POORNIMA
COLLEGE OF ENGINEERING

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Sample Question Paper (Internal and External) Exam

FIRST MID TERM EXAMINATION 2021-22
Code: 3ME1-02 Category: PCC Subject Name–TECHNICAL COMMUNICATION
(BRANCH – MECHNAICAL ENGINEERING)

Course Credit: 02

Max. Time: 2 hrs.   Max. Marks: 40

NOTE:-   Read the guidelines given with each part carefully.

Course Outcomes (CO):

At the end of the course the student should be able to:

CO1:   Understanding the characteristics of technical writing and the importance of purpose, audience, and genre for written communication in technical fields.

CO2:   Planning, drafting, revising, editing, and critiquing technical and professional documents through individual and collaborative writing.

CO3:   Create clear, concise technical documents that effectively use style and grammar and information structure in ways that create meaning with the reader

CO4:   Researching, analyzing, synthesizing, and applying information to create technical reports.

	PART - A: (All questions are compulsory) Max. Marks (5)				
		Marks	**CO**	**BL**	**PO**
Q.1	What is Technical Communication?	1	1	1	8
Q.2	Discuss Technical style.	1	2	1	8
Q.3	Why is Reading a communicative process?	1	2	1	9
Q.4	Write any two features of Technical Communication.	1	1	2	10
Q.5	Write two lines on Note-Making.	1	2	2	10
	PART - B: (Attempt 4 questions out of 6) Max. Marks (20)				
Q.6	What makes technical communication different from general communication? Explain the process of Technical Communication.	5	1	1	8
Q.7	Describe the forms of Technical Communication?	5	1	2	8
Q.8	Write brief notes on: a)Brevity b)Clarity	5	2	1	9
Q.9	What are the importance and need of Technical Communication in today's era? Explain.	5	2	2	9
Q.10	Differentiate Note-taking and Note-making. Support your answer with suitable examples.	5	3	1	10
Q.11	What is Information design? What are the steps to prepare a document?	5	3	2	10
	PART - C: (Attempt 2 questions out of 3) Max. Marks (15)				
Q.12	Define Technical Communication skills. Elaborate Technical Communication skills in terms of LSRW (Listening, speaking, reading and writing).	7.5	1	1	8
Q.13	State the difference between efficient and inefficient reading. Brief about the	7.5	2	2	9

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			7.5	3	3	10

different skills required to read different kinds of texts.

| Q.14	Read the following Comprehension Passage and answer the questions:	7.5	3	3	10
	"I Have a Dream" is a public speech delivered by American MECHANICAL rights activist Martin Luther King Jr. during the March on Washington for Jobs and Freedom on August 28, 1963, in which he calls for an end to racism in the United States and called for MECHANICAL and economic rights. Delivered to over 250,000 MECHANICAL rights supporters from the steps of the Lincoln Memorial in Washington, D.C., the speech was a defining moment of the MECHANICAL rights movement. Beginning with a reference to the Emancipation Proclamation, which freed millions of slaves in 1863, King observes that: "one hundred years later, the Negro still is not free". Toward the end of the speech, King departed from his prepared text for a partly improvised peroration on the theme "I have a dream", prompted by Mahalia Jackson's cry: "Tell them about the dream, Martin!" In this part of the speech, which most excited the listeners and has now become its most famous, King described his dreams of freedom and equality arising from a land of slavery and hatred. Jon Meacham writes that, "With a single phrase, Martin Luther King Jr. joined Jefferson and Lincoln in the ranks of men who've shaped modern America". The speech was ranked the top American speech of the 20th century in a 1999 poll of scholars of public address. A) Write a summary of the given passage. B) What issues does Martin Luther King's speech address? C) What pushes King to speak: "I have a dream"? D) From the last paragraph, give one word for "to leave" E) What is the name of martin Luther King's famed speech? F) In front of whom does King speak?	(2.5) (1) (1) (1) (1) (1)			

BLOOM's LEVEL WISE MARKS DISTRIBUTION
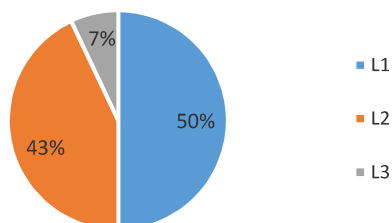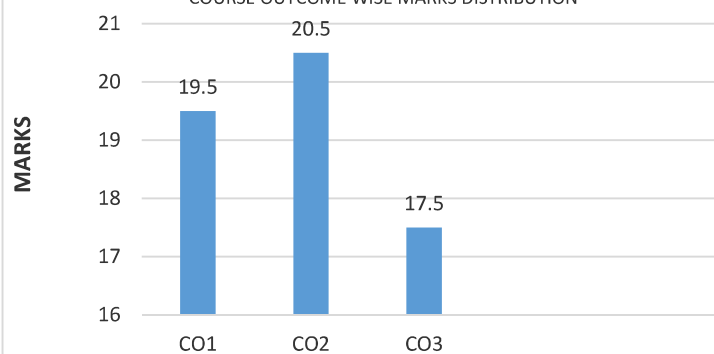
- L1 — 50%
- L2 — 43%
- L3 — 7%

COURSE OUTCOME WISE MARKS DISTRIBUTION

- CO1 — 19.5
- CO2 — 20.5
- CO3 — 17.5

BL – Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3 – Applying, 4 – Analyzing, 5 – Evaluating, 6 - Creating)

CO – Course Outcomes; PO – Program Outcomes

II B.TECH. (III Sem.)   Roll No. _____

FIRST MID TERM EXAMINATION 2021-22
Code: 3ME2-01 Category: BSC Subject Name–Advanced Engineering Mathematics
(BRANCH – MECHNAICAL ENGINEERING)

Course Credit: 03

Max. Time: 2 hrs.   Max. Marks: 60
NOTE:-   Read the guidelines given with each part carefully.

Course Outcomes (CO):
At the end of the course the student should be able to:
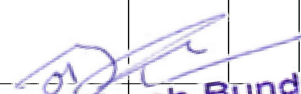CO1: Find the concept of numerical methods, Laplace transform, Fourier transform and Z-transform.
CO2: Explain numerical methods to find unknown values with help of known values, Roots finding techniques and Solution of ordinary differential equation.
CO-3 Apply the appropriate technology and compare the viability of different approaches to the numerical solution of problems.
CO-4 Analyse 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.
CO-5 Solve 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.

	PART - A: (All questions are compulsory) Max. Marks (10)				
		Marks	**CO**	**BL**	**PO**
Q.1	Find the missing term from the following table		1	L2	1
		2			
Q.2	Show that $\Delta = E\nabla$	2	1	L2	1
Q.3	Solve $\dfrac{dy}{dx} = xy$ with the help of Euler's method, given that y(0)=1 and find y when x=0.3.	2	1	L2	1
Q.4	Write the formula of Adam's predicator-corrector methods. Where we use this method?	2	1	L2	1
Q.5	Write the Trapezoidal rule. Where we use this method?	2	1	L2	1
	PART - B: (Attempt 4 questions out of 6) Max. Marks (20)				
Q.6	Use Newton's divided difference formula to find the value of f(6) from the following data:	5	2	L3	1
Q.7	Use by Newton Raphson method, the real root of the equation $x^3 - 3x - 5 = 0$.	5	2	L4	1
Q.8	Apply Simpson's 1/3 and 3/8 rule to evaluate $\displaystyle\int_{0}^{6} \frac{1}{1+x^2}dx$	5	3	L3	1
Q.9	Using Lagrange's formula to find the value of y(2) from the following data:		2	L2	1

Q.1 table:

x	2	4	6	8	10
$f(x)$	5.6	8.6	13.9	?	35.6

Q.6 table:

x	3	7	9	10
f(x)	168	120	72	63

Q.9 table:

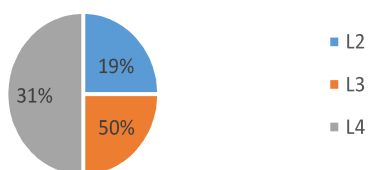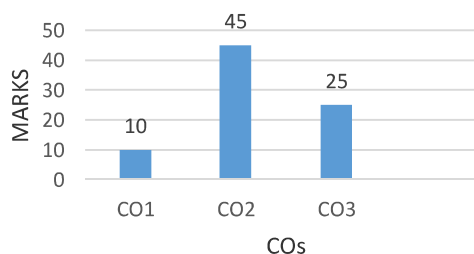| x	0	1	4	5
y	8	11	68	123

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Q.10	Use Milne's Corrector method to find $y(0.8)$ given that : $$\frac{dy}{dx} = x - y^2; y(0) = 0, y(0.2) = .02, y(0.4) = 0.0795. y(0.6) = 0.1762$$	5	2	L3	1
Q.11	Use stirling's formula to find y (28) given:	5	2	L3	1

x:	20	25	30	35	40
f(x)	49225	48316	47236	45926	44306

PART - C: (Attempt 3 questions out of 4) Max. Marks (30)

Q.12	The ordinates of the normal curve are given by the following table:	10	3	L4	1

