DEPARTMENT OF CIVIL ENGINEERING

B.Tech. (Civil Engineering)

Session 2022-23

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

S. No.	Course Code	Course Name	CO No.	Course Outcomes (After completing the course students will be able to…..)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1FY2-01	Engineering Mathematics-I	CO1	Apply the fundamentals of define and explain basic concepts definite integrals, sequence and series, periodic functions and multivariable functions.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO2	Apply the fundamentals of understand properties of beta and gamma function, convergence of sequence and series.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO3	Apply the fundamentals of apply properties of beta and gamma functions and definite integrals to find surface area and volumes of revolution. They will be able to apply partial derivatives and multiple integrals to solve many problems in science and engineering.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO4	Apply the fundamentals of analyse Fourier series to make many useful deductions which lay down foundation of signal processing and image processing.	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
2	1FY2-02	Engineering Physics	CO1	Describe the concepts of Wave and Quantum mechanics, Laser and Fiber optics, material science and electromagnetic theory. (Recall/Remembering)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO2	Explain the different applications of Laser and optical fibers in communication, engineering, medicine and Science. Application of Hall effect (Examine)	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO3	Evaluate energy states in 1-D and 3-D box with the application of quantum mechanics.(Apply)	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO4	Analyze the crystal structure through X-ray Diffraction & wavelength of light through Newton's ring experiment and Michelson- interferometer ,types of materials through Hall effect . (Analyze)	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
3	1FY1-05	Human Values	CO1	Relate sustained happiness through identifying the essentials of human values and skills	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
			CO2	Find the happiness and human values in terms of personal and social life to create harmony in them	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
			CO3	Use and understand practically the importance of trust, mutually satisfaction and human relationship	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
			CO4	Identify the orders of nature for the holistic perception of harmony for human existence	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
			CO5	Implement professional ethics and natural acceptance of human values in his/her life	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-
4	1FY3-06	Programming for Problem Solving	CO1	Understand the basic concepts of fundamental of computer system, number system and programming. (Remembering)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO2	Explain various memory units, representation of number system and Conditional, Iterative statements using arrays, string, pointers, file structure. (Understanding)	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO3	Examine the concept of algorithms, flowchart, Operators, Pointer, Array, String, structure, union using modularization to solve complex problems using C Programming (Applying)	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO4	Illustrate the User Defined functions, Memory management and File concepts to solve real time problems using C Programming (Analyzing)	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
5	1FY3-09	Basic Civil Engineering	CO1	Describe Scope, role and Specialization of Civil Engineering, basics of surveying, types of building, Plinth area, carpet area, floor space index, R.C.C., mode of transportation and different causes of pollution. (Remember)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO2	Explain solid waste management, building by-laws, concept of sun light and ventilation, chemical and hydrological cycle, biodiversity, causes of road accident, sanitary landfill and on-site sanitation, food chain and food web, contour maps, Global warming, Climate Change, Ozone depletion, and Green House effect. (Understand)	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO3	Illustrate method of ranging and levelling, road safety measures, building component, environmental acts, different types of foundation, treatment and disposal of waste water, traffic sign and symbol and rain water harvesting. (Apply)	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO4	Compute errors in linear measurement, bearings and elevations of respective points on the ground. (Analyze)	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
6	1FY2-20	Engineering Physics Lab	CO1	Operate the various devices for the multifarious use in the relative fields.	1	-	-	-	-	-	-	-	-	-	-	2	-	-	-
			CO2	Apply knowledge of Newton's Ring,grating, spectrometer,Optical fiber ,Sextant, Hall effect , a n d L a s e r to determine wavelength of light, dispersive power,Numerical aperature Height of Object, Hall coefficient, coherence length and coherence time	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-
			CO3	To conduct the experiments with interest and an attitude of learning.	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
