To plot pressure distribution curves on a journal bearing.	
4	To perform wheel balancing.	
5	To perform static and dynamic balancing on balancing set up.	
6	To determine mass moment of inertia of a flywheel.	
7	Study of a lathe gear box.	
8	Study of a sliding mesh automobile gear box.	
9	Study of a planetary gear box.	

5ME9A: PRODUCTION ENGINEERING LAB.**B.Tech. (Mechanical) 5th Semester****Max. Marks: 100****OL+OT+3P****Exam Hours: 3**

SN	NAME OF EXPERIMENT	CONTACT HOURS
1	Study of various measuring tools like dial gauge, micrometer, vernier caliper and telescopic gauges.	
2	Measurement of angle and width of a V-groove by using bevel protector..	
3	(a) To measure a gap by using slip gauges (b) To compare & access the method of small-bore measurement with the aid of spheres.	
4	Measurement of angle by using sine bar.	
5	(a) Measurement of gear tooth thickness by using gear tooth vernier caliper. (b) To check accuracy of gear profile with the help of profile projector.	
6	To determine the effective diameter of external thread by using three-wire method.	
7	To measure flatness and surface defects in the given test piece with the help of monochromatic check light and optical flat.	
8	To check the accuracy of a ground, machined and lapped surface - (a) Flat surface (b) Cylindrical surface.	
9	Find out Chip reduction co-efficient (reciprocal of chip thickness ratio) during single point turning.	
10	Forces measurements during orthogonal turning.	
11	Torque and Thrust measurement during drilling.	
12	Forces measurement during plain milling operation.	
13	Measurement of Chip tool Interface temperature during turning using thermocouple technique.	

5ME10A: PROFESSIONAL ETHICS AND DISASTER MANAGEMENT**B.Tech. (Mechanical) 5th Semester****Max. Marks: 50****OL+OT+2P****Exam Hours: 2**

SN	CONTENTS	CONTACT HOURS
1	Human values: Effect of Technological Growth and Sustainable Development. Profession and Human Values: Values crisis in contemporary society. Nature of values. Psychological Values, Societal Values and Aesthetic Values. Moral and Ethical values.	
2	Professional ethics: Professional and Professionalism-Professional Accountability, Role of a professional, Ethic and image of profession; Engineering Profession and Ethics: Technology and society, Ethical obligations of Engineering professionals, Roles of Engineers in industry, society, nation and the world; Professional Responsibilities: Collegiality,	

	Loyalty, Confidentially, Conflict of Interest, Whistle Blowing.	
3	Disaster management: Understanding Disasters and Hazards and related issues social and environmental. Risk and Vulnerability. Types of Disasters, their occurrence/ causes, impact and preventive measures: Natural Disasters- Hydro-meteorological Based Disasters like Flood, Flash Flood, Cloud Burst, Drought, Cyclone, Forest Fires; Geological Based Disasters like Earthquake, Tsunami, Landslides, Volcanic Eruptions. Man made Disasters: Chemical Industrial Hazards, Major Power Break Downs, Traffic Accidents, Fire Hazards, Nuclear Accidents. Disaster profile of Indian continent. Case studies. Disaster Management Cycle and its components.	
4	In order to fulfill objectives of course, a) The institute shall be required to organize at least 3 expert lectures by eminent social workers/professional leaders. b) Each student shall compulsorily be required to: i. Visit a social institution/NGO for at least 7 days during the semester and submit a summary report. ii. II. Perform a case study of a disaster that has occurred in last decade and submit a summary report.	

REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Professional Ethics by R Subramanian, oxford publishers	
2	Engineering Ethics: Concepts and cases by Charles E. Harris, Jr., Michael S. Pritchard, Michael J. Rabins. CENGAGE Learning, Delhi	
3	Controlling Technology: Ethics and Responsible Engineers by Stephen H Unger. John Wiley and Sons.	
4	Ethical Issues in Engineering, by Deborah Johnson. Prentice Hall	
5	Human Values in the engineering Profession, Moniograph by A N Tripathi. Published by IIM Calcutta.	
6	Towards Basics of Natural Disaster Reduction by Prof. D.K. Sinha. Researchco Book Center, Delhi.	
7	Understanding Earthquake Disasters by Amita Sinval. Tata McGraw Hill, New Delhi.	

6ME1A: DESIGN OF MACHINE ELEMENTS- II

B.Tech. (Mechanical) 6th Semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Fatigue Considerations in Design: Variable load, loading pattern, endurance stresses, Influence of size, surface finish, notch sensitivity and stress concentration.	3
	Goodman line, Soderberg line, Design of machine members subjected to combined, steady and alternating stresses.	3
	Design for finite life, Design of Shafts under Variable Stresses, Bolts subjected to variable stresses.	2
II	Design of IC Engine components: Piston, Cylinder, Connecting Rod and Crank Shaft.	8
III	Design of helical compression, tension, torsional springs, springs under variable stresses.	4
	Design of belt, rope and pulley drive system,	4

IV	Design of gear teeth: Lewis and Buckingham equations, wear and dynamic load considerations.	4
	Design and force analysis of spur, helical, bevel and worm gears, Bearing reactions due to gear tooth forces.	4
V	Design of Sliding and Journal Bearing: Methods of lubrication, hydrodynamic, hydrostatic, boundary etc. Minimum film thickness and thermal equilibrium.	4
	Selection of anti-friction bearings for different loads and load cycles, Mounting of the bearings, Method of lubrication.	4
TOTAL		40

TEXT BOOK		
1	Design of Machine Elements, Bhandari V.B, 3rd Ed., Tata McGraw-Hill, New Delhi	2010
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Machine Design, Sharma and Aggarwal, Kataria and Sons, Delhi.	1997
2	Mechanical Engg Design, Shigley, Mischke, Budynas and Nisbett, Tata McGraw-Hill	2002
3	PSG Design Data Book, P.S.G. College of Technology, Coimbatore.	1966
4	A Text Book of Machine Design, Karwa A., Laxmi Publication.	2002
5	Machine Design, Hall, Holwenko and Laughlin, Schaum's Outlines Series, Tata McGraw Hill.	

6ME2A: NEWER MACHINING METHODS

B.Tech. (Mechanical) 6th semester

3L+0T

Max. Marks: 100

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction and classification of advanced machining process, consideration in process selection, difference between traditional and non-traditional process, Hybrid process.	3
	Abrasive finishing processes: AFM, MAF (for Plain and cylindrical surfaces).	4
II	Mechanical advanced machining process: Introduction, Mechanics of metal removal, process principle, Advantages, disadvantages and applications of AJM,USM,WJC.	6
III	Thermo electric advanced machining process: Introduction, Principle, process parameters,advantages, disadvantages and applications about EDM, EDG,	4
	LBM, PAM, EBM	6
IV	Electrochemical and chemical advanced machining process: ECM, ECG, ESD, Chemical machining,	5
	Anode shape prediction and tool design for ECM process. Tool (cathode) design for ECM Process.	3
V	Intorduction to Micro and nanomachining, Nanoscale Cutting, Diamond Tools in Micromachining, Conventional Processes: Microturning, Microdrilling and Micromilling, Microgrinding,	5
	Non-Conventional Processes: Laser Micromachining, Evaluation of Subsurface Damage in Nano and Micromachining, Applications of Nano and Micromachining in Industry.	4
TOTAL		40

TEXT BOOK		
1	Modern Machining Process, Pandey and Shan, Tata McGraw Hill	1980
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Advance Machining Process, Jain V.K., Allied Publishers Ltd.	2002
2	Non Traditional Manufacturing Process, Gary F. Bevedict, Marcel Dekker Inc New York.	1987
3	Non-Conventional Machining Process, Mishra P.K., Narosa Publishing House	2006
4	Non-Conventional Machining Process, J.A. McGeough	1988
5	Nano and Micromachining, J. Paulo Davim, and Mark J. Jackson, Wiley-ISTE	2008

6ME3A: MECHATRONICS

B.Tech. (Mechanical) 6th Semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction: Introduction, scope and applications of Mechatronics systems. Process control automation, FMS and CNC Machines.	5
	MEMS: Basics of Micro- and Nanotechnology, microprocessor-based controllers and Microelectronics	3
II	Introduction to Sensors: Linear and Rotational Sensors, Acceleration, Force, Torque, Power, Flow and Temperature Sensors, Light Detection, Image, and Vision Systems, Integrated Micro-sensors,	4
	Introduction to Actuators: Electro-mechanical Actuators, Electrical Machines, Piezoelectric Actuators, Hydraulic and Pneumatic Actuation Systems, MEMS: Micro-transducers Analysis, Design and Fabrication.	4
III	Systems and Controls: The Role of Controls in Mechatronics, Role of Modelling in Mechatronics Design, Signals and Systems: Continuous- and Discrete-time Signals, Z-Transforms and Digital Systems, Continuous- and Discrete-time State-space Models.	5
	Advanced Control Systems: Digital Signal Processing for Mechatronics Applications, Control System Design, Adaptive and Nonlinear Control Design, Neural Networks and Fuzzy Systems, Design Optimization of Mechatronics Systems.	3
IV	Data Acquisition and related Instrumentation: Introduction to Data Acquisition Measurement Techniques: Sensors and Transducers, Quantizing theory, Analog to Digital Conversion, Digital to Analog (D/A) conversation, Signal Conditioning.	4
	Real time Instrumentation: Computer-Based Instrumentation Systems, Software Design and Development, Data Recording and Logging.	4
V	Design of Mechatronics systems: Introduction of mechatronics systems: Home appliances, ABS (anti-lock braking system) and other areas in automotive engineering, Elevators and escalators, Mobile robots and manipulator arms, Sorting and packaging systems in production lines, Computer Numerically Control (CNC) production machines, Aeroplanes and helicopters, Tank fluid level and temperature control systems.	8
TOTAL		40
TEXT BOOK		
1	Bolton, W., "Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering", Pearson Education	2011