X	1	2	3	4	5	6	7	8
f(x)	1	8	27	64	125	216	343	512

Calculate (i) y (1.5) (ii) y (7.5)

Q.13	Use Runge-Kutta method to find y form x=0.1 to 0.2 for $$\frac{dy}{dx} = x + y; y(0) = 0, h = 0.1$$	10	2	L3	1
Q.14	Apply Regula Falsi method, the real root of the equation $x log_{10} x - 1.2 = 0$ correct to four decimal places.	10	2	L4	1
Q. 15	Find $f'(0)$ from the following table	10	3	L3	

x	0	1	2	3	4	5
$f(x)$	4	8	15	7	6	2

BLOOM's LEVEL WISE MARKS DISTRIBUTION — L2 19%, L3 50%, L4 31%

COURSE OUTCOME WISE MARKS DISTRIBUTION — CO1 10, CO2 45, CO3 25

BL – Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3 – Applying, 4 –

Analyzing, 5 – Evaluating, 6 - Creating)

CO – Course Outcomes; PO – Program Outcomes

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FIRST MID TERM EXAMINATION 2021-22
Code: 3ME3-04 Category: PCC Subject Name–ENGINEERING MECHANICS
(BRANCH – MECHNAICAL ENGINEERING)

Course Credit: 02

Max. Time: 2 hrs.   Max. Marks: 40
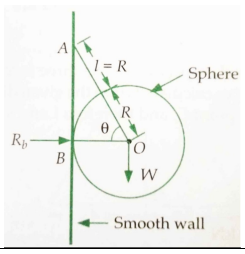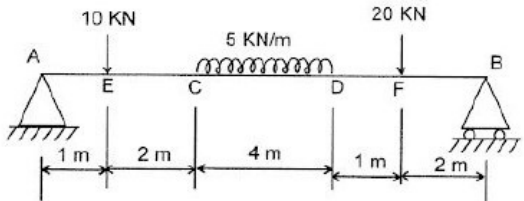 <u>NOTE:-</u>   Read the guidelines given with each part carefully.
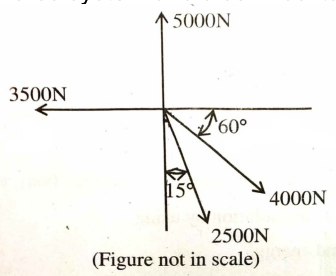
Course Outcomes (CO):
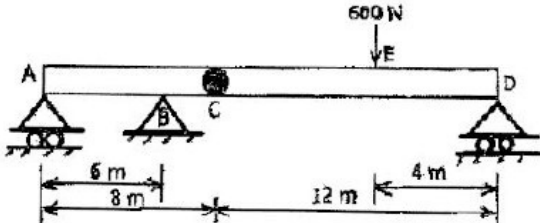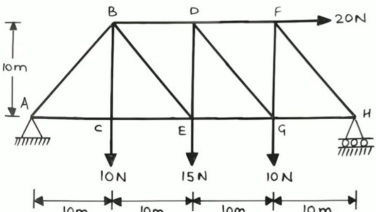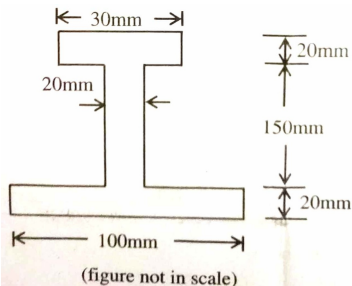At the end of the course the student should be able to:
CO1: Describe Static and Dynamic forces acting in Simple mechanisms and motions
CO2: Explain the motion characteristics of a body subjected to a given force system.
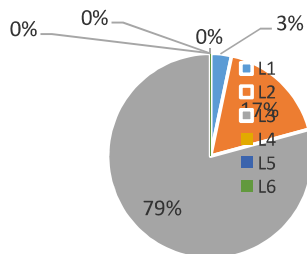CO3: Illustrate numerous concepts for designing mechanics of various machine/automobile components
CO4: Solve the engineering problems of statics and dynamics for mechanical systems

		Marks	CO	BL	PO
	PART - A: (All questions are compulsory) Max. Marks (5)				
Q.1	Resultant of two equal forces is equal to either of them. Show that the angle between the forces is 2π/3.	1	2	3	1
Q.2	A rectangle ABCD has sides AB=CD=80 mm and BC=DA=60 mm. Forces of 150 N each act along AB and CD, and forces of 100 N each act along BC and DA. What is the resultant moment of the force system?	1	2	3	1
Q.3	A smooth sphere of radius R and weight W is supported in contact with a smooth vertical wall by a string whose length equals the radius of sphere. The string joint a point on the wall and a point on the surface of sphere. Draw a free body diagram of the forces of system.	1	4	3	2
Q.4	Mention the forces which are generally omitted while applying the principle of virtual work.	1	1	1	1
Q.5	What is meant by an axis/ plane of symmetry of a body in the context of centroid /centre of gravity	1	1	1	1
	PART - B: (Attempt 4 questions out of 6) Max. Marks (20)				
Q.6	Determine the support reactions for the beam loaded as shown in figure.	5	3	3	1
Q.7	Find the resultant of given force system and also finds its direction.	5	2	3	1
Q.8	State and prove Lami's theorem. What are the limitations of Lami's theorem to find out resultant of forces?	5	1	2	1

Q.9	Two beams AC and CD are hinged at C and are supported by rollers at A and D and a hinge support is provided at B as shown in fig. Using principle of virtual work, determine the reactions at the hinge C and at support B, when a load of 600 N is acting at point E.	5	3	3	1
Q.10	A uniform ladder of weight 250 N rests against a smooth vertical wall and a rough horizontal floor making an angle of 45° with horizontal. Find the forces of friction at floor using principle of virtual work.	5	4	3	2
Q.11	State the varignon's theorem and prove the same.	5	1	2	1
	PART - C: (Attempt 2 questions out of 3) Max. Marks (15)				
Q.12	The resultant of two forces P and Q acting at a point is R, If Q is doubled the force R also gets doubled and if Q is reversed, R is again doubled show that the ratio of P, Q and R is given by P: Q: R = $\sqrt{2}$: $\sqrt{3}$: $\sqrt{2}$	7.5	2	3	1
Q.13	Find the force in member DF, DG and EG.	7.5	4	3	2
Q.14	Find the Moment of Inertia of a given figure about centroidal axis.	7.5	4	3	2

BLOOM's LEVEL WISE MARKS DISTRIBUTION

COURSE OUTCOME WISE MARKS DISTRI
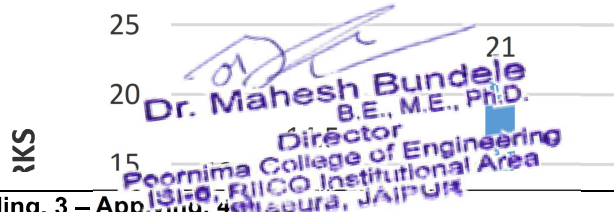
BL – Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3 – Applying, 4 – Analyzing, 5 – Evaluating, 6 - Creating)
CO – Course Outcomes; PO – Program Outcomes

FIRST MID TERM EXAMINATION 2021-22
Code: 3ME4-05 Category: PCC Subject Name–Engineering Thermodynamics
(BRANCH – MECHNAICAL ENGINEERING)

Course Credit: 03

Max. Time: 2 hrs.   Max. Marks: 6
NOTE:-   Read the guidelines given with each part carefully.

Course Outcomes (CO):
At the end of the course the student should be able to:
CO1: Describe the basic concept of thermodynamics
CO2: Apply the basic concepts of thermodynamics to solve complex problems
CO3: Analyse the thermodynamic power cycles like Carnot, Otto, Diesel, Brayton, Ericsson and Rankine
CO4: Evaluate the various thermodynamic parameters using the concepts of Entropy, Availability and Thermodynamics Relationship

|	PART - A: (All questions are compulsory) Max. Marks (10)	Marks	CO	BL	PO
Q.1	Define thermodynamic system, thermodynamic surrounding and thermodynamic system boundary.	2	1	2	1
Q.2	Differentiate heat and work.	2	1	2	1
Q.3	Explain heat engine, heat pump and refrigeration with neat sketch.	2	1	2	1
Q.4	Explain reversible and irreversible processes.	2	1	2	1
Q.5	What is PMM-1 and PMM-II?	2	1	2	1
	PART - B: (Attempt 4 questions out of 6) Max. Marks (20)				
Q.6	Derive the $(T1/T2) = (V2/V1)^{n-1}$ for polytropic process.	5	2	3	1
Q.7	Prove that work done for Polytropic process is $(P1V1/n-1) [1-(1/r^{n-1})]$.	5	2	3	1
Q.8	Prove that change in enthalpy is $m\, c_{p\,(T2-T1)}$.	5	2	3	1
Q.9	Prove that both Kelvin Planks and Clausius statement of second law of thermodynamics are equivalent.	5	2	3	1
Q.10	Derive Carnot Cycle efficiency.	5	2	3	1
Q.11	Prove that efficiency of any reversible engine operating between two reservoirs is independent of the nature of the working fluid and depend solely on the temperature of the reservoir.	5	2	3	1
	PART - C: (Attempt 3 questions out of 4) Max. Marks (30)				
Q.12	Derive steady flow energy equation and find the work done for isothermal process.	10	2	4	1
Q.13	Calculate change in internal energy, heat transferred and change in enthalpy for 0.5 kg air expanding according to the law $pv^{1.2}=C$ from 10 bar 300^0 C to 1 bar. What will be the work done by air during expansion? Assume $C_p= 1.005$ and $C_v= 0.718$.	10	3	4	2
Q.14	An air compressor takes in air at 1 bar and 35^0 C and compress it to 4 bar, Find the work done, heat transfer, and change in internal energy per kg of air compressed if the compression process is according to the law $pv^{1.25}$ constant. Take R=0.287 and y= 1.4.	10	3	4	2
Q. 15	A Carnot heat engine receives 650 kJ of heat per cycle from a high-temperature heat reservoir at 752ºC and rejects heat to a low-temperature heat reservoir at 40ºC. Determine:(a) The thermal efficiency of this Carnot engine (b) The amount of heat rejected to the low-temperature heat reservoir	10			