			CO4	Evaluate the Band Gap and time constants (t=RC) using basic principles of semiconductors and Capacitors by graphs.	-	2	-	-	-	-	-	-	2	-	-	-	-	-	-
7	1FY1-23	Human Values Activities and Sports	CO1	Recall the natural and social issues and their remedies.	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
			CO2	Describe the nature of human values and the impact of external factors over it.	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
			CO3	Validate through actions the significance of trust, respect and harmony with self and surroundings.	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
			CO4	Outline the relation of human with nature and other factors in terms of human existence	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
			CO5	Associate the knowledge of self and society with clear understanding of social issues and the human beings.	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
9	1FY3-27	Basic Civil Engineering Lab	CO1	Describe various sanitary fittings and water supply fittings	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO2	Examine pH, Turbidity, Hardness and Total solids of given water sample	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO3	Use of EDM and Total Station in the field	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO4	Investigate the linear and angular measurements of the points on the ground and levelling	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO5	Students will show an ability to communicate effectively and work as a team member ethically	-	-	-	-	-	-	-	2	3	2	-	-	-	-	-
9	1FY3-24	Computer Programming Lab	CO1	Relate the fundamental of C Programming as variable, operators and taxonomy to write a basic C Program	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO2	Write programs that perform operations using condition control statements and loop control statements, single and multi-dimensional arrays along with specific program of matrix multiplication.(Examine)	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO3	Use C programs to implement operations related to Array, Macros and inline functions, Dynamic memory allocations, concept of Structure, Unions and Pointers	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-

			CO4	Students will show an ability to communicate effectively and work ethically	-	-	-	-	-	-	-	2	-	2	-	-	-	-	-
10	**1FY3-28**	**Computer Aided Engineering Graphics**	**CO1**	Describe engineering drawing terminology, concept of scales and conic sections.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO2	Draw Projection of Points, lines, planes, solids and section of solids	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO3	Draft 2D engineering problems on CAD software.	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
			CO4	Students will show an ability to work as a team member ethically	-	-	-	-	-	-	-	2	3	-	-	-	-	-	-
11	**2FY2-01**	**Engineering Mathematics-II**	**CO1**	Apply the fundamentals of define basic rank of matrix to find, eigen values and eigen vectors of the matrix, degree and order of differential equations.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO2	Apply the fundamentals of explain complementary functions and particular integral of ordinary differential equation and various methods of solution of ODE to solve complex engineering problems.	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO3	The Apply the fundamentals of apply an appropriate analytical technique to find solution of first order and higher order differential equations.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO4	Apply the fundamentals of classify higher order partial differential equations and analyze a wide variety of time dependent phenomena of real world including heat conduction, wave equation particle diffusion.	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
12	**2FY2-03**	**Engineering Chemistry**	**CO1**	Describe characteristics of water, fuel and Engineering materials-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO2	Determine of hardness of water and calorific value of fuels for Industrial as well as domestic purposes	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO3	Compare different techniques of water treatment, fuel analysis, Manufacturing of engineering materials and corrosion protection methods	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO4	Prepare the generic drugs or medicines by identifying the applications of organic reaction mechanism and manufacturing of engineering materials	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
13	**2FY1-04**	**Communication Skills**	**CO1**	Describe the process of communication, basics of Grammar and Writing and Literary Aspects	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
			CO2	Explain the types of communication, barriers and channels of communication and the concept of Literature through Short Stories and poetry	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
			CO3	Write and prepare professional reports, paragraph and business letters with the correct use of grammar	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
			CO4	Discuss and illustrate the impact of social and moral values by implying the basics of English Writing Skills through literary aspects	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