REFERENCE BOOKS		
SN	Name of Authors / Books / Publisher	Year of Pub.
1	Mechatronics, HMT Hand Book, Tata McGraw Hill	2000
2	Alciatore and Histan, "Introduction to Mechatronics and Measurement Systems", Tata McGraw Hill	2011
3	Smaili and Mrad, "Mechatronics: Integrated Technologies for Intelligent Machines", Oxford	2008
4	Mahalik N.P., "Mechatronics: Principles, Concepts and applications", Tata McGraw Hill.	2003

6ME4A: VIBRATION ENGINEERING

B.Tech. (Mechanical) 6th semester
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction to Sound: Frequency dependent human response to sound, Sound pressure dependent human response, Relationship among sound power, sound intensity and sound pressure level.	2
	Introduction to Noise: Auditory and Non auditory effects of Noise, Major sources of the noise, Industrial noise sources, Industrial noise control strategies.	3
	Introduction to Vibration: Importance and scope of vibrations, terminology and classification, Concept of Degrees of freedom, Harmonic motion, vectorial representation, complex number representation, addition.	3
II	Undamped Single Degree of Freedom System: Derivation of equation of motion for one dimensional longitudinal, transverse and torsional vibrations without damping using Newton's second law, D' Alembert's principle and Principle of conservation of energy, Compound pendulum and centre of percussion.	3
	Damped vibrations of single degree of freedom systems: Viscous damping, under-damped, critically damped and over-damped systems, Logarithmic decrement.	3
	Vibration characteristics of Coulomb damped system and Vibration characteristics of Hysteretic damped systems.	2
III	Forced Vibrations of Single Degree of Freedom Systems: Forced vibration with constant harmonic excitation, Steady state and transient parts, Frequency response curves and phase angle plot, Forced vibration due to excitation of support.	4
	Vibration Isolation and Transmissibility: Force transmissibility, Motion transmissibility, Forced vibration with rotating and reciprocating unbalance, Materials used in vibration isolation.	4
IV	System with Two Degrees of Freedom: principle mode of vibration, Mode shapes, Undamped forced vibrations of two degrees of freedom system with harmonic excitation, Vibration Absorber, Undamped dynamic vibration absorber and centrifugal pendulum absorber	5
	Critical Speed of Shaft: Critical speed of a light shaft without damping, critical speed of shaft having multiple discs, secondary critical speed.	3
V	Many Degrees of Freedom Systems (Exact analysis): Equation of Motion, The matrix method, Eigen Values and Eigen Vectors, Method of influence Coefficients and Maxwell's reciprocal theorem. Torsional vibrations of multi rotor system, vibrations of geared system, Generalized coordinates and coordinate coupling Many Degrees of Freedom Systems (approximate methods): Rayleigh's, Dunkerley's, Stodola's and Holzer's methods	5

	Vibrations of continuous systems: Transverse vibration of a string, Longitudinal vibration of a bar, Torsional vibration of a shaft.	3
	TOTAL	40

TEXT BOOK		
1	Rao S.S., "Mechanical Vibrations", Pearson Education, 2nd Indian reprint.	2004
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Ambekar A.G., "Mechanical Vibrations and Noise Engineering", Prentice-Hall of India Pvt. Ltd.	2006
2	Kelly, S.G., "Mechanical Vibrations, Theory and Applications, Cengage Learning	2013
3	Thomson, W.T., and Dahleh, M.D., Padmanabhan, C., "Theory of Vibrations with Applications", Pearson Education.	2014
4	Meirovitch, L., "Elements of Vibration Analysis", Tata McGraw-Hill	2006
5	Tongue, B.H., "Principles of Vibration", Oxford Publication	2007

6ME5A: STEAM ENGINEERING

B.Tech. (Mechanical) 6th Semester
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Steam generators: Classification of Boilers, water and fire tube boilers, High pressure boilers, Advantages of high pr. Boilers, Natural and forced circulation boilers, Water wall.	4
	Steam drum internal, steam super heaters, Economizers, air preheater, induced, forced and balanced draught boilers, Fluidized bed boilers	4
II	Definition and type of nozzle and diffuser equation of continuity, sonic velocity, mach no. and stagnation properties, the steady flow energy equation for nozzles, momentum energy equation for flow through steam nozzles nozzle efficiency, effect of friction, nozzle for uniform pressure drop, throat pressure for maximum discharge or chock flow, critical pressure ratio, design of nozzle and diffuser.	8
III	Steam Turbines: Principle and working of steam turbines, type of turbines, compounding for pressure and velocity. Overview and difference of various type of turbine, different types of governing of turbines.	3
	Impulse turbine: The effect of blade friction on velocity diagram. Force, work and power, Blade or diagram efficiency, Gross stage efficiency, steam speed to blade, speed ratio for optimum performance, turbine performance at various loads	5
IV	Impulse reaction turbine: Velocity diagram and work done , degree of reaction, Parson turbine, blade efficiency, gross stage efficiency comparison of enthalpy drop in various stages, size of blades in impulse reaction turbines for various stages of impulse reaction and impulse turbine.	5
	Regenerative Feed Heating Cycles: Introduction, Ideal regenerative feed heating cycle, Regenerative heating cycles and their representation on T-s and h-s Diagram, Representation of actual process on T-s and h-s Diagram Regenerative cycles, types of feed heating arrangements, Optimum feed water temperature and saving in Heat Rate. direct contact and surface heaters.	4
V	Reheating of steam: Practical reheating and Non- reheating cycles, advantage and disadvantages of reheating, reheat regenerative cycle,	4

	regenerative water extraction cycles.	
	Process heat and by product power cycle, pass out turbine, Binary vapour cycle. Condensers.	3
		40

TEXT BOOK		
1	Steam, Gas Turbine and Power Plant Engineering, Yadav R., CPH Allahabad	
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	A Practical Guide to Steam Turbine, Heinz P. Bloch, McGraw Hill Publication	1995
2	Steam Turbines: Design Application and Rating, Heinz P. Bloch, McGraw Hill Publication.	1996
3	Steam Turbine: Theory and Design, Shlykhin P., University press of Pacific.	2006
4	Steam Turbine: Theory and Construction, Wilde and Salter, Merchant Books.	2007
5	Power Plant Engineering, Nag P.K., Tata McGraw-Hill, New Delhi.	1992
6	Thermal Science & Engineering, Kumar D.S., S.K.Kataria & Sons	2006
7	Engineering Thermodynamics, Nag P.K., Tata McGraw-Hill, New Delhi	1998
8	Fundamentals of Classical Thermodynamics, Gordon J Van Wylen, Wiley Eastern Ltd.	1959
9	Engineering Thermodynamics, Cengel & Boles, Tata McGraw-Hill, New Delhi.	2006
10	Engineering Thermodynamics, Chottopadhyay P., Oxford University Press.	2009

6ME6.1A: NON DESTRUCTIVE EVALUATION AND TESTING

B.Tech. (Mechanical) 6th semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction: An Overview, Factors influencing the Reliability of NDE, Defects in materials, Defects in composites. NDT methods used for evaluation of materials and composites.	3
	Visual Inspection: Basic Principle and Applications.	2
	Liquid Penetrant Testing: Principle, Procedure and Test Parameters, Materials, Limitations and Applications.	3
II	Radiographic Inspection: Principles of X – ray radiography, equipment, Absorption, Scattering, X-ray film processing, General radiographic procedures, Reading and Interpretation of Radiographs, Industrial radiographic practice, Limitations and Applications, Welding defects detection. Gamma ray radiography.	8
III	Ultrasonic Testing: Principle of wave propagation, Ultrasonic equipment, Variables affecting an ultrasound test, Basic methods: Pulse Echo and Through Transmission, Types of scanning.	5
	Applications of UT: Testing of products, Welding Inspection, Tube Inspection, Thickness Measurement, Elastic Constant Determination, Ultrasonic testing of composites.	3
IV	Magnetic Particle Inspection: Methods of generating magnetic field, Demagnetization of materials, Magnetic particle test: Principle, Test Equipment and Procedure, Interpretation and evaluation.	5
	Introduction to Acoustic Emission Testing and Thermography.	3
V	Eddy Current Testing: Principle of eddy current, Factors affecting eddy currents, Test system and test arrangement, Standardization and	5

	calibration, Application and effectiveness.	
	Comparison and Selection of NDT Methods, Codes and Standards	3
	TOTAL	40

