R20 Regulation *Subject code:3P3CF*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech III Semester Supplementary Examinations, December 2024

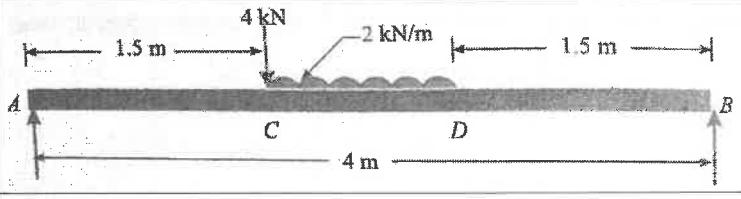
MECHANICS OF SOLIDS

(Mechanical Engineering)

Maximum Marks: 70 Date:13.12.2024 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

	Part-A		
All the following questions carry equal marks (10X2M=20) Marks)		CO	Bloom Tx
1	Define lateral strain, longitudinal strain and Poisson's ratio.	1	L1
2	Explain the following terms (i) Strain Energy and (ii) Proof Resilience	1	L1
3	Write the different types of beams?	2	L1
4	Define shear force and bending moment.	2	L1
5	Write the assumptions of theory of simple bending equation?	3	L1
6	Draw the shear stress diagram for mild steel	3	L1
7	Write about Mohr's Circle?	4	L1
8	Define the terms Principal planes and principal stresses.	4	L1
9	What is polar modulus?	5	L1
10	What is hoop-stress and volumetric strain in shells?	5	L1
	Part-B		
Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
11	Draw stress-strain curve for ductile material and explain its salient futures. [10M]	1	L2
	OR		
12	An axial pull of 40 kN is acting on a bar consisting of three sections of length 30 cm, 25cm and 20cm and diameters 2cm, 4cm and 5cm respectively. If the young's modulus = $2x10^5$ N/mm^2, determine (i) stress in each section and (ii) total extension of the bar. [10M]	1	L2
13	A cantilever beam 2m long is subjected to a gradually varying load from zero at the free end to 2kN/m at the fixed end .Find the values of maximum shear force and bending moment also draw the shear force and bending moment diagrams. [10M]	2	L2
	OR		
14	Draw the shear force and bending moment diagrams for the beam loaded and supported as shown in figure. [10M]	2	L2

			
15	Prove the relations, M/I = f/y =E/R. [10M]	3	L2
	OR		
16	A beam of triangular cross section having base width of 100 mm and height of 150 mm is subjected to a shear force of 13.5 kN. Find the value of maximum shear stress and sketch the shear stress distribution along the depth of the beam. [10M]	3	L2
17	The tensile stresses at a point across two mutually perpendicular planes are 120 N/mm^2 and 60 N/mm^2.Determine the normal, tangential and resultant stresses on a plane inclined at 30^0 to the axis of the minor stress. [10M]	4	L2
	OR		
18	Derive the simple shear stress for Mohr's circle. [10M]	4	L2
19	Design a suitable diameter for a circular shaft required to transmit 90kW at 180 rpm. The shear stress in the shaft is not to exceed 70 MPa and the maximum torque exceeds the mean by 40%. Also find the angle of twist in a length of 2 metres. Take Modulus of rigidity = 90 GPa. [10M]	5	L2
	OR		
20	A cylindrical vessel is 1.6m diameter and 5m long is closed at ends by rivets. It is subjected to an internal pressure of 4N/mm2 .If the maximum principal stress is not to exceed 120 N/mm2 , find the thickness of the shell. Assume E = 2 x 10 5 N/mm2 and Poisson's ratio = 0.25. Find the change in diameter, length and volume of the shell. [10M]	5	L2