			CO5	Restate and outline the basic areas of English Language Skills with the applications of literature	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
14	**2FY3-07**	**Basic Mechanical Engineering**	**CO1**	Apply the fundamentals of retrieve basic concepts of thermal and manufacturing process.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO2	Students will able to compare different types of thermal and manufacturing processes and.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO3	Students will able to annotating about the functioning of turbine & pumps, IC engines, refrigeration system, modes of transmission of power, materials and primary manufacturing process.	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO4	Apply the fundamentals of appraise the fundamental knowledge of thermal engineering, in addition to understanding of power transmission to solve the industrial and societal issues.	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
15	**2FY3-08**	**Basic Electrical Engineering**	**CO1**	Identify basic components of electrical engineering and connect them to form different circuits to verify basic laws.Understanding	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO2	Analyse the output of rectifier circuit,AC and DC machines to solve problems assosciated with Basic electrical engineering.Analyse	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO3	Contribute efficiently in a team to acieve desired response of AC and DC Machines. Team Work	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
			CO4	Demonstrate the output of rectifier circuits consistiong of basic components of electrical engineering. Mechanism	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
16	**2FY2-21**	**Engineering Chemistry Lab**	**CO1**	Determine the strength of unknown solution by volumetric analysis.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO2	Examine the characteristics of lubricating oil in groups	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
			CO3	Analyze different characteristics of water and fuel to solve societal and enviornmental problems	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
			CO4	Students will show an ability to work as a team member ethically	-	-	-	-	-	-	-	2	3	-	-	-	-	-	-
17	**2FY1-22**	**Language Lab**	**CO1**	Use and pronounce the words correctly.	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
			CO2	Acquire knowledge of the correct expressions,vocabulary etc. in personal and professional lives.	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
			CO3	Plan successfully for leadership and teamwork,crack GD's, interviews and other professional activities.	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
			CO4	Synthesize the process of communication using LSRW.	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
18	**2FY3-25**	**Manufacturing Practices Workshop**	**CO1**	Describe the working of Lathe machine.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO2	Apply the basic concepts of Foundry Shop	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO3	Develop various carpentry joints, welding joints and sheet metal objects.	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO4	Students will show an ability to work as a team member ethically	-	-	-	-	-	-	-	2	3	-	-	-	-	-	-
19	**2FY3-26**	**Basic Electrical Engineering Lab**	**CO1**	Discuss measurement of electrical quantites	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO2	Compare different connections of transformer	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO3	Demonstrate constructional features of electrical machines and converters	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO4	Students will show an ability to communicate effectively and work as a team member ethically	-	-	-	-	-	-	-	2	3	2	-	-	-	-	-
20	**2FY3-29**	**Computer Aided Machine Drawing**	**CO1**	Describe orthographic projections and basic Geometrical Concept	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO2	Analyze Sectional Views of different mechanical Components and assembly drawing	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO3	Draft a engineering product using CAD software	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
			CO4	Students will show an ability to work as a team member ethically	-	-	-	-	-	-	-	2	3	-	-	-	-	-	-
21	**3CE2-01**	**Advance Engineering Mathematics-I**	**CO 1**	Find the concept of numerical methods, Laplace transform, Fourier transform and Z-transform.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
			CO 2	Explain numerical methods to find unknown values with help of known values , Roots finding techniques and Solution of ordinary differential equations.	2	-	-	-	-	-	-	-	-	-	-	-	1	1	-
			CO 3	Apply the appropriate technology and compare the viability of different approaches to the numerical solution of problems.	3	-	-	-	-	-	-	-	-	-	-	-	1	1	-
			CO 4	Analyze the Fundamentals of the Fourier transform, Laplace transform, and Z-Transforms .These systems can be carried out in terms of either a time domain or a transform domain formulation.	-	2	-	-	-	-	-	-	-	-	-	-	1	2	-

			CO 5	Evaluate differential equations involved in Vibration theory, Heat transfer and related engineering applications by Laplace transform and Fourier transform techniques and use Z-transform in the characterization of Linear Time Invariant system (LTI), in development of scientific simulation algorithms.	-	3	-	-	-	-	-	-	-	-	-	-	-	-	2	-