TEXT BOOK		
1	Baldev Raj, T. Jay Kumar, M. Thavasimuthu, Practical Non-Destructive Testing, Narosa.	
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Loius Cartz, Non Destructive Testing, ASM International	1995
2	J PRASAD, C G K NAIR, NDT & Evaluation Of Materials, Tata McGraw Hill	2008
3	R. Halmshaw, Introduction to the Non-Destructive Testing of Welded Joints,	1997
4	American Metals Society, Non-Destructive Examination and Quality Control, Metals Hand Book, Vol.17, 9th Ed.	1989

6ME6.2A: DESIGN AND MANUFACTURING OF PLASTIC PRODUCTS

B.Tech. (Mechanical) 6th semester
3L+0T

Max. Marks: 100

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Plastics Materials: An Overview, Classification, Thermoplastics, Thermosets, Crystalline, Amorphous, and Liquid, Crystalline Polymers, Copolymers, Alloys, Elastomers, Additives, Reinforcements, and Fillers, Physical Properties and Terminology.	5
	Mechanical Properties, Thermal Properties, Electrical Properties, Environmental Considerations.	3
II	Design Considerations for Injection-Molded Parts: Injection Molding Process, Design Strategy, Efficient and Functional Design, Material Selection,	2
	Nominal Wall Thickness, Normal Ranges of Wall Thickness, Structural Requirements of the Nominal Wall,	2
	Insulation Characteristics of the Nominal Wall, Impact Response of the Nominal Wall, Draft, Structural Reinforcement, Ribs, Other Geometric Reinforcement, Bosses, Coring, Fillets and Radii, Undercuts	4
III	Polymer processing techniques such as extrusion, compression and transfer moulding.	4
	Injection moulding, blow moulding, thermoforming, rotational moulding, calendaring.	4
IV	Assembly: General Types of Assembly Systems, Molded-In Assembly Systems, Snap-Fit Assembly, Molded-In Threads, Press-Fits, Chemical Bonding Systems, Solvent Welding, Adhesive Bonding, Thermal Welding Methods.	4
	Spin Welding, Radio Frequency (RF) Welding, Electromagnetic or Induction Welding, Assembly with Fasteners, Bolted Assembly, Threaded Metal Inserts, Self-Tapping Screws, Riveted Assembly, Sheet Metal Nuts, Specialty Plastic Fasteners	4
V	Machining of Plastics: Drilling and Reaming, Thread Tapping, Sawing, Milling, Turning, Grinding.	4
	Finishing and Decorating of Plastics: Painting, Vacuum Metallizing and Sputter Plating, Electroplating, Flame Spraying/Arc Spraying, Hot Stamping	4
	TOTAL	40

TEXT BOOK		
1	Design and Manufacture of Plastic Parts, R.L.E. Brown, John Wiley and Sons, New York	1980
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Designing with Plastics, Gerhard, Hanser Verlag	
2	Handbook of Plastics Joining: a practical guide, PDL handbook series, Plastics Design Library, William Andrew	
3	Modern Plastics Handbook, McGraw Hill handbooks, Modern plastics series, Charles A. Harper, McGraw-Hill Professional	1997
4	Industrial Plastics: theory and applications, Erik Lokensgard and Terry L. Richardson, 4th Edition, Cengage Learning	2000

6ME6.3A: MAINTENANCE MANAGEMENT

B.Tech. (Mechanical) 6th semester
3L+0T

Max. Marks: 100

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction -Fundamentals of Maintenance Engineering. Maintenance Engineering its importance in material & energy conservation, inventory control, productivity, safety, pollution control etc.	3
	Safety Regulations, pollution problems, human reliability, total quality management (TQM), total productivity maintenance (TPM), environmental issues in maintenance, ISO 9000.	4
II	Maintenance Management - types of maintenance strategies, Planned and unplanned maintenance, breakdown, preventive & predictive maintenance. Their comparison, advantages & disadvantages. Limitations.	4
	Computer aided maintenance, maintenance scheduling, spare part management, inventory control, organisation of maintenance department.	4
III	Tribology in Maintenance, friction wear and lubrication, friction & wear mechanisms, prevention of wear, types of lubrication mechanisms, lubrication processes.	3
	Lubricants - types, general and special purpose, additives, testing of lubricants, degradation of lubricants, seal & packings.	3
	Repair methods for basic machine elements: Repair methods for beds, slideways, spindles, gears, lead screws and bearings-Failure analysis-Failures and their development-Logical fault location methods-Sequential fault location.	3
IV	Machine Health Monitoring - Condition based maintenance, signature analysis, oil analysis, vibration, noise and thermal signatures, on line & off line techniques,	4
	Instrumentation & equipment used in machine health monitoring. Instrumentation in maintenance, signal processing, data acquisition and analysis, application of intelligent systems, data base design.	4
V	Reliability, availability & maintainability (RAM) Analysis - Introduction to RAM failure mechanism, failure data analysis, failure distribution, reliability of repairable and non repairable systems.	4
	Improvement in reliability, reliability testing, reliability prediction, utilisation factor, system reliability by Monte Carlo Simulation Technique.	4
	TOTAL	40

TEXT BOOK		
1	Anthony Kelly, Strategic Maintenance Planning, Butterworth-Heinemann	2006
2	R. C. Mishra, K. Pathak, Maintenance Engineering and Management, PHI Learning Pvt. Ltd	2012
REFERENCE BOOKS		
SN	Name of Authors / Books / Publisher	Year of Pub.
1	Higgins L.R., "Maintenance Engineering Hand book", McGraw Hill	1988
2	Maintenance & Spare parts Management Gopal Krishnan	
3	Srivastava S.K., "Industrial Maintenance Management", S. Chand and Co	1981
4	Hand book of Condition Monitoring CNR Rao	
5	White E.N., "Maintenance Planning", I Documentation, Gower Press	1979
6	Armstrong, "Condition Monitoring", BSIRSA	1988
7	Davies, "Handbook of Condition Monitoring", Chapman &Hall,	1996

6ME7A: MACHINE DESIGN SESSIONAL-II

B.Tech. (Mechanical) 6th Semester
OL+OT+3P

Max. Marks: 125
Exam Hours: 3

SN	SESSIONAL WORK	CONTACT HOURS
	Problems on:	
1	Fatigue loading.	
2	Helical compression, tension and torsional springs design.	
3	Curved Beams.	
4	Preloaded bolts and bolts subjected to variable stresses.	
5	Belt, Rope and Chain drive system.	
6	Gear Design.	
7	Sliding contact bearing design.	
8	Anti-friction bearing selection	

6ME8A: INDUSTRIAL ENGINEERING LAB-I

B.Tech. (Mechanical) 6th Semester
OL+OT+2P

Max. Marks: 75
Exam Hours: 2

SN	SESSIONAL WORK	CONTACT HOURS
1	Case study on X bar charts and process capability analysis	
2	P Chart: (a) Verify the Binomial Distribution of the number of defective balls by treating the balls with a red colour to be defective. (b) Plot a P-chart by taking a sample of n=20 and establish control limits	
3	To plot C-chart using given experimental setup	
4	Operating Characteristics Curve: (a) Plot the operating characteristics curve for single sampling attribute plan for n = 20 ; c = 1 , 2 , 3 Designate the red ball to defective. (b) Compare the actual O.C. curve with theoretical O.C. curve using approximation for the nature of distribution	
5	Distribution Verification: (a) Verification of Normal Distribution. (b) To find the distribution of numbered cardboard chips by random drawing one at a time with replacement. Make 25 subgroups in size 5 and 10 find the type of distribution of sample average in	

	each case. Comment on your observations	
6	Verification of Poisson distribution	
7	Central Limit Theorem: (a) To show that a sample means for a normal universe follow a normal distribution (b) To show that the sample means for a non normal universe also follow a normal Distribution.	
8	Solve problems using available Statistical Process Control software in lab	

6ME9A: MECHATRONICS LAB

B.Tech. (Mechanical) 6th Semester
OL+OT+2P

Max. Marks: 75
Exam Hours: 2

SN	SESSIONAL WORK	CONTACT HOURS
	Perform any ten experiments from the list given below	
1	Study the following devices (a) Analog & digital multimeter (b) Function/Signal generators (c) Regulated d. c. power supplies (constant voltage and constant current operations)	
2	Displacement Measurement using Capacitive & inductive Pick-ups.	
3	Study of Speed Measurement System: (a) Magnetic Pick-up (b) Stroboscope	
4	Study of Load Measurement System Load Cell	
5	Measurement of temperature using thermocouple, thermistor and RTD	
6	Measurement of displacement using POT, LVDT & Capacitive transducer	
7	Torque measurement using torque measuring devices	
8	Strain Measurement using strain gauge	
9	Frequency to Voltage Converter and vice versa	
10	Position and velocity measurement using encoders	
11	Study on the application of data acquisition system for industrial purposes	
12	Speed control of DC motor using PLC.	
13	Study of Load Measurement System Load Cell	

6ME10A: VIBRATION ENGINEERING LAB.

B.Tech. (Mechanical) 7th Semester
OL+OT+2P

Max. Marks: 75
Exam Hours: 2

SN	NAME OF EXPERIMENT	CONTACT HOURS
1	To verify relation $T = 2\pi\sqrt{l/g}$ for a simple pendulum.	
2	To determine radius of gyration of compound pendulum.	
3	To determine the radius of gyration of given bar by using bifilar suspension.	
4	To determine natural frequency of a spring mass system.	
5	Equivalent spring mass system.	
6	To determine natural frequency of free torsional vibrations of single rotor system. i. Horizontal rotor ii. Vertical rotor	
7	To verify the Dunkerley's rule.	
8	Performing the experiment to find out damping co-efficient in case of free damped torsional vibration	
9	To conduct experiment of trifler suspension.	
10	Harmonic excitation of cantilever beam using electro-dynamic shaker and determination of resonant frequencies.	