BLOOM's LEVEL WISE MARKS DISTRIBUTION

Legend: L1 (20%), L2 (40%), L3 (40%)

COURSE OUTCOME WISE MARKS DISTRIBUTION

CO	MARKS
CO1	10
CO2	20
CO3	30
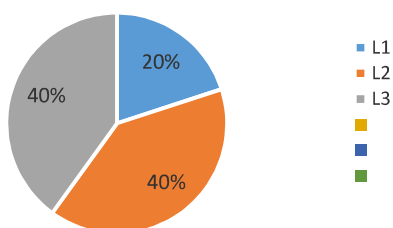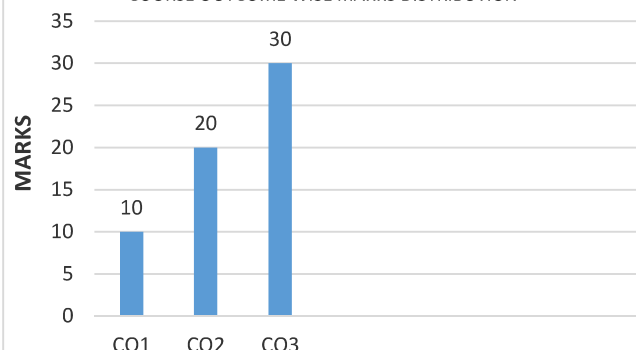
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FIRST MID TERM EXAMINATION 2021-22
Code: 3ME4-06 Category: PCC Subject Name–Material Science and Engineering
(BRANCH – MECHNAICAL ENGINEERING)

Course Credit: 03

Max. Time: 2 hrs.   Max. Marks: 60

NOTE:-   Read the guidelines given with each part carefully.

Course Outcomes (CO):
At the end of the course the student should be able to:
CO1:   Understand advanced sciences (chemistry and physics) and engineering of materials
CO2:   Integrate understanding of the scientific and engineering principles; i.e. structure, properties, processing, and performance related to systems
CO3:   Apply and integrate learnt knowledge to solve materials selection at design problems
CO4:   Understand advance areas of materials used in industry.
CO5:   Identify applications in current and emerging industries and areas of application

PART - A: (All questions are compulsory) Max. Marks (10)

		Marks	CO	BL	PO
Q.1	Identify briefly different crystal imperfections	2	2	2	1
Q.2	What is recrystallization temperature	2	1	1	1
Q.3	State the reaction of eutectoid and eutectic	2	3	4	1
Q.4	Define briefly Bauschinger's effect and strain hardening	2	2	2	1
Q.5	Define phase diagram and phase transformation	2	2	1	1

PART - B: (Attempt 4 questions out of 6) Max. Marks (20)

|		Marks	CO	BL	PO
Q.6	Draw neat sketches of unit cells of simple cubic, FCC and BCC crystal structures. Calculate the number of atoms in each case.	5	4	2	3
Q.7	Define crystalline, polycrystalline and amorphous material with examples	5	1	1	1
Q.8	What are Miller indices? How are they determined?	5	1	1	1
Q.9	State and classify the various engineering materials	5	2	1	1
Q.10	Explain and draw an equilibrium diagram of binary isomorphous alloy system.	5	3	2	1
Q.11	How do distinguish between slip and twin mechanisms, (b) hot and cold working	5	2	2	1

PART - C: (Attempt 3 questions out of 4) Max. Marks (30)

		Marks	CO	BL	PO
Q.12	What is mechanism of crystallization? Write it types. Distinguish between homogeneous and heterogeneous nucleation for solidification of a pure metal	10	2	2	1
Q.13	Describe recovery, re-crystallization and grain growth with suitable diagram.	10	1	2	1
Q.14	Describe binary system when two metals are completely soluble in the liquid state but only partly soluble in the solid-state with suitable examples	10	3	4	1
Q. 15	Draw neat labelled Iron-Carbon equilibrium diagram and discuss clearly the various terms, phases and invariant reactions points.	10	3	4	1

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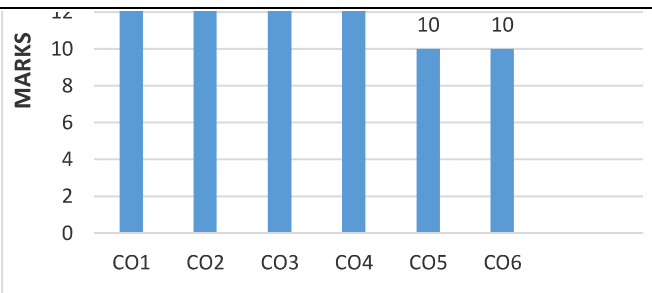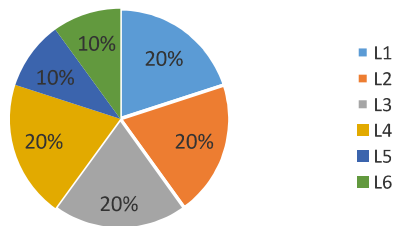
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CO – Course Outcomes; PO – Program Outcomes

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3E1209

B.Tech. III Sem. (Main) Examination, April / May - 2022
Automobile Engineering
3AE4-06 Materials Science and Engineering
AE, ME

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

Attempt all ten questions From Part A, All five Questions from **Part B and three questions out of five questions from Part C**

Schematic diagram must be shown wherever necessary. Any **data missing May** suitably be assumed and stated clearly. Units of quantities used/**calculated must** be stated clearly.

Use of following supporting material is permitted during **examination** (As mentioned in form No. 205)

PART - A (Word limit 25)

1. What is Re-Crystallization?
2. Define Miller Indices.
3. What is eutectic point? Explain **characteristic** of it.
4. What is Elastic deformation?
5. What is martensitic transformation?
6. Define Carburising.
7. What is solid solution?
8. What are Nano materials?
9. Discuss the general effects of tempering the steel
10. Discuss mechanical properties of materials   (10×2=20)

PART - B (Word limit 100)

1. Explain with neat sketches, the various types of crystal imperfections
2. What is phase transformation in the Iron carbon diagram
3. Explain Nitriding process of heat treatment of Steps
4. Explain the effects of addition of Si, Cr, Mo, V and W alloying elements on the properties of steel.
5. Explain Rockwell hardness testing method with sketch.   (5×4=20)

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PART - C (Any three)

1. Draw neat labelled Iron carbon equilibrium diagram. Explain invariant reactions occur in this diagram.

2. What are properties and engineering applications of PMMA, ABS, PVC, PA and PTFE?

3. What do you understand by tempering of steel? What properties can be acquired by steel after tempering process? Classify various tempering processes.

4. Draw a neat sketch of the TTT diagram for a eutectoid steel and label the regions.

5. Differentiate hardness and hardenability. Explain the following transformation.

   i) Austenite to Bainite.

   ii) Austenite to parlite.   (3×10=30)

3E1208

B.Tech. III Sem. (Main) Examination, April/May - 2022
Automobile Engineering
3AE4-05 Engineering Thermodynamics
AE, ME

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

Attempt all ten questions From Part A, All five Questions from Part B and three questions out of five questions from Part C .

Schematic diagram must be shown wherever necessary. Any data missing may suitably be assumed and states clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination (As mentioned in form No. 205).

PART - A (Word limit 25)   (10×2=20)

1. What is thermodynamic equilibrium?   (2)

2. What is triple point of a substance?   (2)

3. Explain clausius statement?   (2)

4. Explain the principle of entropy increase?   (2)

5. What is a pure substance?   (2)

6. Explain Gibbs Dalton law.   (2)

7. In Otto, Diesel and dual cycle, with same operating conditions which cycle has the maximum thermal efficiency?   (2)

8. What are the thermodynamic variables?   (2)

9. What are the properties of Ideal working fluid in vapour power cycle? (2)

10. What do you mean by Regeneration in a cycle.   (2)

PART - B (Word limit 100)   (5×4=20)

1. 0.3 Kg of nitrogen gas of 100 kpa and 40°C is contained in a cylinder. The piston is moved compressing or Nitrogen until 1 MPa. at this point the temperature is 160°C. The work done during the process is 30 KJ. Calculate the heat transfer from the Nitrogen.