22	**3CE1-02**	**Technical Communication**	**CO 1**	Understanding the characteristics of technical writing and the importance of purpose, audience, and genre for written communication in technical fields.	-	-	-	-	-	-	-	-	1	2	-	1	1	-	2
			CO 2	Planning, drafting, revising, editing, and critiquing technical and professional documents through individual and collaborative writing.	-	-	-	-	-	-	-	-	1	2	-	2	2	-	2
			CO 3	Create clear, concise technical documents that effectively use style and grammar and information structure in ways that create meaning with the reader	-	-	-	-	-	-	-	-	1	1	-	2	2	-	2
			CO 4	Researching, analyzing, synthesizing, and applying information to create technical reports.	-	-	-	-	-	-	-	-	1	2	-	2	2	-	3
23	**3CE3-04**	**Engineering Mechanics**	**CO 1**	Describe the basic fundamental laws of Engineering mechanics for civil engineering	2	-	-	-	-	-	-	-	-	-	-	-	1	2	-
			CO 2	Implement the process of concept on various typical structure like spring, plane trusses in field	2	-	-	-	-	-	-	-	-	-	-	-	1	2	1
			CO 3	Apply the concept of technical parameters like principle of virtual work, moment of inertia in civil engineering	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1
			CO 4	Analyze the various structural parameters such as force, work, truss, stresses and strains & their significance in civil engineering	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
24	**3CE4-05**	**Surveying**	**CO 1**	Explain the basic principles of surveying instruments and their significance in Civil Engineering.	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
			CO 2	Apply the working Principles of Survey instrument in ground levels, curve tracing, topography map & areas for construction.	3	-	-	-	-	-	-	-	-	-	-	-	2	1	-
			CO 3	Analyze the linear and angular measurements,photogrammetry, geometry of curves, reduce levels of ground, errors and corrections in the field.	-	3	-	-	-	-	-	-	-	-	-	-	-	1	-
			CO 4	Examine the Surveying data parameters and technology for civil engineering applications such as culverts,sewer lines and Tunnel.	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-
25	**3CE4-06**	**Fluid Mechanics**	**CO 1**	Define the types of fluids, Peroperties, types of flows, instruments used for flow measurement, losses in pipe.	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
			CO 2	Explain the types of fluids, Peroperties of fluids, Static, Kinematics & Dynamics behaviour of fluid, instruments used for flow measurement,losses in pipe and principles of flow	2	-	-	-	-	-	-	-	-	-	-	-	-	1	-
			CO 3	Apply the concept of Pascal, Archemedes, Euler, Bernoulli, Darcy Wesibach and momentum equations	3	-	-	-	-	-	-	-	-	-	-	-	-	1	-
			CO 4	Analyse the flow, Properties, forces,Pressure & discharge of fluid and losses in pipes	-	3	-	-	-	-	-	-	-	-	-	-	-	1	1
26	**3CE4-07**	**Building Materials and Construction**	**CO 1**	Explain the different building materials and building construction techniques.	2	-	-	-	-	-	-	-	-	-	-	-	1	1	-
			CO 2	Classify the types, properties, tests with instruments used for construction works and materials.	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
			CO 3	Apply the techniques used for construction of various building components.	3	-	-	-	-	-	-	-	-	-	-	-	1	2	-
			CO 4	Compare the building materials and construction techaniques used at construction site.	-	3	-	-	-	-	-	-	-	-	-	-	1	2	-
					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	**3CE4-08**	**Engineering Geology**	**CO 1**	Describe the basic concept of geology, GIS and remote Sensing for civil engineering.	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
			CO 2	Demonstration of geological studies, investigation process and their significance in civil engineering	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
			CO 3	Apply the process of Engineering Geology, GIS and remote sensing in civil engineering application	3	-	-	-	-	-	-	-	-	-	-	-	-	2	-
			CO 4	Analyze the properties, behavior and engineering significance of rocks, mineral and geological features.	-	3	-	-	-	-	-	-	-	-	-	-	2	-	-
28	**4CE2-01**	**Advance Engineering Mathematics-II**	**CO 1**	Define probability models using probability mass (density) functions and concept of variance and sampling distribution	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
			CO 2	Classify the probability distributions of discrete and continuous random variables, Mathematical expectation and moments	2	-	-	-	-	-	-	-	-	-	-	-	1	1	-
			CO 3	Apply discrete and continuous distribution such as binomial, Poisson, uniform, exponential, normal distribution and their statistical measures to various problems and the curve fitting methods of linear and non-linear forms to analyze the data	3	-	-	-	-	-	-	-	-	-	-	-	1	2	-
			CO 4	Examine the concept of the Test of significance on sampling and the behavior of the sample mean	-	2	-	-	-	-	-	-	-	-	-	-	1	2	-
			CO 5	Evaluate the correlation between two variables and use regression analysis applications for purposes of description and prediction	-	3	-	-	-	-	-	-	-	-	-	-	1	2	1
29	**4CE1-03**	**Managerial Economics & Financial**	**CO 1**	Describe the fundamental concepts of Economics and Financial Management and define the meaning of national income, demand, supply, cost, market structure, and balance sheet	-	-	-	-	-	1	-	-	-	2	3	-	-	-	1