11	Study of Vibration measuring instruments.	
12	Perform study of the following using Virtual Lab http://www.vlab.co.in/	
13	Forced Vibration of a Cantilever Beam with a Lumped Mass at Free End: To calculate the natural frequency and damping ratio for forced vibration of a single DOF cantilever beam system, experimentally; and compare the results with theoretical values.	
14	Harmonically Excited Forced Vibration of a Single DOF System: To analyze the forced vibration response of a single DOF system at different damping ratio and frequency ratio.	
15	Perform study of the following using Virtual Lab http://www.vlab.co.in/	
16	Forced Vibration of a Cantilever Beam with a Lumped Mass at Free End: To calculate the natural frequency and damping ratio for forced vibration of a single DOF cantilever beam system, experimentally; and compare the results with theoretical values.	
17	Harmonically Excited Forced Vibration of a Single DOF System: To analyze the forced vibration response of a single DOF system at different damping ratio and frequency ratio.	

7ME1A: FINITE ELEMENT METHODS

B.Tech. (Mechanical) 7th semester
3L+0T

Max. Marks: 100

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction to FEM and its applicability, Review of :Matrix algebra, Gauss elimination method, Uniqueness of solution, Banded symmetric matrix and bandwidth.	4
	Structure analysis: Two-force member element, Local stiffness matrix, coordinate transformation, Assembly, Global stiffness matrix, imposition of Boundary conditions, Properties of stiffness matrix	4
II	One-dimensional Finite Element Analysis: Basics of structural mechanics, stress and strain tensor, constitutive relation, Principle of minimum Potential, General steps of FEM, Finite element model concept / Discretization, Derivation of finite elements, equations using potential energy approach for linear and quadratic 1-D bar element,	5
	shape functions and their properties, Assembly, Boundary conditions, Computation of stress and strain.	3
III	Two Dimensional Finite Element Analysis: Finite element formulation using three noded triangular (CST) element , Plane stress and Plain strain problems,	4
	Shape functions, node numbering and connectivity, Assembly, Boundary conditions, Isoparametric formulation of 1-D bar elements,	2
	Numerical integration using gauss quadrature formula, computation of stress and strain.	2
IV	Finite Element Formulation from Governing Differential Equation: Method of Weighted Residuals, Collocation, Sub domain method, Least Square method and Galerkin's method,	5
	Application to one dimensional problems, one-dimensional heat transfer, etc. introduction to variational formulation (Ritz Method.)	3
V	Higher Order Elements: Lagrange's interpolation formula for one and two independent variable, Convergence of solution, compatibility, element continuity, static condensation, p and h methods of mesh refinement, Aspect ratio and element shape,	5
	Application of FEM, Advantages of FEM, Introduction to concept of element mass matrix in dynamic analysis.	3
	TOTAL	40

TEXT BOOK		
1	Seshu P., "Text Book of Finite Element Analysis", Prentice Hall India	2003
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Dixit, U. S., "Finite Element Methods for Engineers" Cengage Learning	2003
2	Finite Element Procedure in Engineering Analysis, Bathe K.J., Prentice Hall India.	2001
3	An Introduction to the Finite Element Method, Reddy J.N., Tata McGraw-Hill, New Delhi	1993
4	Concepts & Applications of Finite Element Analysis, Cook and Plesha, Wiley India New Delhi.	2007
5	Introduction to Finite Elements in Engineering, Chandupatla and Belegundu, Prentice Hall India.	1999

7ME2A: REFRIGERATION AND AIR CONDITIONING

B.Tech. (Mechanical) 7th Semester
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction: Refrigeration and second law of Thermodynamics, Refrigeration effect and unit of Refrigeration, Heat pump, reversed Carnot cycle. Vapour Compression Refrigeration System: Analysis of simple vapour compression Refrigeration cycle by p-h and T-S diagram. Effect of operating conditions	5
	Multiple Evaporator and compressor system: Application, air compressor system, Individual compressor, compound compression, cascade system. Application, air compressor systems, individual compressor, compound compression, cascade system.	3
II	Gas Cycle Refrigeration: Limitation of Carnot cycle with gas, reversed Brayton cycle, Brayton cycle with regenerative heat exchanger.	4
	Air cycle for air craft: Necessity of cooling of air craft, Basic cycle, boot strap, regenerative type air craft refrigeration cycle.	4
III	Other refrigeration systems (description only): Vapour absorption refrigeration system, Electrolux refrigerator, Lithium Bromide - Water system, Water vapour refrigeration system, Vortex tube refrigeration system, thermo electric refrigeration system.	4
	Refrigerants: Classification, Nomenclature, selection of Refrigerants, global warming potential of CFC Refrigerants. Refrigeration Equipments: Compressor, condenser, evaporator, expansion devices, types & working.	4
IV	Psychrometry: Psychrometric properties, psychometric relations, psychrometric charts, psychrometric processes, cooling coils, By-pass factor, Apparatus Dew point temperature and air washers.	5
	Human Comfort: Mechanism of body heat losses, factors affecting human comfort, effective temperature, comfort chart.	3
V	Cooling load calculations: Internal heat gain, system heat gain, RSHF, ERSHF, GSHF, cooling load estimation, heating load estimation, psychrometric calculation for cooling.	5
	Selection of air conditioning: Apparatus for cooling and dehumidification, Air conditioning system, year round air conditioning.	3
	TOTAL	40

TEXT BOOK		
1	Arora, C.P., Refrigeration and Air Conditioning, Tata McGraw Hill	
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Stoecker W.F., "Refrigeration & Air Conditioning" McGraw Hill Publication.	2000
2	Andrew D. Althouse., "Modern Refrigeration & Air Conditioning" GoodHeart-Willcox Co.	2002
3	Jorden & Priester, Refrigeration & Air Conditioning, Prentice Hall of India.	2003
4	Roy J. Dossat, Principal of Refrigeration, Pearson Education, New Delhi.	2014
5	Edward G. Pita, Air Conditioning Principles and Systems, Pearson Education, New Delhi.	2003
6	Jain V.K., Refrigeration & Air Conditioning, Tata McGraw Hill New Delhi.	2004

7ME3A: OPERATIONS RESEARCH

B.Tech. (Mechanical) 7th semester
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Overview of Operations Research	1
	Linear Programming: Applications and model formulation, Graphical method, Simplex method, duality and Sensitivity analysis.	4
	Transportation Model and Assignment Model including travelling salesman problem.	4
II	Integer Linear Programming: Enumeration and cutting Plane solution concept, Gomory's all integer cutting plane method, Branch and Bound Algorithms, applications of zero-one integer programming.	5
	Replacement Models: Capital equipment replacement with time, group replacement of items subjected to total failure.	3
III	Queuing Theory: Analysis of the following queues with Poisson pattern of arrival and exponentially distributed service times, Single channel queue with infinite customer population, Multichannel queue with infinite customer population,	3
	Competitive Situations and Solutions: Game theory, two person zero sum game, saddle point, minimax (maximin) method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle. Rectangular games without saddle point – mixed strategy, approximate solution, and simplified analysis for other competitive situations. Application of linear programming	4
IV	Theory of Decision making: Decision making under certainty, risk and uncertainty. Decision trees.	5
	Deterministic Inventory control models: functional role of inventory, inventory costs, model building, Single item inventory control model without shortages, with shortage and quantity discount. Inventory control model with uncertain demand, service level, safety stock, P and Q systems, two bin system. Single period model. Selective Inventory control techniques.	4
V	Probabilistic Inventory control models: Instantaneous demand without setup cost and with setup cost, Continuous demand without setup cost	4
	Simulation: Need of simulation, advantages and disadvantages of simulation method of simulation. Generation of Random numbers, Generation of Normal Random numbers. Use of random numbers for	4

	system simulation. , Monte Carlo simulation, simulation language ARENA, Application of simulation for solving queuing Inventory Maintenance, Scheduling and other industrial problems	
	TOTAL	40

TEXT BOOK		
1	Operations Research, Ravindran, Phillips and Solberg, Wiley India.	
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Introduction to Operations Research, Hillier F.S. and Lieberman G.J., CBS Publishers.	
2	Operations Research, Taha H.A., Pearson Education	
3	Linear Programming and Network Flows, Bazaraa, Jarvis and Sherali, Wiley India.	
4	Principles of Operations Research, Wagner H.M., Prentice Hall of India.	
5	Operations Research, Gupta and Heera, S. Chand Publications.	