    To the surroundings take C_v = 0.75 KJ/kg K. for Nitrogen.   (4)

2. Explain the concept of Entropy and Irreversibility and prove

$$ds \ge \frac{\delta\theta}{T}$$ (4)

3. A vessel of $0.03m^3$ capacity contains gas at 3.5 Bar pressure and 35°C temperature. Determine the mass of the gas in the vessel. If the pressure of this gas is increased to 10.5 Bar while the volume remain constant, What will be the temperature of the Gas? For the gas take R = 290 J/kg K (4)

4. A) Prove that the equation for enthalphy is given by: all nomenclature have usual meaning.

$$dh = C_P dT + \left\{ v - T\left(\frac{\partial v}{\partial T}\right)_P \right\} dP$$ (2)

   B) Prove that thermal efficiency of an Otto cycle is given by: $\left\{ \eta = 1 - \frac{1}{r^{\gamma-1}} \right\}$.

   Where all nomenclature have usual meaning. (2)

5. A) Explain vapour power cycle with a neat Diagram. (2)

   B) What are the various effect of operating conditions on the efficiency of vapour power cycle? (2)

PART - C (Any three)   (3×10=30)

1. A) The specific heat capacity of the system during a certain process is given by:

$$C_n = (0.4 + 0.004T) \, KJ / kg \, ^{O}C$$

   If the mass of the gas is 6 kg and its temperature changes from 25°C to 125°C find:

   i)   Heat transferred

   ii) Mean specific heat of gas. (5)

   B) Comment whether the following quantities can be called as properties or not.

   i) $\int Pdv$ ii) $\int vdP$ iii) $\int Pdv + vdP$ (5)

2. Air at 20°C and 1.05 bar occupies $0.025m^3$, the air is heated at constant volume until the pressure is 4.5 Bar, and then cooled at constant pressure.

   Back to original temperature. Calculate.

   i)   Net heat flow from the air.

   ii) Net entropy change. Sketch the process on T-S diagram. (10)

3E1208   (2)

3. Write short notes on

   A) P-V-T Surface

   B) Dryness fraction

   C) Super heated Steam

   D) Latent heat. (10)

4. For a perfect gas obeying Pv=RT show that C_v and C_p are independent of pressure. (10)

5. A turbine is supplied with steam at a pressure of 32 Bar and a temperature of 410°C. The steam then expands isentropically to a pressure of 0.08 Bar. Find the dryness fraction at the end of expansion and thermal efficiency of the cycle.

   If the steam is reheated at 5.5 Bar to a temperature of 395°C and then expanded isentropically to a pressure of 0.08 Bar, What will be the dryness fraction and thermal efficiency of the cycle? (10)

   _____

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POORNIMA COLLEGE OF ENGINEERING, JAIPUR

II B.TECH. (III Sem.)   Roll No. _____

FIRST MID TERM EXAMINATION 2021-22
Code: 3ME4-07 Category: PCC Subject Name-Mechanics of Solids
(BRANCH – MECHNAICAL ENGINEERING)

Course Credit: 04

Max. Time: 2 hrs.   Max. Marks: 80
NOTE:-   Read the guidelines given with each part carefully.

Course Outcomes (CO):
At the end of the course the student should be able to:
CO1: Explain basic concepts of stress, strain, deflection, torsion, bending and strain Energy.
CO2: Apply the concept of stresses and strain, theories of failure, bending & torsion on different types of loading conditions and sections to determine deformation, strain energy, Stresses & Strain etc.
CO3: Analyze the stresses in Mechanical Elements like Beam, Rod, shafts, and cylindrical and spherical thin wall pressure vessels etc., long and short columns for different end conditions.
CO4: Evaluate the deflection of beams and stresses in principal plane by analytical & graphical method.

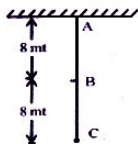**PART - A: (All questions are compulsory) Max. Marks (10)**

		Marks	CO	BL	PO
Q.1	Define the terms stress and strain along with its types.	2	CO1	L1	PO1
Q.2	Draw the stress strain curve for mild steel and mention the properties evaluated by it.	2	CO1	L1	PO1
Q.3	Discus the terms lateral and linear strain and shows the relation between them.	2	CO1	L2	PO1
Q.4	Explain Modulus of Elasticity (E) & Modulus of Rigidity (G).	2	CO1	L2	PO1
Q.5	What is temperature stress & Strain? Explain.	2	CO1	L1	PO1

PART - B: (Attempt 4 questions out of 6) Max. Marks (28)

		Marks	CO	BL	PO
Q.6	A bar of 25mm diameter is subjected to a pull of 40kN. The measured extension on gauge length of 200mm is 0.085mm and the change in diameter is 0.003mm. Calculate the Poisson's ratio and the values of three modulus of elasticity.	7	CO2	L3	PO1
Q.7	A steel bar of variable section is subjected to forces as shown in fig. Taking E = 205 kN/m², determine the total elongation by using principal of Superposition.	7	CO2	L3	PO1
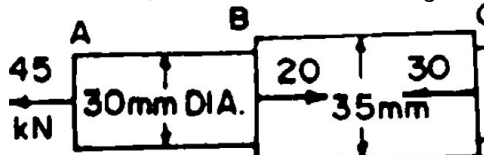
|		Marks	CO	BL	PO
Q.8	A steel bar ABC 16-meter-long having cross- sectional area of 4mm² weighs 20 N as shown in figure. If E for wire material is 200GPa, find the deflection at C & B.	7	CO2	L3	PO1

|		Marks	CO	BL	PO
Q.9	Illustrate an expression between modulus of elasticity and modulus of rigidity.	7	CO2	L2	PO1
Q.10	Find the extension of a bar uniformly tapering from diameter 'd₁' at one end to diameter 'd₂' at the other end subjected to an axial tensile load P at both ends. Length of bar is taken as 'L'.	7	CO2	L2	PO1
Q.11	At a point within a body subjected to two mutually perpendicular directions, the stresses are 80N/mm² tensile and 40 N/mm² tensile as shown in fig. Each above stresses is accompanied by a shear stress of 60 N/mm². Determine the normal stress, shear stress and resultant stress on an oblique plane inclined at an angle of 45° with the axis of minor tensile stress.		CO2		PO2

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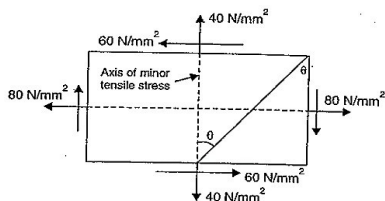
Q.12	A steel rod 20 mm in diameter passes centrally through a steel tube of 25 mm internal diameter and 30 mm external diameter. The tube is 800mm long and is closed by rigid washers of negligible thickness which are fastened by nuts threaded on the rod. The nuts are tightened until the compressive load on the tube is 20 kN. Calculate the stresses in the tube and the rod. Analyse the increase in these stresses when one nut is tightened by one quarter of a turn relative to the other. There are 4 threads per 10 mm. take E = 2 x 105 N/mm^2.	14	CO3 L4 PO2	

Q.13	A metallic bar 250mm x 100mm x 50mm is loaded as shown in figure. Find the change in volume. Take E = 2x10^5 N/mm^2 & Poisson's Ratio = 0.25. Compute the change that should be made in the 4MN load in order that there should be NO change in the volume of the bar.	14	CO3 L5 PO2	
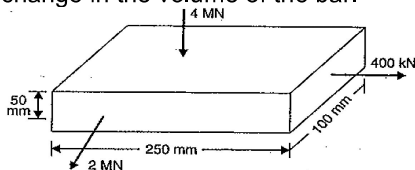
Q.14	A steel tube of 30mm external diameter and 20mm internal diameter enclosed a copper rod of 15mm diameter to which it is rigidly joined at each end. If at a temperature of 10°C there is no longitudinal stress, calculate the stresses in the rod and tube when the temperature is raised to 200°C. Take E for steel and copper as 2.1 x 10^5 N/mm^2 and 1 x 10^5 N/mm^2 respectively. The value of co-efficient of linear expansion for steel and copper is given as 11 x 10^{-6} per ^{O}C and 18 x 10^{-6} per ^{O}C respectively.	14	CO3 L3 PO2	

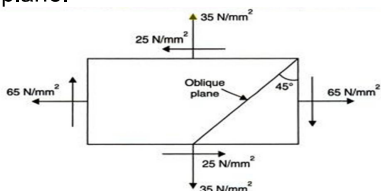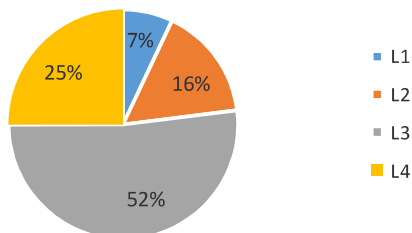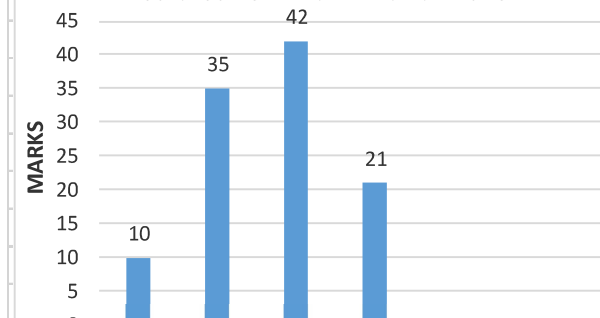|				
Q. 15	A point in a strained material is subjected to stresses sown in fig. using Mohr's circle method; Evaluate the normal and tangential stresses across the oblique plane.	14	CO4 L5 PO2	

Fig. No.

