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R18 Regulation

Subject code:2P3CE

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

## B.Tech III Semester Supplementary Examinations, December 2025

### MECHANICS OF SOLIDS

(ME)

Maximum Marks: 70

Date:24.12.2025

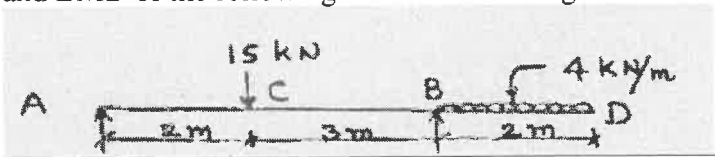
Duration: 3 hours

- 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.
  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)		Marks	CO	BTL
1	Explain thermal stresses.	2M	1	L1
2	Draw SFD and BMD for cantilever beam with UDL	2M	1	L1
3	Draw the shear stress diagram for I- section	2M	2	L1
4	what is point of contraflexure?	2M	2	L1
5	What are the assumptions in pure bending?	2M	3	L1
6	What is section the modulus for rectangular section?	2M	3	L1
7	What are the axial stresses and compound stresses?	2M	4	L1
8	Define the terms Principal planes and principal stresses	2M	4	L1
9	What is Torsion and Torsional rigidity?	2M	5	L1
10	Define thin cylinder?	2M	5	L1

#### Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Draw stress-strain curve for ductile material and silent futures	10M	1	L2
OR				
12	The extension in a rectangular steel bar of length 400 mm and thickness 10 mm is found to be 0.21 mm. the bar tapers uniformly in width from 100 mm to 50 mm. if the Young's modulus is 200 GPa, determine the axial load on the bar.	10M	1	L2
13	Draw SFD and BMD of the following beam shown in figure	10M	2	L2
				
OR				
14	A simply supported beam of span, 9 m has UDL of 15 KN/m over 4 m from left support and a concentrated load of 20 KN at the centre. Draw SF and BM diagrams.	10M	2	L2

15	A steel beam of I-section, 200 mm deep and 160 mm wide has 16 mm thick flanges and 10 mm thick web. The beam is subjected to a bending moment of 200 kN m at a critical section. Determine the maximum bending stress if the web of the beam is kept horizontal	10M	3	L2
	OR			
16	A beam of I-section, 60 cm deep and 19 cm wide, has flanges 4 cm thick and web 1.6 cm thick. It carries a shearing force of 400 kN at a section. Draw shear stress distribution diagram.	10M	3	L2
17	Determine principal stresses and its planes, If $\sigma_x = 70 \text{ N/mm}^2$ , $\sigma_y = 25 \text{ N/mm}^2$ and $\sigma_{xy} = 30 \text{ N/mm}^2$ Also determine maximum shear stress and its position	10M	4	L2
	OR			
18	Derive an expression for maximum shear stress theory.	10M	4	L2
19	A hollow shaft with inner diameter to outer diameter ratio of 0.8 is to transmit a torque of 2600Nm. Taking the allowable shear stress for the shaft material as 46MP and the limiting angle of twist in 2 m length of shaft as $1.6^\circ$ . Determine the inner and outer diameters of the shaft take $G=81 \text{ KN/mm}^2$	10M	5	L2
	OR			
20	A thin cylindrical shell of 0.6m diameter and 0.9 m long is subjected to an internal pressure $1.2 \text{ N/mm}^2$ . Thickness of cylinder wall is 15mm. Determine change in diameter, length and volume. Take $E=200 \text{ GPa}$ and Poisson's ratio=0.3.	10M	5	L2