7ME4A: TURBOMACHINES

B.Tech. (Mechanical) 7th Semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Basic Concepts of Turbo Machines: Definition & classification of Turbo machine, Basic laws and governing equations: continuity equation, steady flow energy equation(1st law of thermodynamics), 2nd law of thermodynamics applied to turbo machines, Newton's 2nd law of motion applied to turbomachines - Euler's pump equation and Euler's turbine equation	4
	Dimensional analysis applied to hydraulic machines, power coefficient, flow coefficient, head coefficient, non-dimensional specific speed, Range of specific speeds for various turbo machines, Dimensional analysis applied to compressible flow machines, pressure ratio as a Function of temperature ratio, mass flow rate parameter and speed parameter	4
II	Centrifugal Compressors and Fans: Components and description, velocity diagrams, slip factor, energy transfer, power input factor, stage pressure rise and loading coefficient, pressure coefficient, degree of reaction, Centrifugal compressor characteristic, surging, rotating Stall and Choking	3
	Axial Flow Compressors and Fans: Basic constructional features, Advantages of axial flow compressors, working principle, velocity triangle, elementary theory, stage work, work done factor, stage loading, degree of reaction; vortex theory, simple design calculations, introduction to blade design, cascade test, compressibility effects, operating characteristics	3
	Reciprocating Compressors: Basic constructional features, working principle, work done calculation, single and double acting compressors	2
III	Centrifugal Pumps: Main parts, work done and velocity triangles, slip and slip factor, pump losses and efficiencies, minimum starting speed, net positive suction head, performance curve.	3
	Axial Flow Pumps: Description, velocity triangles, work done on the fluid, energy transfer, axial pump characteristics, cavitation.	3
	Reciprocating Pumps: Classification, component and working, single acting and double acting, discharge, work done and power required, coefficient of discharge, indicator diagram, slip, effect of friction and	2

	acceleration, theory of air vessels.	
IV	Gas power cycles: Ideal and practical gas turbine cycle, heat exchange cycle, reheat cycle, intercooled cycle, Comparison of various cycles.	4
	Thermodynamic Cycles: Advantages, disadvantages and performance characteristics of Ram jet engine, pulse jet engine, turbo prop engine, turbo jet engine, turbo fan engine, Calculation of specific thrust and efficiency	4
V	Gas Turbines: impulse and reaction type gas turbines, Velocity triangles and calculation of work done, efficiency etc.	8
TOTAL		40

TEXT BOOK		
1	Gas turbines, V. Ganesan, Tata McGraw-Hill	
2	Subramanya, K., Hydraulic Machine, Tata McGraw Hill	2013
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Principle of Turbo Machinery, Turton R.K., Springer Publication	1994
2	Fundamentals of Turbo Machinery, William W., John Wiley and Sons.	2008
3	Turbo Machinery Basic Theory and Application, Logan E.J.	1981
4	Principles of Turbo Machinery, Shepherd Dennis G., Mac Millan Publisher, New York.	1956
5	TurboMachines, A Valan Arasu, Vikas Publishing House Pvt. Ltd.	2009
7	Gas turbine theory, Cohen and Saravanamutto, Pearson Educational Publication	2009
8	Hydraulic Machine: Turbines and Pumps, Nazarov N.T., Springer New York.	2003
9	Gas Turbine Theory, Cohen and Roger, Pearson Education.	
10	Hydraulic Machinery, Jagdish Lal, Metropolitan Books.	

7ME5A: OPERATIONS MANAGEMENT

B.Tech. (Mechanical) 8th semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction to operations management (OM), the scope of OM; Historical evolution of OM; Trends in business; the management process. Operations Strategy, Competitiveness and Productivity	3
	Demand Forecasting: components of forecasting demand, Approaches to forecasting: forecasts based on judgment and opinion, Time series data. Associative forecasting techniques, Accuracy and control of forecasts, Selection of forecasting technique.	4
II	Product and Service design, Process selection, Process types, Product and process matrix, Process analysis.	3
	Capacity Planning: Defining and measuring capacity, determinants of effective capacity, capacity strategy, steps in capacity planning process, determining capacity requirements, Capacity alternatives, Evaluation of alternatives; Cost-Volume analysis.	2
III	Facility Location: Need for location decisions, factors affecting location, qualitative and quantitative techniques of location. Facilities layout: Product, Process, Fixed position, combination and cellular layouts; Designing product and process layout, line balancing. Material Handling	4
	Planning levels: long range, Intermediate range and Short range	4

	planning, Aggregate planning: Objective, Strategies, and techniques of aggregate planning. Master scheduling; Bill of materials, MRP; inputs processing and outputs, and overview of MRPII, use of MRP to assist in planning capacity requirements, Introduction to ERP	
IV	Production Control: Capacity control and priority control, production control functions; Routing, scheduling, dispatching, expediting and follow up. Techniques of production control in job shop production, batch production and mass production systems. sequencing: priority rules, sequencing jobs through two work centers, scheduling services	4
	Introduction to Just-in-time (JIT) and Lean Operations: JIT production, JIT scheduling, synchronous production, Lean operations system	4
V	Supply Chain Management (SCM): Need of SCM, Bullwhip effect, Elements of SCM, Logistics steps in creating effective supply chain, Purchasing and supplied management.	3
	Project Management: Nature of projects, project life cycle, Work breakdown structure, PERT and CPM, Time-Cost trade-offs: Crashing. Resource allocation, leveling	5
	TOTAL	40

TEXT BOOK		
1	Stevenson, Operations Management, Tata McGraw Hill.	2009
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Roberta S. Russell, Bernard W. Taylor, Operations Management, John Wiley & Sons	2010
2	Joseph S. Martinich, Production And Operations Management, John Wiley & Sons	2008
3	S.N. Chary, Production and Operations Management, Tata McGraw Hill	2009
4	Norman Gaither, Greg Frazier, Operations Management, Thomson Learning	2002
5		

7ME6.1A MICRO AND NANO MANUFACTURING

B.Tech. (Mechanical) 7th semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Nanoscale Cutting:- Introduction, Material representation and microstructure, Atomic interaction; Nonomachining:- Introduction, Nanometric machining, Theoretical basis of machining;	4
	Meso-micromachining:- Introduction, size effects in micromachining, mechanism for large plastic flow, origin of the size effect, Meso-machining processes. Product quality in micromachining, Burr formation in micromachining operations.	4
II	Microturning:- Characteristic features and applications, Microturning tools and tooling systems, Machine tools for microturning	2
	Microdrilling: Characteristic features and applications, Microdrills and tooling systems, Machine tools for microdrilling Micromilling:- Characteristic features and applications, Micromills and	2

	tooling systems, Machine tools for micromilling,	
	Micro machining high aspect ratio microstructures, micromolding, micromolding processes, micromolding tools, micromold design, micromolding applications, limitations of micromolding.	3
III	Microgrinding and Ultra-precision Processes: Introduction, Micro and nanogrinding, Nanogrinding apparatus, Nanogrinding procedures, Nanogrinding tools, Preparation of nanogrinding wheels, Bonding systems, Vitrified bonding	4
	Non-Conventional Processes: Laser Micromachining:- Introduction, Fundamentals of lasers, Stimulated emission, Types of lasers, Laser microfabrication, Nanosecond pulse microfabrication, Shielding gas, Effects of nanosecond pulsed microfabrication, Picosecond pulse microfabrication, Femtosecond pulse microfabrication, Laser nanofabrication.	4
IV	Diamond Tools in Micromachining: Introduction, Diamond technology, Hot Filament CVD (HFCVD), Preparation of substrate, Selection of substrate material, Pre-treatment of substrate, Modified HFCVD process.	4
	Deposition on complex substrates, Diamond deposition on metallic (molybdenum) wire, Deposition on WC-Co microtools, Diamond deposition on tungsten carbide, (WC-Co) microtool, Performance of diamond-coated microtool	4
V	Evaluation of Subsurface Damage in Nano and Micromachining: Introduction, Destructive evaluation technologies, Cross-sectional microscopy, Preferential etching, Angle lapping/angle polishing, X-ray diffraction, Micro-Raman spectroscopy.	4
	Applications of Nano and Micromachining in Industry: Introduction, Typical machining methods, Diamond turning, Shaper/planner machining, Applications in optical manufacturing, Aspheric lens, Fresnel lens, Microstructured components, Semiconductor wafer production.	5
	TOTAL	40

TEXT BOOK		
1	Micro and Nano manufacturing by Marks J. Jackson springer	2008
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	J. Paulo Davim, Mark J. Jackson, Nano and Micromachining ISTE Ltd John Wiley & Sons, Inc.	2009

7ME6.2A: ROBOTICS

B.Tech. (Mechanical) 7th semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction to Robotics: Evolution of Robots and Robotics, Laws of Robotics, What is and What is not a Robot, Progressive Advancement in Robots.	3
	Robot Anatomy, Human Arm Characteristics, Design and Control Issues, Manipulation and Control, Sensors and Vision, Programming Robots, The Future Prospects, Notations.	5
II	Robot End Effectors: Classification of end effectors, drive system for grippers, Mechanical, Magnetic, Vacuum, Adhesive grippers, Hooks,	4