BL – Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3 – Applying, 4 –

Analyzing, 5 – Evaluating, 6 - Creating)

CO – Course Outcomes; PO – Program Outcomes

3E1206

B.Tech. III Sem. (Main) Examination, April/May - 2022
Automobile Engineering
3AE2-01 Advance Engineering Mathematics-I
AN, AG, AE, CE, CR, EC, EI, ME, MH, PT

Time : 3 Hours   Maximum Marks : 70

Instructions to Candidates:

Attempt all ten questions From Part A, All five Questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination (As mentioned in form No.205)

PART - A
(Word limit 25)

(10×2=20)

1. Evaluate, $\Delta^6 (ax-1)(bx^2-1)(cx^3-1)$

2. Prove that, $\left(\dfrac{\Delta^2}{E}\right)x^3 = 6x$ (if $h=1$)

3. Using Newton-Raphson's method, find the root of $x^4 -12x+7=0$ which is near to $x=2$.

4. Find the z-transform of unit impulse function which is given by $\delta_n = \begin{cases} 1 & if \ n=0 \\ 0 & if \ n \neq 0 \end{cases}$

5. Find inverse Z Transform of $\dfrac{5z}{(2-z)(3z-1)}$.

6. Find the Laplace transform of $f(t) = \begin{cases} \sin t & 0 < t < \pi \\ 0 & t > \pi \end{cases}$.

7. Find inverse Laplace transform of $\dfrac{s+2}{(s-2)^3}$

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8. Write the Formulae of Fourier complex transform Fourier cosine transform and their inverse also.

9. Write the formulae of Simpson 1/3 rule and Simpson 3/8 rule.

10. By using Picard's method, solve the equation $\frac{dy}{dx} = y - x$ with $x = 0, y = 2$ upto third order of approximation.

PART - B

(Word limit 100)

1. From the following table find the number of students who obtained $(5\times4=20)$
   a) Less than 45 marks.
   b) More than 45 marks.

Marks obtained:	30-40	40-50	50-60	60-70	70-80
No's of students:	31	42	51	35	31

2. Find the approximate value correct to three places of decimal of the real root of the equation $x^3 - 3x + 4 = 0$, using method of false position three times in succession.

3. Find the Fourier Sine and Cosine transform of $f(x) = \begin{bmatrix} x & for & 0 < x \le 1 \\ 2-x & for & 1 < x < 2 \\ 0 & for & x \ge 2 \end{bmatrix}$

4. If $\bar{u}(z) = \frac{2z^2 + 5z + 14}{(z-1)^4}$ for the sequence $\{u_n\}, n \ge 0$ Evaluate u_2 and u_3.

5. Find Inverse Laplace transform of $\frac{S}{S^4 + 4a^4}$

PART - C

(Any Three) $(3\times10=30)$

1. Solve $(D^2 + 9)y = \cos 2t$, given that $y(0) = 1$. $y(\pi/2) = -1$.

2. Obtain Fourier transform of $f(x) = \begin{cases} x^2 & for & |x| \le a \\ 0 & for & |x| > a \end{cases}$

   Hence evaluate $\int_0^\infty \cos\left(\frac{as}{2}\right)\left[\frac{(a^2 s^2 - 2)\sin as + 2as\cos as}{s^3}\right] ds$

3. Solve by z transform of $u_{n+2} - 6u_{n+1} + 8u_n = 2^n + 6n$.

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4. Using Milne's Predictor-Corrector Method, obtain the value of y for $x = 0.4$ for the following equation $\frac{dy}{dx} = 2e^x - y$, given that

x:	0	0.1	0.2	0.3
y:	2	2.01	2.04	2.09

5. A slider in a machine moves along a fixed straight rod. Its distance x(cm) along the rod is given below for various values of time t(sec)

$t \Rightarrow$	0	0.1	0.2	0.3	0.4	0.5	0.6
$x \Rightarrow$	30.28	31.43	32.98	33.54	33.97	33.48	32.13

Evaluate

i) Velocity for t = 0.1, 0.5 and 0.3

ii) Acceleration for t = .02, .33 and .58

3E1206   https://www.rtuonline.com

3E1210

3E1210

B.Tech. III Sem. (Main) Examination, April/May - 2022
Automobile Engineering
3AE4-07 Mechanics of Solids
AE, ME

Time : 3 Hours   Maximum Marks : 70

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**. All **five** questions from **Part B** and **three** questions out of **Five** questions from **Part C**.*

Schematic diagrams must be shown wherever necessary. Any data missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

PART - A (Words limit 25)

1. Draw stress-strain diagram (Tensile test diagram).   (10×2=20)
2. Define the ultimate strength.
3. What is the Poisson's ratio?
4. Explain modulus of rigidity.
5. Write down the maximum shear stress theory.
6. Write down the maximum strain energy theory.
7. Write down the expression for equivalent twisting moment for shaft subjected to torsion and bending forces?
8. Write down the Rankine general formula for Columns.
9. Write the relationship among twisting moment, shear stress and torsional rigidity.
10. Write down the general bending moment equation having modulus of elasticity and moment of inertia.

PART - B (Words limit 100)

                                                                (5×4=20)

1. What are the "complimentary shear stresses"? Using Mohr circle, derive expression for normal and tangential stresses on a diagonal plane of a piece of material in pure shear.

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2. At a point in an elastic material under strain, there are normal stresses of 50N/mm² and 13 N/mm² respectively at right angles to each other with a shearing stress of 25 N/mm². Find the principal stresses and position of principal planes if:

   i) 50 N/mm² is tensile and 30 N/mm² is also tensile.

   ii) 50 N/mm² is tensile and 30 N/mm² is compressive.

   Find also the maximum shear stress and its plane in both the cases using mohr circle method.

3. Draw the shear force diagram and Bending moment diagram for following simply supported beam with point loads.
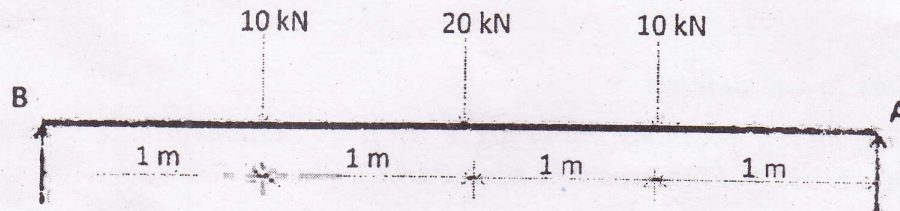
4. The cross section of a joist is a T section 150 mm × 200mm×13 mm with 150 mm side horizontal. Find the maximum intensity of shear stress and sketch the distribution of stress across the section if it has to resist a shear force of 80 kN.
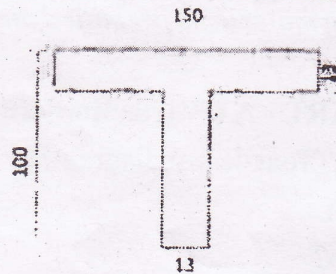

5. A mild steel column is of hollow circular section with 120 mm external diameter and 90 mm internal diameter. The column is 3m long and hinged at both the ends. Calculate the maximum permissible load with an eccentricity of 20 mm if the maximum compressive stress is limited to 80 N/mm². Take E=2.05×10⁵ N/mm²

PART - C (Any three)   (3×10=30)