			CO 2	Calculate the domestic product, national product and elasticity of price on demand and supply	-	2	-	-	-	-	-	-	-	-	3	-	-	-	1
			CO 3	Draw the cost graphs, revenue graphs and forecast the impact of change in price in various perfect as well as imperfect market structures	-	-	2	-	-	-	-	-	-	-	3	-	-	-	1
			CO 4	Compare the financial statements to interpret the financial position of the firm and evaluate the project investment decisions	-	-	-	2	-	-	-	-	-	-	3	-	-	1	-
30	**4CE3-04**	**Basic Electronics for Civil Engineering Applications**	**CO 1**	Explain the concepts of semiconductor, diode, BJT, measurement errors and digital electronics.	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
			CO 2	Apply the basic concepts of electronics components in instrumentation etc.	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
			CO 3	Analyse the various characteristics of sensors and transducers.	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
			CO 4	Explain the concept of digital image and digital image processing	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-
31	**4CE4-05**	**Strength of Materials**	**CO 1**	Describe the basic knowledge of strength of material for analysis of structural component.	2	-	-	-	-	-	-	-	-	-	-	-	3	3	-
			CO 2	Apply concepts of SFD, BMD, Hooks laws and Deflection methods for structural engineering applications.	3	-	-	-	-	-	-	-	-	-	-	-	3	3	-
			CO 3	Analyze the structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behavior of materials.	-	3	-	-	-	-	-	-	-	-	-	-	2	2	-
			CO 4	Compare the different classical method of S.F.D, B.M.D ,bending & deflection of beams,strength of Columns & Torsion of shaft for structural analysis.	-	3	-	-	-	-	-	-	-	-	-	-	3	2	1
3	**4CE4-06**	**Hydraulics Engineering**	**CO 1**	Describe the basic concept of dimensional and model analysis.	2	-	-	-	-	-	-	-	-	-	-	-	2	-	2
			CO 2	Apply the phenomenon of hydraulics and various flow over field.	3	-	-	-	-	-	-	-	-	-	-	-	2	-	2
			CO 3	Analyze the open channel flow and bounadry layer conditions of surface profile.	-	3	-	-	-	-	-	-	-	-	-	-	2	3	3

		Engineering	CO 4	Diffrentiate the characteristics for turbine and hydraulic pump applications in civil engineering.	-	3	-	-	-	-	-	-	-	-	-	-	3	2	2
32	4CE4-07	Building Planning	CO 1	Explain the fundamental principles, and concepts of building planning,sun path diagram,Vaastu shastra and architecture for buildings.	2	-	-	-	-	-	-	-	-	-	-	-	1	1	-
			CO 2	Apply various aspects of local building bye-laws, Vaastu shastra and provisions of National Building Code in respect of building and town planning.	3	-	-	-	-	-	-	-	-	-	-	-	1	1	-
			CO 3	Prepare the plan, elevation and section for Residential and Non Residential Buildings.	3	-	-	-	-	-	-	-	-	-	-	-	2	2	1
			CO 4	Analyze the concepts of the buildings according the modern requirements such as sustainability, environment friendly for Green Buildings.	-	3	-	-	-	-	-	-	-	-	-	-	3	2	1
33	4CE4-08	Concrete Technology	CO 1	Identify the functional role of ingredients of concrete and use this knowledge to mix design philosophy.	2	-	-	-	-	-	-	-	-	-	-	-	1	2	2
			CO 2	Explain an experimental approach to characterize the fresh and hardened properties of concrete	2	-	-	-	-	-	-	-	-	-	-	-	-	1	2
			CO 3	Evaluate the effect on structural concrete using the properties, failure modes, environment on service life performance, destructive and non destructive testing methods.	-	2	-	-	-	-	-	-	-	-	-	-	2	1	2
			CO 4	Design a concrete mix which fulfills the required properties of fresh and hardened concrete.	-	-	3	-	-	-	-	-	-	-	-	-	2	1	2
34	5CE3-01	Construction Technology and equipment	CO 1	Describe the basic concept of construction, its technology & various equipments used in construction field.	2	-	-	-	-	-	-	-	-	-	-	-	1	2	-
			CO 2	Execute the safety programmes necessary for construction work in civil engineering	3	-	-	-	-	-	-	-	-	-	-	-	1	2	1
			CO 3	Apply the various safety measures in construction field and fire safety as Per NBC code	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1
			CO 4	Analyze the inspection, quality control in construction planning and materials management	-	3	-	-	-	-	-	-	-	-	-	-	1	1	1
35	5CE4-02	Structure Analysis- I	CO 1	Able to define basic concepts of structure analysis used in civil engineering.	2	-	-	-	-	-	-	-	-	-	-	-	1	1	1
			CO 2	Able to explain various methods and theorems used for analysis of civil structures.	2	-	-	-	-	-	-	-	-	-	-	-	2	2	3
			CO 3	Able to apply concepts of Area moment method, Conjugate beam method, Three moments theorem, vibration, Mathematical models to analyze building components.	-	2	-	-	-	-	-	-	-	-	-	-	2	2	3
			CO 4	Able to analyze Statically Indeterminate Structures using Slope-deflection method, Moment-distribution method and simple harmonic motion concepts.	-	3	-	-	-	-	-	-	-	-	-	-	2	2	3
36	5CE4-03	Design of Concrete Structures	CO 1	Explain the design parameters of RCC beams, slabs, Column and Footings.	2	-	-	-	-	-	-	-	-	-	-	-	1	2	-
			CO 2	Apply the fundamental concepts to design reinforced concrete member according to the IS code 456:2000	3	-	-	-	-	-	-	-	-	-	-	-	1	2	1
			CO 3	Investigate control deflection and crack width of singly, doubly, flanged beams thorugh test serviceability as per codal provisions	-	2	-	-	-	-	-	-	-	-	-	-	2	-	1
			CO 4	Assess failure condition due to shear, bond curtailment of reinforcement, deflection and torsion in beams and slabs as per codal provision	-	3	-	-	-	-	-	-	-	-	-	-	1	1	1