	Scoops, Miscellaneous devices, Gripper force analysis and Design, Active and Passive Grippers	
	Coordinate Frames, Mapping and Transforms: Coordinate Frames, Description of Objects in Space, Transformation of Vectors, Inverting a Homogeneous Transform, Fundamental Rotation Matrices.	4
III	Symbolic Modeling of Robots: Direct Kinematic Model, Mechanical Structure and Notations, Description of Links and Joints, Kinematic Modeling of the Manipulator,	3
	Denavit – Hartenberg Notation, Kinematic Relationship between Adjacent Links, Manipulator Transformation Matrix. Introduction to Inverse Kinematic model, Solvability of Inverse Kinematics model, Solution techniques.	5
IV	Robotic Sensors: The Meaning of Sensing, Sensors in Robotics, Kinds of Sensors used in Robotics, Choosing the right sensors	3
	Robotic vision: Introduction to Robotic Vision, Industrial Applications of Vision-Controlled Robotic Systems, Process of Imaging, Architecture of Robotic Vision Systems, Image Acquisition, Image Representation and Image Processing	5
V	Robot Applications: Industrial Applications, Material Handling, Processing Applications, Assembly Applications, Inspection Application, Principles for Robot Application and Application Planning, Justification of Robots, Robot Safety, Non-Industrial Applications.	4
	Robot Programming: Robot languages, Classification of Robot language, Computer control and robot software, VAL system and language	4
	TOTAL	40

TEXT BOOK		
1	Mittal R.K., Nagarath, I.K., Robotics and Control, Tata Mc Graw Hill,	2007
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Deb S.R., Robotics Technology and Flexible Automation, Tata McGraw Hill	2010
2	Ghoshal, A., Robotics Fundamental Concepts and Analysis, Oxford University Press	2010
3	Craig JJ, Introduction to Robotics, Mechanics and Control, Addison-Wesley, 2 nd Ed.	2004
4	Fu, K.S., Gonzales, R.C. and Lee, C.S.G., Robotics: Control, Sensing, Vision and Intelligence, McGraw Hill	1987
5	Groover, M. P., Wiess, M., Nagel, R. N. and Odery, N. G. Industrial Robotics- Technology, Programming and Applications, McGraw Hill Inc. Singapore	2000
9		

7ME6.3A: CNC MACHINES AND PROGRAMMING

B.Tech. (Mechanical) 7th semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction: Definition of NC, Applications of NC ,Historical Developments in Automation, Classification of NC Systems, Comparison of NC and Conventional Machines, Advantages of NC	8
II	NC Hardware: Architecture of NC Systems, Design Considerations, Mechanical Elements, Structure, Guideways and Slides, Guideway Elements, Transmission Systems, Spindle Unit, Coolant system, Lubrication System, Tool and work Changing Mechanisms, Electrical	8

	Elements, Drives, Sensors, Control Loops, Computing Elements/ Firmware, Interpolators	
III	NC Software: Introduction, Manual Part Programming, Computer-Assisted Part Programming, Language Based , Geometric Modeling Based, Automatic Part Program Generation,	8
IV	CAPP Systems , 5 Axis Programming, Post-Processing, Programming Robots and CMMs	4
	NC Simulation, Kinematic simulation, Volumetric simulation, Applications of Volumetric NC Simulation, Verification	4
V	Advanced Topics:, Adaptive Control, Off-line adaptive control, Various optimisation criteria, Hardware Based AC, Software Based AC, Tooling and Instruments for NC Special Considerations in High Speed Cutting (HSC) and Die Sinking, Rapid Product Development, CAM, FMS, CIM	8
	TOTAL	40

TEXT BOOK		
1	Krar S. and Gill A., CNC: Technology and Programming, McGraw Hill	1990
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Koren Y., Computer Control of Manufacturing Systems, Tata McGraw Hill.	1983
2	Pressman R.S. and Williams J.E., Numerical Control and Computer-Aided Manufacturing, John Wiley & Sons	1977,
3	Jones B.L., Introduction to Computer Numerical Control, John Wiley & Sons.	1986
4	Kral I.H., , Numerical Control Programming in APT, Prentice-Hall	1986
5	Chang C.H. and Melkanoff M.A., ,NC Machine Programming and Software Design, Prentice-Hall	1986

7ME7A: THERMAL ENGINEERING LAB-II

B.Tech. (Mechanical) 7th Semester
0L+0T+3P

Max. Marks: 100
Exam Hours: 3

SN	LABORATORY WORK/NAME OF EXPERIMENT	CONTACT HOURS
1	To perform constant speed load test on a single cylinder diesel engine and to plot performance curves: indicated thermal efficiency, brake thermal efficiency, mechanical efficiency Vs. Brake power, and heat balance sheet.	
2	To estimate the Indicated Power, Friction Power and Mechanical Efficiency of a multi-cylinder Petrol Engine. (Morse Test)	
3	Analysis of engine exhaust gases using Orsat apparatus / gas analyzer.	
4	To study refrigeration cycle, determination of coefficient of performance of cycle and tonnage capacity of refrigeration unit.	
5	To determine the COP and tonnage capacity of a Mechanical heat pump.	
6	To study various controls used in Refrigeration and Air conditioning system.	
7	Determination of dryness fraction of steam.	
8	Study and Performance of Simple Steam Turbine	
9	Performance characteristics of Pelton wheel turbine.	
10	Performance characteristics of Francis turbine.	
11	Performance characteristics of Kaplan turbine.	
12	Performance characteristics of variable speed centrifugal pump.	
13	Performance characteristics of rated speed centrifugal pump.	

7ME8A: FINITE ELEMENT LAB.**B.Tech. (Mechanical) 7th Semester**
OL+OT+3P**Max. Marks: 100****Exam Hours: 3**

SN	LABORATORY WORK/NAME OF EXPERIMENT	CONTACT HOURS
1	Laboratory work for the solution of solid mechanics problems, heat transfer problems, and free vibration problems A: by using FE packages such as NASTRAN/ ANSYS/ SIMULIA/ ABAQUS	
2	Introduction of GUI of the software in the above mentioned areas realistic problems.	
3	Analysis of beams and frames (bending and torsion problems)	
4	Plane stress and plane strain analysis problems	
5	Problems leading to analysis of axisymmetric solids	
6	Problems leading to analysis of three dimensional solids (a) Heat transfer problems (b) Modal analysis problem	
	B: by writing own code for finite element analysis using MATLAB for:	
7	Plane stress and plane strain analysis problems	
8	Modal Analysis problem	

8ME1A: COMPUTER INTEGRATED MANUFACTURING SYSTEMS**B.Tech. (Mechanical) 8th semester**
3L+OT**Max. Marks: 100****Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	Introduction to CIM: Overview of Production Systems, the product cycle, Automation in Production Systems, computer's role in manufacturing, sources and types of data used in manufacturing. The Beginning of CAM: Historical Background,	2
	Numerical Control (NC): Basic components of an NC system, coordinate system and motions control systems. Computer Numerical Control (CNC): features of CNC, machine control unit, CNC software. Direct Numerical Control and Distributed Numerical Control. Applications, advantages and disadvantages of NC. Adaptive control of machining system.	3
II	NC Part programming: Manual and computer assisted part programming, Part programming with APT. NC part programming using CAD/CAM software. NC cutter path verification.	8
III	Computer Aided Process Planning: Traditional Process Planning, Retrieval process planning system, Generative Process Planning, Machinability data systems, computer generated time standards.	4
	Group Technology: Introduction, part families, part classification and coding, coding system and machining cells.	4
IV	Computer Aided Production Management Systems: Introduction to computer aided PPC, Introduction to computer aided inventory management, manufacturing resource planning (MRPII), computer process monitoring and shop floor control, computer process control.	6
	Computer Aided Quality Control; Computer in quality control, contact inspection methods, Non contact inspection methods, optical and non optical computer aided testing.	2
V	Computer Aided Material Handling; Computer control on material handling, conveying, picking. Ware house control, computerized material handling for automated inspection and assembly.	

	Computer Integrated Manufacturing Systems: Introduction, types special manufacturing systems, flexible manufacturing systems (FMS).	5
	Collaborative Engineering; Introduction, Faster Design throughput, Web based design, Changing design approaches, extended enterprises, concurrent engineering, Agile and lean manufacturing.	3
	TOTAL	40

TEXT BOOK		
1	Mikell P. Groover, , Automation, Production Systems, and Computer-Integrated Manufacturing, 3rd ed., Pearson/Prentice Hall,	2008
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	James A. Rehg and Henry W. Kraebber, 2005, Computer-Integrated Manufacturing, 3rd ed., Pearson/Prentice Hall,	
2	Nanua Singh, 1996, Systems Approach to Computer-Integrated Design and Manufacturing, John Willey & Sons.	
3	Computer Aided Manufacturing, Chang, Wysk and Wang, Pearson Education	
4	CAD/CAM: Principles and Applications, P.N. Rao, McGraw Hill	
5	Computer Control of Manufacturing Systems,Y. Koren, McGraw Hill	
6	Computer aided Manufacturing, Rao, Tiwari and Kundra, Tata McGraw Hill.	
7	Computer Numerical Control: Machining and Turning Centres, Quesada and Jeyepoovan, Pearson Education	