1. A rod shown in the following fig. is subjected to a pull of 500 kN on the ends. Taking E = 205 kN/mm², find the extension of the rod.
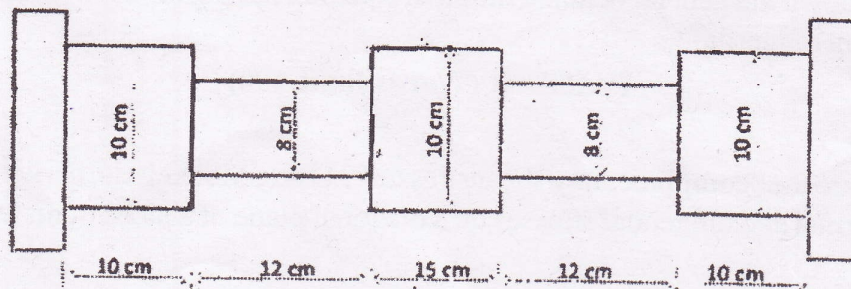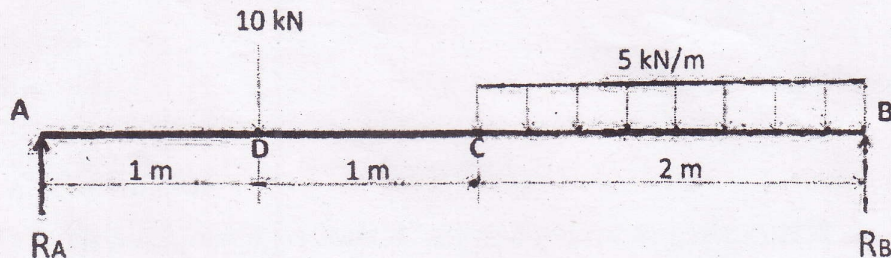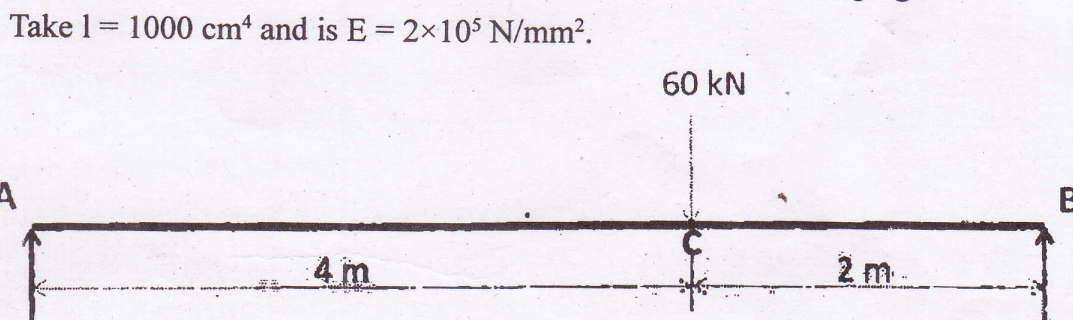

3E1210   (2)

2. A beam AB of 4 metre span is simply supported at the ends and is loaded as shown in the following figure. Determine

   i)   Deflection at point C,

   ii)   Maximum deflection and

   iii)   Slope at the end A.

Take E= 2×10^5 N/mm^2 and I = 1000 cm^4.

3. A copper tube of 50 mm internal diameter, 1 m long and 1.25 mm thick has closed ends and is filled with the water under pressure. Neglecting any distortion of the end plates, determine the alteration of pressure when an additional volume of 3 cubic centimetres of water is pumped into the tube.

4. A hollow steel shaft 4 m long is to transmit 150 kW power at 150 R.P.M. The total angle of twist in this length is not to exceed 2.5 degree and the allowable shear stress is 60 N/mm^2. Determine the inside and outside diameters if N = 0.082×10^6 N/mm^2.

5. Using area moment method, compute

   i)   Deflection at point C,

   ii)   Slope at point B for the Beam AB as shown in the following figure.

Take I = 1000 cm^4 and is E = 2×10^5 N/mm^2.

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3E1250

3E1250

B.Tech. III sem. (Main) Examination, April/May - 2022
Technical Communication
Common to All Branches

Time : 2 Hours   Maximum Marks : 70

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**. All **five** questions from **Part B** and **three** questions out of **Five** questions from **Part C**.*

Schematic diagrams must be shown wherever necessary. Any data missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination (As mentioned in form No. 205).

PART - A
(word limit 25)   (10×2=20)

1. What is a Technical Project Proposal?
2. Define Linguistic Ability in short.
3. Enlist two factors which determine Information Design.
4. Suggest two ways for enhancing Listening Skills.
5. Give a comprehensive definition of Technical Communication.
6. Discuss importance of Technical communication for engineers in brief.
7. Write a short note on Technical Discourse.
8. Distinguish between the Agenda and Minutes of Meeting?
9. List any two characteristics of Technical Documents.
10. Name the different types of Technical Articles.

PART - B
(word limit 100)   (5×4=20)

1. Discuss the forms of technical communication, giving suitable examples.
2. Distinguish between the Print Media and Online Media.
3. Enlist the features, Types and structure and Format of Technical Reports.

4. **Correct the following sentences :**
   1. I have seen him yesterday.
   2. We had gone to the movies last night.
   3. I had spoken to them about my holiday.
   4. You must attend your teacher's instructions.
   5. The hen has lain six eggs.
   6. I have seen him a moment ago.
   7. They discussed about the whole matter.
   8. We are playing tennis every day.

5. Write a letter to the Editor of a magazine Expressions, New Delhi on the deterioration in the standard of living in your city. Give suggestions for improvement.

PART - C

(Any three)   (3×10=30)

1. Mention the Aspects of Technical Communication in detail.
2. Describe the importance of reading and understanding Instructions and Technical Manuals for engineering students.
3. Describe the process of Technical Writing in detail.
4. What is Report Writing? What is the structure of a report?
5. You are Yogi/Yogita, a B.Tech III SEM student. You need the transcript of your mark sheets from your college. Write an email to the Chairman, Examination Office requesting him to issue the same in 120 words.

B.Tech. III sem. (Main) Examination, April/May - 2022
Automobile Engineering
3AE3-04 Engineering Mechanics
AE, ME

Time : 2 Hours
Maximum Marks : 70

Instructions to Candidates:

Attempt all ten questions From Part A, All five Questions from Part B and three questions out of five questions from Part C.

Schematic diagram must be shown wherever necessary. Any data missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.
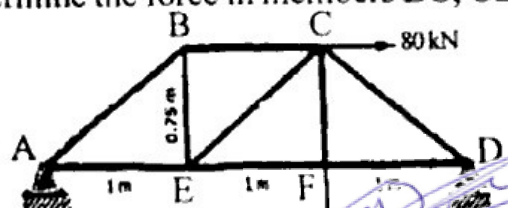
Use of following supporting materials is permitted during examination (As mentioned in form No. 205).

Part - A(Word limit 25)

1. What's the difference between a moment and a couple?

2. Why to Provide Redundant Members in trusses?

3. Define radius of gyration.

4. What is the difference between worm and worm wheel?

5. What is importance of friction in our daily life?

6. Why is crowning on a pulley?

7. Define projectile motion with example.

8. Why is D Alembert's principle used?

9. What do you mean by work energy principle?

10. What is the relation between momentum and impulse? (10×2=20)

PART - B (Word limit 100)

1. From the truss in Figure 1, determine the force in members BC, CE, and EF. Solve by using method of sections.

Figure: 1

2. Explain the Law of machine and using following table shows observations on a certain machine. Find the law of machine equation and maximum Mechanical advantage.

Load	Effort
100 N	10 N
200 N	14 N

3. Derive the tension ration equation of flat belt drive.
4. Define and explain Newton's law of motion for rotational motion.
5. Explain the principle of work and energy and derive an expression for the same.

(5×4=20)

PART - C (Any three)

1. Given the forces $F1 = 2.91 N$, $F2 = 2.67 N$, $F3 = 2.47 N$ and $F4 = 2.23 N$ and the angles $\alpha = 60°$ and $\beta = 30°$, calculate the resultant force R and its angle γ with the x-axis
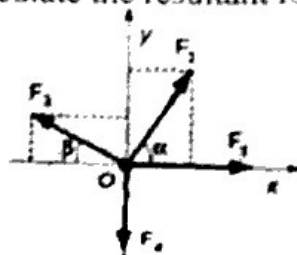

Figure: 2

2. Find the moment of inertia about the vertical and horizontal axis passing through the centroid of the section shown in figure - 3.

Figure: 3

3. A ladder of weight 390 N and 6m long is placed against a vertical wall at an angle of 30° with wall. The co-efficient of friction between the ladder and the wall is 0.25 and that between ladder and floor is 0.38. Find how high a man of weight 1170 N can ascend, before the ladder begins to slip.

4. A balloon weighing 'W' newton descend with acceleration of 'a'. If weight 'w' is removed from the balloon has upward acceleration of 'a' Show that $w = \dfrac{2aW}{a+g}$

5. A pile hammer of 250 kg mass is made to fall freely on a pile from a height of 6 m. If the hammer come to rest in 0.012 sec, determine
   i) The change in momentum.
   ii) Impulse and
   iii) Average force.

(3×10=30)

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3E1207

3E1207

B.Tech. III sem. (Main) Examination, April/May - 2022
Automobile Engineering
3AE3-04 Engineering Mechanics
AE, ME

Time : 2 Hours

Maximum Marks : 70

Instructions to Candidates:

Attempt all ten questions From Part A, All five Questions from Part B and three questions out of five questions from Part C.

Schematic diagram must be shown wherever necessary. Any data missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting materials is permitted during examination (As mentioned in form No. 205).