			CO 5	Design of beams, slab, column and column footings economically and according to site conditions.	-	-	3	-	-	-	-	-	-	-	-	-	2	1	2
37	5CE4-04	Geotechnical Engineering	CO 1	Identify the soil and its behavior according to their properties.	2	-	-	-	-	-	-	-	-	-	-	-	2	2	-
			CO 2	Apply the fundamental concepts of mathematics, solid mechanics and fluid mechanics for the solution of geotechnical engineering problems.	3	-	-	-	-	-	-	-	-	-	-	-	3	2	-
			CO 3	Analyze various engineering properties of different types of soils, strength parameters and the effect of surroundings on properties of soil	-	2	-	-	-	-	-	-	-	-	-	-	-	3	2
			CO 4	Evaluate interrelationship of different soil properties, stresses of soil mass, the settlements of foundations, stability of natural slopes, and bearing capacity of soils.	-	-	-	2	-	-	-	-	-	-	-	-	2	2	-
38	5CE4-05	Water Resources Engineering	CO 1	Understand different methods of irrigation technique and evaluate water requirements for crop production.	1	-	-	-	-	-	-	-	-	-	-	-	3	-	-
			CO 2	Compute channels for appropriate water application in respective areas.	-	-	2	-	-	-	-	-	-	-	-	-	3	-	-
			CO 3	Design of various dams in respective areas.	-	-	2	-	-	-	-	-	-	-	-	-	-	2	-
			CO 4	Compare various cross-drainage structures and rainfall intensity in respective areas.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1
39	5CE5-12	Disaster Management	CO 1	Explain the concept of disasters, risks, hazards, capacity building, coping with disaster and disaster management act and policy in India	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
			CO 2	Interpret the disasters types, risks, hazards, management techniques based on causes, occurence etc.	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
			CO 3	Differentiate the different type of disaster such as Hyderometeorological, Bological, Geological, technological disasters etc.	-	3	-	-	-	-	-	-	-	-	-	-	-	2	-
			CO 4	Distinguish the concept of capacity building, coping with disaster and disaster management act and policy in India	-	3	-	-	-	-	-	-	-	-	-	-	-	3	-
40	5CE5-13	Town Planning	CO 1	Describe the concept of Town Planning and different terminologies, Town Planning National Protocols.	2	-	-	-	-	-	-	-	-	-	-	-	2	2	1
			CO 2	Discuss the town planning methodologies and significant impact on a project.	2	-	-	-	-	-	-	-	-	-	-	-	3	2	2
			CO 3	Apply the concept of town planning on growth of a city, nation, migration of people etc.	3	-	-	-	-	-	-	-	-	-	-	-	2	2	2
			CO 4	Analyze effect of town planning on the growth of city zones like residential, commercial, industrial etc.	-	3	-	-	-	-	-	-	-	-	-	-	3	2	2
41	5CE5-14	Repair and Rehabilitation of Structures	CO 1	Explain the basic knowledege of repair and rehabilitation of Civil engineering structures.	2	-	-	-	-	-	-	-	-	-	-	-	3	2	-
			CO 2	Implement the preventive methods of reinforcement corrosion, cracking, Non-destructive test and Repair Techniques on concrete structures.	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
			CO 3	Differentiate the Deterioration, crack patterns, material for repairing of concrete structures.	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO 4	Conduct the investigation on bridges, piers and different concrete structures as the case studies.	-	-	-	3	-	-	-	-	-	-	-	-	-	3	-
					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	5CE5-15	Ground Improvement Technique	CO 1	Explain the fundamental concepts of ground improvement techniques in civil engineering construction activities.	3	--	-	-	-	-	-	-	-	-	-	-	-	1	-
			CO 2	Apply knowledge of Science and Geotechnical Engineering to solve problems in the field of modification of ground required for construction of Civil Engineering structures.	3	--	-	-	-	-	-	-	-	-	-	-	-	2	-
			CO 3	Analyze reinforced wall design using steel strip or geo-reinforcement in highway embankments.	--	3	-	-	-	-	-	-	-	-	-	-	-	2	-
			CO 4	Differentiate the various methods of ground improvement techniques and Outline the solution for problematic soils.	--	3	-	-	-	-	-	-	-	-	-	-	-	2	-
			CO 1	Explain the fundamental concept of shapes of structures, loadings, load flow concept and design loads.	2	-	-	-	-	-	-	-	-	-	-	-	3	1	-

43	6CE03-01	Wind & Seismic Analysis	CO 2	Apply the construction techniques for earthquake resistant constructions for new and existing structures as per differents indian codal recommendations.	3	-	-	-	-	-	-	-	-	-	-	-	3	1	-
			CO 3	Analyze the scientific and technological principles of planning,Combination of loads, analysis of buildings according to earthquake design philosophy.	-	3	-	-	-	-	-	-	-	-	-	-	3	1	1
			CO 4	Examine the flat,pitched and Monoslope roof subject to wind load of building structure.	-	3	-	-	-	-	-	-	-	-	-	-	3	1	1
44	6CE4-02	Structural Analysis-II	CO 1	State the basic concept of strain energy, Rolling load, ILD, Arches, Shear Centre & Unsymmetrical bending for structural members.	2	-	-	-	-	-	-	-	-	-	-	-	1	2	-
			CO 2	Explain Strain Energy theorem, Muller Breslau Principle, Shear Centre, unsymmetrical bending, and approximate method of building frame for structural analysis.	2	-	-	-	-	-	-	-	-	-	-	-	1	2	1
			CO 3	Apply the concept of strain energy, Rolling load, ILD, Arches, Shear Centre & Unsymmetrical bending and Building frames for structural analysis.	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1
