



R18 Regulation

Subject code:2P3AC

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

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

## STRENGTH OF MATERIALS-I

(CE)

Maximum Marks: 70

Date:19.12.2025

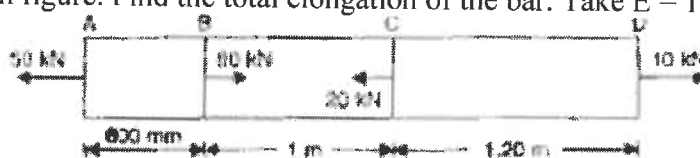
Duration: 3 hours

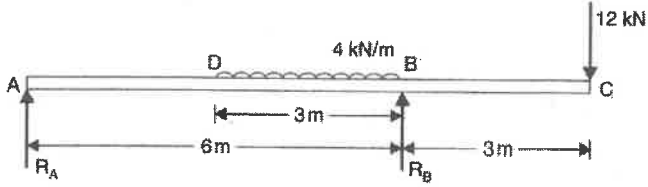
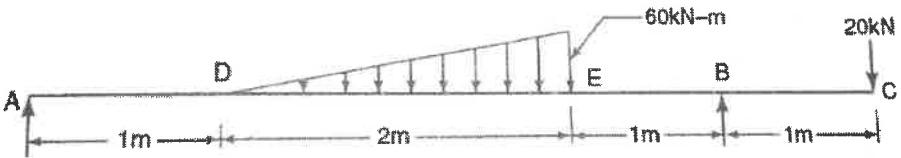
- Note:**
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Answer any one full question from each unit.
  4. Each question carries 10 marks and may have a, b, c, d as sub questions.

### Part-A

All the following questions carry equal marks (10X2M=20 Marks)		Marks	CO	BTL
1	Write the relationship between modulus of elasticity, modulus of rigidity and Poisson's ratio, Bulk modulus.	2M	1	L1
2	What is Strain Energy?	2M	1	L1
3	What do you understand by the term point of contraflexure?	2M	2	L1
4	List the various types of support.	2M	2	L1
5	State the assumptions while deriving the general formula for shear stresses.	2M	3	L1
6	Write down the bending moment equation.	2M	3	L1
7	What do you mean by flexural rigidity?	2M	4	L1
8	Define the term slope.	2M	4	L1
9	What is meant by principal plane?	2M	5	L1
10	What do you mean by state of stress?	2M	5	L1

### Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Explain in detail about the stress strain curve of a mild steel material.	10M	1	L2
OR				
12	A brass bar, having cross sectional area of $1000 \text{ mm}^2$ , is subjected to axial forces as shown in figure. Find the total elongation of the bar. Take $E = 1.05 \times 10^5 \text{ N/mm}^2$ .	10M	1	L2
				
13	A cantilever beam of length 4m carries point loads of 1kN, 2kN and 3kN at 1, 2 and 4m from the fixed end. Draw the S.F and B.M diagrams for the cantilever.	10M	2	L2
OR				
14	A simply supported beam of length 8m carries point loads of 4kN and 6kN at a distance of 2m and 4m from the left end. Draw the S.F and B.M diagrams for the beam.	10M	2	L2

15	A cantilever of length 3m is carrying a point load of 50kN at a distance of 2m from the fixed end. If $I = 10^8 \text{mm}^4$ and $E = 2 \times 10^5 \text{ N/mm}^2$ , find slope and deflection at free end using conjugate beam method.	10M	3	L2
OR				
16	A beam ABC of length 9m has one support to the left end and the other support at a distance of 6m from the left end. The beam carries a point load of 1 kN at the right end and also carries a uniformly distributed load of 4kN/m over a length of 3m as shown in the figure. Determine slope and deflection at point C. $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 5 \times 10^8 \text{ mm}^4$ . Use moment–area method.	10M	3	L2
				
17	A beam of length 6m is simply supported at its ends and carries two point loads of 48kN and 40kN at a distance of 1m and 3m respectively from the left support. Find the deflection under each load, maximum deflection and the point at which the maximum deflection occurs. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 85 \times 10^6 \text{ mm}^4$	10M	4	L2
OR				
18	The stresses at a point in a bar are $200 \text{ N/mm}^2$ (tensile) and $100 \text{ N/mm}^2$ (compressive). Determine the resultant stress in magnitude and direction on a plane inclined at $60^\circ$ to the axis of major stress. Also determine the maximum intensity of shear stress in the material at that point.	10M	4	L2
19	A specimen of steel 25 mm diameter with a gauge length of 200 mm is teste to destruction. It has an extension of 0.16 mm under a load of 80 kN and the load at elastic limit is 160 kN. The maximum load is 180 kN. The total extension at fracture is 56 mm and diameter at neck is 18 mm. Find percentage elongation and percentage reduction in area.	10M	5	L2
OR				
20	Draw the SFD and BMD for the overhanging beam as shown in the figure.	10M	5	L2
 <p style="text-align: center;">(a) Space Diagram</p>				