8ME2A: LAWS FOR ENGINEERS

B.Tech. (Mechanical) 8th semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Constitutional Law: The Preamble; Fundamental Rights; Directive principles of State policy; Fundamental Duties; Emergency provisions – kinds, legal requirements and legal effects.	5
	General Principles of Contract under Indian Contract Act, 1872: General principles of contract – Sec. 1 to 75 of Indian Contract Act and including Government as contracting party, Kinds of government contracts and dispute settlement, Standard form contracts; nature, advantages, unilateral character, principles of protection against possibility of exploitation, judicial approach to such contracts, exemption clauses, clash between two standard form contracts.	4
II	Introduction to Human Rights: Theoretical foundation, Historical development of human rights; Human Rights in Indian tradition and Western tradition; Covenant on Civil & Political Rights 1966 including Optional Protocol – I (Individual Complaint Mechanism) & Optional Protocol – II (Abolition of Death Penalty); Covenant on Economic, Social and Cultural Rights 1966 including Optional Protocol – I (2002);	4
	Enforcement of Human Rights in India including Supreme Court, High Courts, Statutory Commissions – NHRC, NCW, NCM, NC-SC/ST etc.	4
	Labour Laws: Industrial Disputes Act, 1947; Collective bargaining; Industrial Employment (Standing Orders) Act, 1946; Workmen's Compensation Act, 1923.	3
III	Right to Information Act, 2005: Evolution and concept; Practice and procedures; Official Secret Act, 1923; Indian Evidence Act, 1872;	3

	Information Technology – legislation and procedures, Cyber crimes – issues and investigations.	
	Law relating to Intellectual property: Introduction–meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; International instruments on IP – Berne convention, Rome convention, TRIPS, Paris convention and international organizations relating IPRs, WTO etc;	4
IV	Law relating to Copyright in India, Meaning of copyright – literary, dramatics and musical works, sound records and cinematographic films, computer programs, Ownership of copyrights, Criteria of infringement, Piracy in Internet – Remedies and procedures in India;	1
	Law relating to Trademarks under Trademark Act, 1999 including Rationale of protection of trademarks as Commercial aspect and Consumer rights, Trademarks, registration, procedures, Distinction between trademark and property mark, Doctrine of deceptive similarity, Passing off an infringement and remedies;	2
	Law relating to Patents under Patents Act, 1970, Patentable inventions with special reference to biotechnology products, Patent protection for computer programs, Process of obtaining patent –application, examination, opposition and sealing of patents, Patent cooperation treaty and grounds for opposition, Rights and obligations of patentee, Duration of patents – law and policy considerations, Infringement and related remedies.	3
V	Corporate Law: Meaning of corporation; Law relating to companies, public and private (Companies Act, 1956) general provisions; Law and multinational companies – International norms for control, FEMA 1999, Corporate liability, civil and criminal.	4
	Election provisions under Indian Constitution (Art.324–329): Representation of Peoples Act and Prevention of Corruption Act, 1988; Superintendence, directions and control of elections to be vested in Election Commission; Election to the house of people and to the legislative assemblies of States to be on the basis of adult suffrage. Candidate electoral rights.	3
	TOTAL	40

REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	D.D. Basu, Shorter Constitution of India, Prentice Hall of India	1996
2	M.P. Jain, Indian Constitutional Law, Wadhwa & Co.	2005
3	S.K. Awasthi & R.P. Kataria, Law relating to Protection of Human Rights, Orient Publishing	2006
4	S.K. Kapur, Human Rights under International Law and Indian Law, Central Law Agency	2001
5	Avtarsingh, Law of Contract, Eastern Book Co	2002
6	Wadhera , Intellectual Property Rights, Universal Law Publishing Co	2004
7	T. Ramappa, Intellectual Property Rights Law in India, Asia Law House	2010
8	O.P. Malhotra, Law of Industrial Disputes, N.M. Tripathi Publishers	

8ME3A: POWER GENERATION

B.Tech. (Mechanical) 8th Semester
3L+1T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction to economics of power generation: Load duration	7

	curves, location of power plants, power plant economics.	
II	Analysis of Steam Power Plants (SPP): Components of steam power plants, Effect of variations, variation of steam condition on thermal efficiency of steam power plant. Typical layout of SPP. Efficiencies in a SPP.	9
III	Analysis of Hydroelectric Power Plants (HEPP): Components of HEPP, Typical layout of HEPP, Performance of turbines and comparison.	4
	Analysis of Diesel and Gas Turbine Power Plants: General layout of Diesel and Gas Turbine power plants, Performance of Diesel and Gas Turbine power plants, comparison with other types of power plants.	4
IV	Wind Energy: Wind energy potential measurement, general theories of wind machines, basic laws and concepts of aerodynamics, aerofoil design; wind mill and wind electric generator. Description and performance of the horizontal-axis wind machines. Description and performance of the vertical-axis wind machines. The generation of electricity by wind machines,	8
V	Solar radiation: its measurement and prediction. Flat plate collectors, liquid and air type. Theory of flat plate collectors, advanced collectors, optical design of concentrators, selective coatings, solar water heating, thermal storage. Conversion of heat into mechanical energy. Solar cells, photovoltaic effect, performance of a solar cell, P-V material, performance of solar cells, P-V modules. Solar P-V plants, Economies of solar photovoltaic's.	8
		40

TEXT BOOK		
1	P.K.Nag, Power Plant Engineering, Tata McGraw Hill	2008
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Hau E., Wind Turbines: Fundamentals, Technologies, Application and Economics, Springer	2000
2	Mathew S., Wind Energy: Fundamentals, Resource Analysis and Economics, Springer	2006
3	Burton T. Sharpe D. Jenkins N. and Bossanyi E., Wind Energy Handbook, John Wiley	2001
4	Jiandong T. (et al.) , Mini Hydropower, John Wiley	
5	Duffie J. A. and Beckman W. A. , Solar Engineering of Thermal Processes, John Wiley	1997
6	Goswami D. Y. Kreith F. and Kreider J. F. Principles of Solar Engineering, Taylor and Francis	2006
7	Garg H. P. and Prakash S. Solar Energy: Fundamental and Application, Tata McGraw Hill	1999
8	Green M., Third Generation Photovoltaics: Advance Solar Energy, Springer	1997
9	Tiwari G. N., Solar Energy: Fundamentals, Design, Modeling and Applications, Narosa	2005
10	Johnson G. L. Wind Energy Systems (Electronic Edition), Prentice Hall	2002
11	Wagner H. and Mathur J. Introduction to Hydro energy Systems : Basics, Technology and Operation, Springer	2006
12	Nayak J. K. and Sukhatme S.P. Solar Energy: Principles of Thermal Collection and Storage, Tata McGraw Hill	2011
13	Solanki C. S. Solar Photovoltaics: Fundamentals, Technologies and Applications, Prentice Hall India	2006
14	F.T.Morse, D.Van.Nostran, Power Plant Engineering, Newyork,	2009
15	Johnson G. L. Wind Energy Systems (Electronic Edition), Prentice Hall	1953

16	Wagner H. and Mathur J. Introduction to Hydro energy Systems : Basics, Technology and Operation, Springer	2006
17	M.M.EI- Wakil, Power Plant Technology, McGraw Hill	1984

8ME4.1A: PRODUCT DEVELOPMENT AND LAUNCHING

B.Tech. (Mechanical) 8th semester
3L+0T

Max. Marks: 100

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Importance of New Product: Definition-importance-Development Process, Importance of new product for growth of enterprise, Definition of product and new product,	2
	Responsibility for new product development, Demands on product development team, Classification of products from new product development point of view- Need based/Market pull products, Tech. push, Platform based, Process based and customized products,	3
	New product development process and organization, Generic product development process for Market Pull Products, Modification of this process for other types of products.	3
II	Need Analysis: Problem Formulation Establishing economic existence of need, Need Identification and Analysis, Engineering Statement of Problem, Establishing Target Specification.	8
III	Generation of Alternatives and Concept Selection: Concept generation- a creative process, Creativity, Road Elects to creative thinking-Fear of criticism and Psychological set,	4
	Tools of creativity like brain storming, Analogy, Inversion etc., Creative thinking Process, Concept feasibility and Concept Selection, Establishing Engineering Specification of Products.	4
IV	Preliminary and Detailed Design: Design Review Preliminary design- Identification of subsystems, Subsystem specifications, Compatibility, Detailed design of subsystems, component design,	6
	Preparation of assembly drawings, Review of product design from point of view of Manufacturing, Ergonomics and aesthetics.	2
V	Management of New Product: Development and Launch New Product Management's Challenges, Maintaining focus, Promotion of Right Culture, Management of Creativity, Top Management attention, Design Team Staffing and Organization, Setting key mile stone, Identification of Risk Areas, Project Execution and Evaluation Product Launch Strategies,	8
	TOTAL	40

TEXT BOOK		
1	Product Design and Manufacturing, Chitale and Gupta. McGraw Hill.	
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Product Design and Development, Ulrich and Eppinger, McGraw Hill	2003
2	Project Management in New Product Development, Barkley B.T., Tata McGraw Hill.	2008
3	Product Management, Anandan C., McGraw Hill.	2009
4	Engineering Design Methods, Cross, Nigel, John Wiley and Sons.	1995
5	Product Design and Manufacture, Lindbeck, J.R., Prentice Hall of India.	1995