			CO 4	Analyze beam and frames using strain energy method, unit load method, rolling load, influence line diagram method and approximate methods.	-	3	-	-	-	-	-	-	-	-	-	-	1	1	1
45	6CE4-03	Environmental Engineering	CO 1	Explain water quality standards, the water distribution system for residentail areas, reservoirs and conduit for potable water transport system , source of residential and industrial air pollution and noise pollution	2	-	-	-	-	-	-	-	-	-	-	-	1	2	3
			CO 2	Apply water treatment methods like RO, UV, primary, advance etc and parameters used in the sewer system for its management and treatment.	3	-	-	-	-	-	-	-	-	-	-	-	3	2	2
			CO 3	Analyze the sewerage characteristics quality parameters inlcuding Physica, Chemical and Biological parameters (Such as BoD, CoD, DO and pH etc.) and the indian standards of disposal on land.	-	3	-	-	-	-	-	-	-	-	-	-	3	2	1
			CO 4	Examine treatment methods of sewage like aerobic and, anaerobic and pollution sources due to improper disposal of sewage.	-	3	-	-	-	-	-	-	-	-	-	-	2	3	2
46	6CE-04	Design of Steel Structures	CO 1	Explain the fundamental concept of structural steel, plastic analysis, basic steel structure elements, plate girder, gantry girder, roof trusses & truss girder bridges.	2	-	-	-	-	-	-	-	-	-	-	-	1	1	-
			CO 2	Apply the concept of mechanism method, shape factor, connection types, basic steel structure elements, plate girder, gantry girder & roof trusses in steel structures.	3	-	-	-	-	-	-	-	-	-	-	-	1	1	-
			CO 3	Analyze the basic steel structural members, plate girder, gantry girder & roof trusses as per the concept of Indian Standard.	-	3	-	-	-	-	-	-	-	-	-	-	2	2	1
			CO 4	Design the basic steel structural members, plate girder, gantry girder & roof trusses for available site conditions as per the concept of Indian Standard.	-	-	3	-	-	-	-	-	-	-	-	-	3	2	1
47	6CE4-05	Estimating and Costing	CO 1	Explain the various types of estimates and its significance in Civil Engineering.	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
			CO 2	Apply the rate and specification of a material in construction sector.	3	-	-	-	-	-	-	-	-	-	-	-	1	1	2
			CO 3	Analyze the quantities and measurements of various types of civil engineering structure like building, roads and culverts.	-	3	-	-	-	-	-	-	-	-	-	-	1	-	1
			CO 4	Distinguish the different methods of valuation for various types of civil engineering structures	-	2	-	-	-	-	-	-	-	-	-	-	1	-	2
48	6CE5-12	Solid and Hazardous Waste Management	CO 1	Define the municipal waste, biomedical waste, hazardous waste, E-waste, industrial waste for environment safety	2	-	-	-	-	-	-	-	-	-	-	-	-	2	3
			CO 2	Explain the Solid Waste and Hazadous Waste charaterstics, collections, processing, treatment and disposal of waste, rules and acts for Solid waste mangement	3	-	-	-	-	-	-	-	-	-	-	-	-	-	2
			CO 3	Illustarte the differents solid waste collection and treatment with equipments, 3R principles, rules and acts.	-	2	-	-	-	-	-	-	-	-	-	-	-	1	-
			CO 4	Analyze the charaterstics, waste processing, methods of treatment, collectione techniques of Solid Waste and Hazadous Waste	-	3	-	-	-	-	-	-	-	-	-	-	-	3	1
49	6CE5-13	Traffic Engineering & Management	CO 1	Explain the fundamentals of traffic engineering and its features, elements of highway safety and approaches to accident Studies.	3	-	-	-	-	-	-	-	-	-	-	-	1	1	-
			CO 2	Apply the concept of planning, designing and management in traffic engineering.	2	-	-	-	-	-	-	-	-	-	-	-	1	1	-
			CO 3	Analyze various traffic characteristics for safety purpose on highway engineering.	-	3	-	-	-	-	-	-	-	-	-	-	2	2	1
			CO 4	Evaluate traffic data to find multiple solutions of complex traffic problems.	-	-	2	-	-	-	-	-	-	-	-	-	3	2	1
50	6CE5-14	Bridge Engineering	CO 1	Explain different types of bridges, components and loadings as per Indian standards provisions.	1	-	-	-	-	1	1	-	-	-	-	-	1	-	-
			CO 2	Apply the fundamental concept of bridge loadings on Steel and RCC bridges.	2	-	-	-	-	-	-	-	-	-	-	-	-	2	-
			CO 3	Analyze the RCC and steel bridges using Courbons and Hendry-Jaegar method.	-	2	-	-	-	-	-	-	-	-	-	-	-	2	-
			CO 4	Design of Bearings, Steel and RCC bridges according to IRC codal provisions.	-	-	2	-	-	-	-	-	-	-	-	-	2	-	-
51	6CE5-15	Rock Engineering	CO 1	Describe the basic concept of rock engineering and its mass classification systems	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
			CO 2	Apply methods for in situ investigation and laboratory testing of rock matrix and discontinuities.	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
			CO 3	Differentiate the characteristics and the mechanical properties (strength and failure criteria) of rock mass, rock matrix and discontinuities.	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-
			CO 4	Analyse the stress distribution (isotropic, anisotropic) in situ and around an opening in rock (competent rock, jointed rock mass, blocky rock)	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-
52	6CE5-16	GIS & Remote Sensing	CO 1	Discuss the basic concepts of remote sensing and GIS	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
			CO 2	Demonstrate the knowledge of remote sensing and GIS	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
			CO 3	Implement the Remote sensing and GIS methods in different field such as Urban, Agriculture, water resource etc.	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-
			CO 4	Analyze the photogrammetry, remote sensing and GIS technology and its processes.	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-