Part - A(Word limit 25)

1. What's the difference between a moment and a couple?

2. Why to Provide Redundant Members in trusses?

3. Define radius of gyration.

4. What is the difference between worm and worm wheel?

5. What is importance of friction in our daily life?

6. Why is crowning on a pulley?

7. Define projectile motion with example.

8. Why is D Alembert's principle used?

9. What do you mean by work energy principle?

10. What is the relation between momentum and impulse?   (10×2=20)

PART - B (Word limit 100)

1. From the truss in Figure 1, determine the force in members BC, CE, and EF. Solve by using method of sections.

Figure: 1

https://www.rtuonline.com

2. Explain the Law of machine and using following table shows observations on a certain machine. Find the law of machine equation and maximum Mechanical advantage.

Load	Effort
100 N	10 N
200 N	14 N

3. Derive the tension ration equation of flat belt drive.

4. Define and explain Newton's law of motion for rotational motion.

5. Explain the principle of work and energy and derive an expression for the same.

(5×4=20)

PART - C (Any three)

1. Given the forces $F1 = 2.91 N$, $F2 = 2.67 N$, $F3 = 2.47 N$ and $F4 = 2.23 N$ and the angles $\alpha = 60°$ and $\beta = 30°$, calculate the resultant force R and its angle γ with the x-axis

Figure: 2

2. Find the moment of inertia about the vertical and horizontal axis passing through the centroid of the section shown in figure - 3.

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3. A ladder of weight 390 N and 6m long is placed against a vertical wall at an angle of 30° with wall. The co-efficient of friction between the ladder and the wall is 0.25 and that between ladder and floor is 0.38. Find how high a man of weight 1170 N can ascend, before the ladder begins to slip.

4. A balloon weighing 'W' newton descend with acceleration of 'a'. If weight 'w' is removed from the balloon has upward acceleration of 'a' Show that $w = \dfrac{2aW}{a+g}$

5. A pile hammer of 250 kg mass is made to fall freely on a pile from a height of 6 m. If the hammer come to rest in 0.012 sec, determine

   i) The change in momentum.
   ii) Impulse and
   iii) Average force.

(3×10=30)

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3E1200

3E1200

B.Tech. III Sem. (Main) Examination, April/May - 2022
Managerial Economics and Financial Accounting
Common to All Branches

Time : 2 Hours   Maximum Marks : 70

Instructions to Candidates:

Attempt all ten questions from Part A. All five questions from Part B and three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination (As mentioned in form No.205)

PART - A
(word limit 25)   (10×2=20)

1. What is dividend pay out ratio?
2. Define oligopoly.
3. Explain the relationship b/w. Average cost and Marginal cost with the help of a diagram.
4. Define production possibility curve.
5. Explain the law of demand.
6. Distinguish between consumer goods and capital goods. Which of these are final goods?
7. Define price Elasticity of supply.
8. What is fund flow statement?
9. Distinguish between stock and flow with examples.
10. Define production function.

PART - B
(word limit 100)   (5×4=20)

1. "Economics is an art" Explain. Also explain the basic economic activities of an economy.
2. Explain briefly any three factors which lead to 'Decrease in Demand'.
3. Explain the relationship between ATC, AVC and MC with a suitable example.
4. "Under perfect competition the seller is a price taker whereas under monopoly he is the price maker". Explain.

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5. How will you calculate cash flows from operating activities by direct/indirect method? Explain with example.

PART - C
(Any three)
(3×10=30)

1. The following trading and profit & loss Account of Fantasy Ltd. for the year 31/3/2000 is given below.

Particular	Rs.	Particular	Rs.
To opening stock	76,250	By sales	5,00,000
"Purchases	3,15,250	"Closing stock	98,500
"Carriage & Freight	2,000		
"Wages	5,000		
"Gross profit b/d	2,00,000		
	5,98,500		**5,98,500**
To Administratin expenses	1,01,000	By Gross profit b/d	2,00,000
"Selling & Dist expenses	12,000	"Non-Operating incomes :	
"Non - operating expenses	2,000	"Interest on securities	1,500
"Financial Expenses	7,000	"Dividend profit on shares	3,750
Net profit c/d	84,000	"Profit on sales of shares	750
	2,06,000		**2,06,000**

Calculate :

1. Gross profit Ratio.
2. Expenses Ratio.
3. Operating Ratio.
4. Net Profit Ratio.
5. Stock turnover Ratio.

2. What are the capital budgeting techniques explain with suitable example.

3. When the price of a commodity is Rs. 20 per unit, its quantity demanded is 800 units. When its price rises by Rs. 5 per unit, its quantity demanded falls by 20%. Calculate the price elasticity of demand. Is its demand elastic? Give reason for your answer.

4. Given below is the cost schedule of a firm. Its Average Fixed cost is Rs. 20 when it produces 3 units

Output (Q) units	1	2	3
Average variable cost (AVC) (Rs).	30	28	32

Calculate its Marginal cost and Average total cost at each given level of output.

5. Describe the steps involved in the estimation of National Income by income method. State any two precautions that must be taken while estimating national Income by this method.
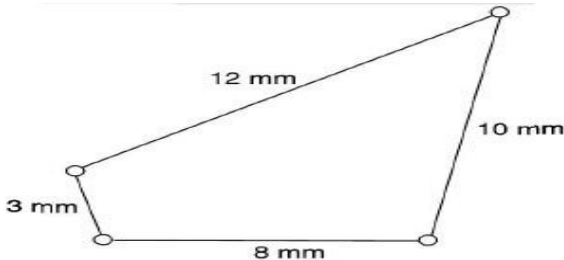

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POORNIMA COLLEGE OF ENGINEERING, JAIPUR

II B.TECH. (IV Sem.)   SET- 1

FIRST MID TERM ONLINE EXAMINATION 2020-21
Code: 4ME4-07 Category: PCC Subject Name–Theory of Machine
MECHANICAL ENGINEERING

Max. Time: 90 Minutes   + 15 Min for Uploading   Max. Marks: 50

Instruction:
1. All Question are Compulsory.
2. Write your answer on a clean A4 size or any paper and mention your Name, Roll no., Reg. no, Subject name, subject code, Section, Set number. Date and time on the top of the sheet and page no on bottom of the sheet. Write Name, Registration & Page no on other pages.
3. Scan and upload your hand written answer copy to the class room only (do not mail).
4. Make sure that scan documents (PDF) is readable for evaluation purpose and you have additional 15 minutes to upload the PDF.
5. Save documents with your Name, Reg No., and Subject Name.
   (Exp. – Abhishek_PCE18ME310_AEM)
6. The answer-sheet upload after the specified time duration shall be rejected and not be evaluated.
7. Follow the sequence to upload as General -> Assignment -> Your work -> Add or Create -> Select file to upload -> Hand In or Turned in.
8. Keep your hard copy of answer sheet intact as it will be submitted after college resumes.
9. CO- Course Outcome, PO- Program Outcome, BL- Bloom's Taxonomy Levels & PI- Performance Index are mentioned according to the exam reform policy- AICTE.

Q. No.	Question	Marks	CO	PO	BL	PI

Q.1	a) **Distinguish between**
	
	   I. **Mechanism and Machine**
	
	  II. **Kinematics and Dynamics**
	
	  III. **Kinematic Pair and Kinematic Chain**
		(5)	CO1	PO1	L-1	1.2.1

	b) **Discuss various types of constrained motion.**	**(5)**	CO1	PO1	L-2	1.2.1
Q.2	**Find all the inversion of the chain in given figure:** 	**(10)**	CO2	PO1	L-4	1.4.1

Q.3	**Drive a relation for minimum frictional torque for flat pivotal bearing in case of**
	   a) Uniform pressure
	   b) Uniform wear?
		(10)	CO3	PO2	L-3	2.2.3

Q.4	**An effort of 1500 N is required to just move a certain body up an inclined plane at angle 12^0, force acting parallel to the plane. If the angle of inclination is increased to 15^0, then the effort required is 1720 N. find the weight of the body and the coefficient of friction.**					1.3.1

Q.5	What are centripetal and tangential components of acceleration? When do they occur? How are they determined?	(10)	CO1	PO1	L-1	1.2.1

*** ALL THE BEST***

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FIRST MID TERM ONLINE EXAMINATION 2020-21
Code: 6ME4-04 Category: PCC Subject Name–DESIGN OF MACHINE ELEMENT-II
(BRANCH – MECHANICAL ENGINEERING)