8ME4.2: COMPUTATIONAL FLUID DYNAMICS

UNIT	CONTENTS	CONTACT HOURS
I	Introduction to Computational Fluid Dynamics and Principles of Conservation: Conservation of mass, linear momentum: Navier-Stokes equation, Conservation of Energy, General scalar transport equation, Reynolds transport theorem,	4
	Classification of Partial Differential Equations and Physical Behaviour: Elliptic, parabolic and hyperbolic partial differential equations	2
	Approximate Solutions of Differential Equations: Error Minimization Principles, Approximate solutions of differential equations, variational approach, Weighted residual approach: trial function and weighting function, Essential and natural boundary conditions, Least square method, Galerkin's method, Rayleigh-Ritz method	4
II	Fundamentals of Discretization: Pre-processing, Solution, Post-processing, Finite Element Method, Finite difference method, Well posed boundary value problem, Conservativeness, Boundedness, Transportiveness, Finite volume method (FVM), 1-D steady state heat conduction without and with constant source term	3
	Finite Volume Method: FV Discretization of a 1-D steady state diffusion type problem, Composite material with position dependent thermal conductivity, Source term linearization, Implementation of boundary conditions, 1-D unsteady state diffusion problems: implicit, fully explicit and Crank-Nicholson scheme	4
III	Solution of Systems of Linear Algebraic Equations: Solution techniques for systems of linear algebraic equations: Elimination, Iteration and Gradient Search method, L-U decomposition technique, Tridiagonal matrix algorithm (TDMA): Thomas algorithm	4
	Iteration methods: Generalized analysis of the iterative methods, Sufficient condition for convergence, Scarborough criteria of for convergence Relaxation methods, Preferential characteristics of iterative methods, Multigrid method, Line by line TDMA, Alternating direction implicit method, Gradient search methods: Steepest descent method, Conjugate gradient method	4
IV	Discretization of Convection-Diffusion Equations: A Finite Volume Approach: Central difference scheme, Upwind scheme, Exponential scheme and Hybrid scheme, Power law scheme, Generalized convection-diffusion formulation, The concept of false diffusion, QUICK scheme.	5
	Discretization of Navier Stokes Equations: Discretization of the Momentum Equation: Stream Function-Vorticity approach and Primitive variable approach, Staggered grid and Collocated grid, SIMPLE Algorithm, SIMPLER Algorithm	3
V	Introduction to Turbulence Modeling: Vorticity transport equation, Homogeneous turbulence and isotropic turbulence, Reynolds average Navier stokes (RANS) equation, Necessity of turbulence modeling, Turbulence model: Eddy viscosity, Mixing length, The κ - ϵ model, RNG κ - ϵ model, κ - ω model, Reynolds stress model (RSM), Large eddy Simulation (LES), Direct numerical simulation (DNS)	4
	The basic structure of a CFD code: Pre-processor, Solver and Post-processor, User-defined-subroutines, Solution to some basic problems in heat transfer and fluid flow	3
	TOTAL	40

TEXT BOOK

1	Computational Fluid Dynamics, John Anderson, McGraw Hill Publication	
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Computational Fluid Dynamics, Jiynan Tu, Butter Worth Henman.	1998
2	Computational Fluid and Heat Transfer, Anderson & Tannehill, Taylor & Francis Publication.	1997
3	Computational Methods for Fluid Dynamics, Joel H. Ferziger, Springer Publication.	2009
4	Computational Heat Transfer, Jaluria Y., Taylor and Francis Publication.	1996
5	Computational Heat Transfer and Fluid Flow, Murlidhar and T. Sunder Rajan, Narosa Publications	2011

8ME4.3A: TOTAL QUALITY MANAGEMENT

B.Tech. (Mechanical) 8th semester
3L+0T

Max. Marks: 100
Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	Introduction to TQM: Definition, Basic approach, Guru's of TQM, TQM framework, benefits.	2
	Leadership: Characteristics of Quality Leadership, Leadership Concepts, The 7 Habits of Highly Effective People, The Deming Philosophy, The Role of TQM Leaders, Quality Council, Core Values, Concepts, and Framework, Quality Statements, Strategic Planning Communications, Decision Making.	3
	Customer Satisfaction: Introduction, Customer Perception of Quality, Feedback, Using Customer Complaints, Service Quality, Translating Needs into Requirements, Customer Retention.	3
II	Continuous Process Improvement: Introduction, Process, The Juran Trilogy, Improvement Strategies, Types of Problems PDSA Cycle, Problem-Solving Method, DMAIC, Kaizen, Reengineering.	3
	Supplier Partnership: Principles of Customer/Supplier Relationship Partnering, Sourcing Supplier, Selection ,Supplier Certification Supplier Rating, Relationship Development.	2
	Performance Measures: Basic Concepts, Strategy, performance measure presentation, Cost of Quality, Malcolm Baldrige and Rajiv Gandhi National Quality Award, Balanced Score Card	3
III	Lean Enterprise: Historical Review, Lean Fundamentals, Value Stream Map, Implementing Lean, Benefits.	3
	Six Sigma: Statistical Aspects, Improvement Methodology, Organizational Structure Benefits.	3
	Benchmarking: Benchmarking Defined, Reasons to Benchmark, Process, deciding what to benchmark, Pitfalls and Criticisms.	2
IV	Quality Management Systems: Benefits of ISO Registration, ISO Series of Standards, Sector-specific Standards, ISO 9001 Requirements, Implementation, Documentation, Writing the Documents, Internal Audits, Registration.	2
	Environmental Management Systems: ISO 14000 Series Standards, Concepts of ISO 14001, ISO 14001, Requirements, Benefits, Integrating QMS and EMS. Other EMS Systems, Relationship to Health and Safety	2
	Quality Function Deployment: The QFD Team, Benefits, the voice of the Customer, Organization of Information, House of Quality, Building a House of Quality, QFD Process.	2
	Total Productive Maintenance: The Plan, Learning the New Philosophy, Promoting the Philosophy, Training, Improvement Needs, Goal,	2

	Developing Plans, Autonomous Work Groups	
V	Management Tools: Forced Field Analysis, Nominal Group Technique, Affinity Diagram, Interrelationship Digraph, Tree Diagram, Matrix Diagram, Prioritization Matrices, Process Decision Program Chart, Activity Network Diagram	2
	Experimental Design: Introduction, Basic Statistics, Hypothesis, t Test F Test. One Factor at a Time Orthogonal Design, Point and Interval Estimate, Two Factors Full Factorials.	3
	Taguchi's Quality Engineering: Introduction, Loss Function, Orthogonal Arrays, Signal-to-Noise Ratio, Parameter Design, Tolerance Design, Case study	3
	TOTAL	40

TEXT BOOK		
1	D. H. Besterfield, G. H Besterfield, Hemant Urdhwaresh, Total Quality Management: Revised Third Edition, Pearson Higher Education	2013
REFERENCE BOOKS		
SN	Name of Authors /Books /Publisher	Year of Pub.
1	Total Quality Management: text with cases, John S Oakland, Butterworth-Heinemann	2003
2	Total Quality Management for Engineers, Zaire, M., Wood Head Publishing Ltd.	1991
3	Total Quality Control, Feigenbaum. Armand V., McGraw Hill	1991
4	The Management and Control of Quality,(5th Edition), James R.Evans and William M.Lidsay, South-Western (Thomson Learning)	2002
5		

8ME5A: CAM LAB.

B.Tech. (Mechanical) 8th Semester
0L+0T+2P

Max. Marks: 75
Exam Hours: 2

SN	NAME OF EXPERIMENT	CONTACT HOURS
1	To prepare part programming for plain turning operation.	
2	To prepare part programming for turning operation in absolute mode.	
3	To prepare part program in inch mode for plain turning operation.	
4	To prepare part program for taper turning operation.	
5	To prepare part program for turning operations using turning cycle.	
6	To prepare part program for threading operation.	
7	To prepare part program for slot milling operation.	
8	To prepare part program for gear cutting operation.	
9	To prepare part program for gear cutting using mill cycle.	
10	To prepare part program for drilling operation.	
11	To prepare part program for multiple drilling operation in Z-axis.	
12	To prepare part program for multiple drilling in X-axis.	
13	To prepare part program for multiple drilling in X and Z axis using drilling cycle.	

8ME6A: CAD LAB.

B.Tech. (Mechanical) 8th Semester
0L+0T+3P

Max. Marks: 100
Exam Hours: 3

SN	NAME OF EXPERIMENT	CONTACT

		HOURS
1	Introduction and different features of the CAD Software.	
2	2-D Drafting.	
3	3-D Modeling.	
4	3-D Advanced Modeling.	
5	Assembly modeling.	
6	Feature Modification and Manipulation	
7	Detailing.	
8	Sheet Metal Operations.	
9	Surface Modeling	
10	One Dimensional problems of Finite Element Method Note: (These exercises may be performed by any of the following Advanced CAD Software such as Pro E /Unigraphics/ AutoCAD Inventor)	

8ME7A: INDUSTRIAL ENGINEERING LAB-II

B.Tech. (Mechanical) 8th Semester
0L+0T+2P

Max. Marks: 75
Exam Hours: 2

SN	NAME OF EXPERIMENT	CONTACT HOURS
1	Determination of time standard for a given job using stopwatch time-study.	
2	Preparation of flow process chart, operation process chart and man-machine charts for an existing setup and development of an improved process.	
3	Study of existing layout of a workstation with respect to controls and displays and suggesting improved design from ergonomic viewpoint.	
4	To carry out a work sampling study.	
5	To conduct process capability study for a machine in the workshop.	
6	To design a sampling scheme based on OC curve.	
7	To conduct Shewart's experiments on known population	
8	Generation of random numbers for system simulation such as facility planning, job shop scheduling etc.	