53	7CE4-01	Transportation Engineering	CO 1	Explain the basic knowledege of Highway, railway and airport engineering.	2	-	-	-	-	-	-	-	-	-	-	-	1	1	-
			CO 2	Apply the construction principal of matreial and their properties along with the behaviour of different modes of transportation Engineering.	3	-	-	-	-	-	-	-	-	-	-	-	2	1	-
			CO 3	Analyze the horizontal and vertical alignment, including super elevation as per standards of IRC.	-	3	-	-	-	-	-	-	-	-	-	-	2	-	-
			CO 4	Design rigid and flexible pavements which comply with IRC: 37 standards, and factor influencing their maintenance.	-	3	-	-	-	-	-	-	-	-	-	-	2	2	-
54	7CE60.1	Environmental Impact Analysis			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO 1	Describe the Environmental Impact Assessment concept and impact of anthropogenic interventions on water, air, flaura and fauna	2	-	-	-	-	-	-	-	-	-	-	-	2	2	-
			CO 2	Discuss Stockholm and Basal convention, Copenhagen conference, Rio-Earth summit, and Guidelines of MoEF and CPCB in Indian Scenario	2	-	-	-	-	-	-	-	-	-	-	-	2	2	-
			CO 3	Analyze environmental impact assessment like water, noise and air pollution by a project/activity like thermal and water power plants	-	3	-	-	-	-	-	-	-	-	-	-	2	2	-
			CO 4	Evaluate Ad hoc,Overlays, Checklist, Matrix and Network methods of EIA, quality standards for environmental assessment	-	-	2	-	-	-	-	-	-	-	-	-	2	2	-

55	**7CE60.2**	**Disaster Management**	**CO 1**	Define concept of disasters, risks, hazards, capacity building, coping with disaster and disaster management act and policy in India.	3	-	-	-	-	-	-	-	-	-	-	2	-	-
			CO 2	Explain concept of disasters, risks, hazards, capacity building, coping with disaster and disaster management act and policy in India.	2	-	-	-	-	-	-	-	-	-	-	2	-	-
			CO 3	Classify disasters, risks, hazards, management techniques.	-	2	-	-	-	-	-	-	-	-	-	2	-	2
			CO 4	Distinguish the concept of capacity building, coping with disaster and disaster management act and policy in India	-	3	-	-	-	-	-	-	-	-	-	2	2	2
			CO 5	Investigate of natural and man made disasters as a case study.	-	-	-	2	-	-	-	-	-	-	-	3	2	2
56	**8CE4-01**	**Project Planning and Construction Management**	**CO 1**	Explain the basic principles of project planning, objectives, stages, categories of construction project, Project Management and Financial aspects of project management	2	-	-	-	-	-	-	-	-	2	-	2	2	-
			CO 2	Apply the different project management techniques and the methods of network for various project	3	-	-	-	-	-	-	-	-	2	-	2	2	-
			CO 3	Analyze the optimum duration of a project and optimum cost of the project, updating of project networks, resources allocation' types of tender and contract and Contract document, Legal aspects of contracts, Contract negotiation and arbitration	-	3	-	-	-	-	-	-	-	2	-	2	2	-
			CO 4	Judge the causes of accidents and safety measure to be taken against different construction sites and imitates the Project Management Information System, Environmental and social aspects of various types of construction projects	4	-	-	-	-	-	-	-	-	2	-	2	2	-
57	**8CE60.1**	**Composite Material**	**CO 1**	Explain the basics of composites, its structure and its properties like metal matrix, polymer matrix and ceramic matrix composites, Fibres Matric	2	-	-	-	-	-	-	-	-	-	-	2	2	-
			CO 2	Discuss micromechanics, macro-mechanics properties like volume fraction, weight fraction, density ofcomposites longitudinal elastic properties, Transverse elastic properties	2	-	-	-	-	-	-	-	-	-	-	2	2	-
			CO 3	Analyze engineering properties of composite materials , elastic behaviour of composite Lamina-Macro-mechanics	-	2	-	-	-	-	-	-	-	-	-	2	2	-
			CO 4	Evaluate testing of composites like Mechanical testing of composites, Tensile testing, Compressive testing, Intra-Laminar shear testing, Fracture testing	-	3	-	-	-	-	-	-	-	-	-	2	2	-
58	**8CE60.2**	**Fire and Safety Engineering**	**CO 1**	Explain the fundamentals of Fire Engineering.	2	-	-	-	-	-	-	-	-	-	-	-	-	2
			CO 2	Apply the learned principles in planning, designing and management of fire safe buildings.	-	2	-	-	-	-	-	-	-	-	-	2	-	-
			CO 3	Compare firefighting installations, control technologies and hazardous materials.	-	1	-	-	-	-	-	-	-	-	-	-	-	1
			CO 4	Use of fire fighting equipment, safety Design, safety management and legislation.	-	2	-	-	-	-	-	-	-	-	-	-	2	-
59	**8CE7-50**	**Project**	**CO 1**	Team work to select an engineering problem and its solution	2	2	-	-	-	3	-	3	-	-	-	1	1	2
			CO 2	Formulate the problem and design using modern technologies and new software learning	1	-	-	-	-	-	-	3	3	3	-	-	2	-	1
			CO 3	Develop the engineering solutions by considering society and environment	2	-	-	-	-	-	-	2	3	3	-	-	1	-	-
			CO 4	Applying solution considering societal, health, safety, legal and cultural issues	2	1	-	-	-	-	-	-	2	2	-	-	1	-	-
			CO 5	Analysis and explanation of data to provide the valid conclusions.	2	-	-	-	-	1	-	-	2	2	-	-	2	-	-
			CO 6	Use of management principles in project functioning and consider the multidisciplinary environments.	-	-	-	-	-	-	-	-	-	-	3	2	-	1	2
			CO 7	To work effectively in Project as an individual member and team by following the ethical principles	-	-	-	-	-	-	-	3	3	-	-	-	-	-	1
			CO 8	Communicate effectively for various activities with help of reports, presentations and verbal communication that can help in life-long learning.	-	-	-	-	-	-	-	-	-	3	-	2	-	-	2