(253) SET-II

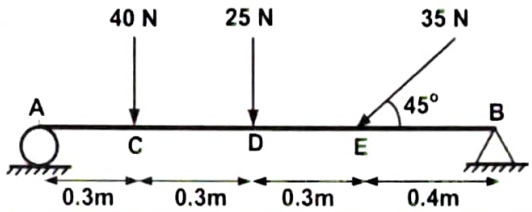
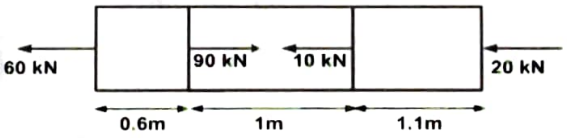
Roll No. | | | | | | | | | |

COER University

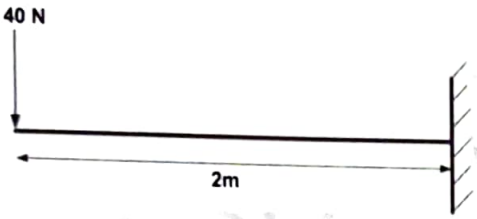
END SEMESTER EXAMINATION, EVEN SEMESTER, 2023-24

Time : 3 hour **Semester** : IV **Total Marks : 100**
Program Name : B.Tech **Branch/Specialization** : Mechanical Engineering
Course Code : BTME401 **Course Name** : Strength of Materials

Note: All questions are compulsory. No student is allowed to leave the examination hall before the completion of the time.

Q. No 1	Attempt Any Four Parts. Each Question Carries 5 Marks.	CO	BL
(a)	Kindly explain coplanar parallel forces and non-coplanar concurrent forces with neat diagram.	CO 1	2
(b)	Kindly explain about free body diagram with an example and also write the condition of equilibrium of coplanar system.	CO 1	2,3
(c)	Define the moment and its engineering applications.	CO 1	1,2
(d)	A beam is in equilibrium. Find the reactions at point A and B. 	CO 1	2,3
(e)	A brass bar having cross-sectional area of 2000mm^2 is subjected to axial force as shown in the figure. Find the total elongation of the bar. Take Modulus of elasticity of the brass bar is 100 GN/m^2. 	CO 1	2,3

Q. No 2	Attempt Any Four Parts. Each Question Carries 5 Marks.	CO	BL
(a)	Draw and explain the stress strain diagram for ductile material.	CO 2	1,2
(b)	Writhe the assumptions made in the theory of pure torsion.	CO 2	2,3
(c)	A tensile load of 58 kN was applied to a bar of 32 mm diameter with 350 mm gauge length. Measurements showed 0.14 mm increase in length and the correspond 0.0036 mm contraction in diameter. Make calculations for the Poisson's ratio and the value of three moduli (elastic constants).	CO 2	3
(d)	A cicular steel shaft of 30 mm diameter is subjected to a torque of 600 Nm. Determine (a) the maximum shear stress developed in the shaft. Take modulus of rigidity for the shaft material, C = 80 GPa.	CO 2	3
(e)	Define Poisson ratio. During compression test, a metallic bar 55 mm 55 mm in cross-section was subjected to an axial compressive load of 600 kN. Measurements showed that there was 0.05 mm increase in thickness and 0.6 mm contraction in length over a gauge length of 250 mm. Determine the values of Poisson's ratio and modulus of elasticity.	CO 2	3

Q. No 3	Attempt Any Four Parts. Each Question Carries 5 Marks.	CO	BL
(a)	Explain about the types of beams.	CO 3	1,2
(b)	Write the assumptions and equation for the pure bending of beams.	CO 3	2,3
(c)	Derive the expression for Pure bending of beams.	CO 3	3
(d)	A rectangular beam with depth 160 mm and width 150 mm is subjected to maximum bending moment of 400 KNm. Determine maximum stress in beam. Take E= 200 GPa.	CO 3	3
(e)	Draw Shear Force and Bending Moment Diagram of Fig. 1. 	CO 3	3

Q. No 4	Attempt Any Two Parts. Each Question Carries 10 Marks.	CO	BL
(a)	Name the various theories of failures and the explain the need of theories of failures. Explain maximum principles stress theory (Rankine Theory).	CO 4	2
(b)	What is deflection of beams. Kindly write the expression for the deflection of beams. Discuss the different methods used to calculate slope and deflection of beams.	CO 4	2
(c)	Using Macaulay's method calculate the deflection and slope of a beam of 2 m simply supported beam carrying a load of 48 KN at the center of the beam. Take $E=2x10^5$ N/mm^2 and $I = 85x10^6$ mm^4.	CO 4	3

Q. No 5	Attempt Any Two Parts. Each Question Carries 10 Marks.	CO	BL
(a)	Explain about the thick and thin cylinder selection criteria and stress developed in the thin cylinder. What is the need to calculate the stresses in the thin and thick cylinders for practical application.	CO 5	2
(b)	Calculate the bursting pressure for a cold drawn seamless steel tubing of 80 mm inside diameter with 2 mm wall thickness. The ultimate strength of steel is 380 MN/m^2.	CO 5	3
(c)	Derive the Lame's equation for thick cylinder shell and state the meaning of each term appearing in the equation.	CO 5	2

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