Max. Time: 90 Minutes   + 15 Min for Uploading   Max. Marks: 50

Instruction:
1. All Question are Compulsory.
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Q. No.	Question	Marks	CO	PO	BL	PI
Q.1	**(a)** Discuss stresses developed in helical spring subjected to axial load.	(5)	CO1	PO1	L-1	1.3.1
	(b) Explain bucking of connecting rod in IC engines in brief.	(5)	CO1	PO1	L-1	1.3.1
Q.2	Discuss Soderberg line, Goodman line and Gerber Parabola in detail.	(10)	CO1	PO1	L-2	1.3.1
Q.3	A hot rolled steel shaft is subjected to a torsional moment that varies from 330 N-m clockwise to 110 N-m counter-clockwise and an applied bending moment at a critical section varies from 440 N-m to – 220 N-m. The shaft is of uniform cross-section and no keyway is present at the critical section. Determine the required shaft diameter. The material has an ultimate strength of 550 MN/m^2 and a yield strength of 410 MN/m^2. Take the endurance limit as half the ultimate strength, factor of safety of 2, size factor of 0.85 and a surface finish factor of 0.62.	(10)	CO3	PO2	L-3	2.1.2
Q.4	A helical spring is made from a wire of 6 mm diameter and has outside diameter of 75 mm. If the permissible shear stress is 350 MPa and modulus of rigidity 84 kN/mm^2, find the axial load which the spring can carry and the deflection per active turn.	(10)	CO2	PO1	L-4	1.4.1
Q.5	The bore of a cylinder of the four stroke diesel engine is 150 mm. The max. gas pressure inside the cylinder is limited to 3.5 MPa. The cylinder head is made of grey cast iron FG 200 (Sut = 200 N/mm^2) and the factor of safety is 5. Determine the thickness of the cylinder head. Studs are made of steel FeE 250 (Syt = 250 N/mm^2) and the factor of safety is 5. Calculate. (i) Number of studs (ii) Nominal diameter of studs. (iii) Pitch of Studs	(10)	CO2	PO1	L-5	1.4.1

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FIRST MID TERM ONLINE EXAMINATION 2020-21
Code: 6ME4-04 Category: PCC Subject Name–DESIGN OF MACHINE ELEMENT-II
(BRANCH – MECHANICAL ENGINEERING)
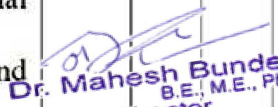
Max. Time: 90 Minutes + 15 Min for Uploading   Max. Marks: 50

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Q. No.	Question	Marks	CO	PO	BL	PI
Q.1	(a) Explain Modified Goodman Diagram for bending Stresses.	(5)	CO1	PO1	L-1	1.3.1
	(b) What are the factors that affect endurance limit of machine part?	(5)	CO1	PO1	L-1	1.3.1
Q.2	What do you mean by stress concentration? How do you take it into consideration in case of components subjected to dynamic loads	(10)	CO1	PO1	L-2	1.3.1
Q.3	A circular bar of 500 mm length is supported freely at its two ends. It is acted upon by a central concentrated cyclic load having a minimum value of 20 kN and a maximum value of 50 kN. Determine the diameter of bar by taking a factor of safety of 1.5, size effect of 0.85, surface finish factor of 0.9. The material properties of bar are given by : ultimate strength of 650 MPa, yield strength of 500 MPa and endurance strength of 350 MPa.	(10)	CO3	PO2	L-3	2.1.2
Q.4	A helical compression spring is made of 1mm diameter wire having yield strength as 720 MPa. It has mean diameter of 12 and there are 14 active coils of the spring. Find 1. Deflection 2. Stiffness 3. Solid length 4. Free length. Take $G= 0.84 \times 10^5$ N/mm^2	(10)	CO2	PO1	L-4	1.4.1
Q.5	The following data is given for a four-stroke diesel engine: Cylinder bore = 250 mm, Length of stroke = 300 mm, Speed = 600 rpm, Indicated mean effective pressure = 0.6 Mpa, Mechanical Efficiency = 80%, Maximum gas pressure = 4 Mpa, Fuel consumption = 0.25 kg per BP per h, Heigher calorific value of fuel = 44000 kJ/kg. Assume that 5% of the total heat developed in the cylinder is transmitted by the piston. The piston is made of grey cast iron FG 200 (σ_{ut} = 200 N/mm^2 and k = 46.6 W/m/oC). and the factor of safety is 5. The temperature difference between the centre and the edge of the piston head is 220°C. (i) Calculate the thickness of piston head by strength & thermal consideration. Which criterion decides the thickness of piston head? (ii) State whether the ribs are required, If so, calculate the number and thickness of piston ribs. (iii) State whether a cup is required in the top of the piston head, If calculate the radius of the cup.	(10)	CO2	PO1	L-5	1.4.1

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POORNIMA COLLEGE OF ENGINEERING, JAIPUR

III B.TECH. (VI Sem.)   SET- 3

FIRST MID TERM ONLINE EXAMINATION 2020-21
Code: 6ME4-04 Category: PCC Subject Name–DESIGN OF MACHINE ELEMENT-II
(BRANCH – MECHANICAL ENGINEERING)

Max. Time: 90 Minutes   + 15 Min for Uploading   Max. Marks: 50

Instruction:
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2. Write your answer on a clean A4 size or any paper and mention your Name, Roll no., Reg. no, Subject name, subject code, Section, Set number. Date and time on the top of the sheet and page no on bottom of the sheet. Write Name, Registration & Page no on other pages.
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Q. No.	Question	Marks	CO	PO	BL	PI
Q.1	**(a)** What are the desirable properties of a piston material of IC engine?	(5)	CO1	PO1	L-1	1.3.1
	(b) What do you understand by Wahl's factor? State its important in design of springs?	(5)	CO1	PO1	L-1	1.3.1
Q.2	Discuss influence of stress concentration, size, and surface finish factors on endurance limit of material.	(10)	CO1	PO1	L-2	1.3.1
Q.3	A simply supported beam has a concentrated load at the centre which fluctuates from a value of P to 4 P. The span of the beam is 500 mm and its cross-section is circular with a diameter of 60 mm. Taking for the beam material an ultimate stress of 700 MPa, a yield stress of 500 MPa, endurance limit of 330 MPa for reversed bending, and a factor of safety of 1.3, calculate the maximum value of P. Take a size factor of 0.85 and a surface finish factor of 0.9.	(10)	CO3	PO2	L-3	2.1.2
Q.4	A helical spring is made from a wire of 6 mm diameter and has outside diameter of 75 mm. If the permissible shear stress is 350 MPa and modulus of rigidity 84 kN/mm², find the axial load which the spring can carry and the deflection per active turn.	(10)	CO2	PO1	L-4	1.4.1
Q.5	The following data is given for the piston of four stroke diesel engine: Cylinder bore = 250 mm, Material of piston rings = Grey cast iron. Allowable tensile stress = 100 N/mm2, Allowable radial pressure on cylinder wall = 0.03 MPa, Thickness of piston Head = 42 mm, Number of piston rings = 4. Calculate:- (i) Radial width & Axial thickness of the piston rings (ii) Gap between the free ends of the piston rings before & after assembly. (iii) width of the top land & width of the ring grooves (iv) Thickness of the piston barrel and thickness of the barrel at open end.	(10)	CO2	PO1	L-5	1.4.1

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POORNIMA COLLEGE OF ENGINEERING, JAIPUR

III B.TECH. (VI Sem.)   SET- 4

FIRST MID TERM ONLINE EXAMINATION 2020-21
Code: 6ME4-04 Category: PCC Subject Name–DESIGN OF MACHINE ELEMENT-II
(BRANCH – MECHANICAL ENGINEERING)

Max. Time: 90 Minutes + 15 Min for Uploading   Max. Marks: 50

Instruction:
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Q. No.	Question	Marks	CO	PO	BL	PI
Q.1	**(a)** Explain Modified Goodman Diagram for bending Stresses.	**(5)**	CO1	PO1	L-1	1.3.1
	(b) What are the desirable properties of a piston material of IC engine?	**(5)**	CO1	PO1	L-1	1.3.1
Q.2	Define the following terms used in design of machine elements (i) Size Factor (ii) Notch Sensitivity (iii) surface Finish Factor (iv) Endurance limit (v) Reliability factor	**(10)**	CO1	PO1	L-2	1.3.1
Q.3	A pulley is keyed to a shaft midway between two bearings. The shaft is made of cold drawn steel for which the ultimate strength is 550 MPa and the yield strength is 400 MPa. The bending moment at the pulley varies from −150 N-m to + 400 N-m as the torque on the shaft varies from − 50 N-m to + 150 N-m. Obtain the diameter of the shaft for an indefinite life. The stress concentration factors for the keyway at the pulley in bending and in torsion are 1.6 and 1.3 respectively. Take the following values: Factor of safety = 1.5, Load correction factors = 1.0 in bending, and 0.6 in torsion, Size effect factor = 0.85, Surface effect factor = 0.88	**(10)**	CO3	PO2	L-3	2.1.2
Q.4	A helical compression spring is made of 1mm diameter wire having yield strength as 720 MPa. It has mean diameter of 12 and there are 14 active coils of the spring. Find 1. Deflection 2. Stiffness 3. Solid length 4. Free length. Take G= 0.84×10^5 N/mm^2	**(10)**	CO2	PO1	L-4	1.4.1
Q.5	The bore of a cylinder of the four stroke diesel engine is 150 mm. The max. gas pressure inside the cylinder is limited to 3.5 MPa. The cylinder head is made of grey cast iron FG 200 (S_{ut} = 200 N/mm^2) and the factor of safety is 5. Poisson's Ratio is 0.25. Determine the thickness of the cylinder wall. Also calculate the apparent and net circumferential and longitudinal stresses in the cylinder wall.	(5)	CO2	PO1	L-5	1.4.1

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