



R20 Regulation **Subject code: 3P3AD**
TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
 (Autonomous, Accredited by NAAE with 'A+' Grade)

B.Tech III Semester Supplementary Examinations, February 2024
STRENGTH OF MATERIALS - I
(CIVIL ENGINEERING)

Maximum Marks: 70

Date: 23.02.2024 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.
 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	A steel bar of circular section 22 mm diameter in a length of 750 mm. Determine the elongation of the bar due to the action of an axial load of 25 kN. Use $E = 200 \text{ GPa}$.	CO1	L3
2	State Hooke's law.	CO1	L1
3	What are the different types of loads acting on a beam?	CO2	L1
4	State point of contra flexure with an illustration.	CO2	L2
5	What is the flexure formula ? Explain the terms in it.	CO3	L1
6	What do you understand by terms 'Neutral axis and moment of resistance'?	CO3	L1
7	What is the differential equation of deflected curve of a beam?	CO4	L1
8	List the cases where Mohr's theorem is conveniently used.	CO4	L1
9	Define the terms principal planes and principal stresses	CO5	L1
10	Define the term 'obliquity' and write how it is determined.	CO5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)

11	Draw the stress strain diagram for mild steel and identity the significant points.	10M	CO1	L4
OR				
12	A steel rod of 20mm diameter passes centrally through a copper tube of 50mm external diameter and 40mm internal diameter. The tube is closed at each end by rigid plates of negligible thickness. The nuts are tightened lightly on the projecting parts of the rod. If the temperature of the assembly is raised by 50°C , calculate the stresses developed in copper and steel. Take E for steel and copper as 200GN/m^2 and 100GN/m^2 and α for steel and copper as $12 \times 10^{-6} \text{ per } ^{\circ}\text{C}$ and $18 \times 10^{-6} \text{ per } ^{\circ}\text{C}$.	10M	CO1	L3
13	Explain the different types of beams with various load conditions.	10M	CO2	L2
OR				
14	A cantilever beam of length 2m carries the point loads 200N, 400N and 700N at distances 0.5m, 1.2m and 2m respectively from the fixed end. Draw	10M	CO2	L3

	the SF and BM diagrams for cantilever beam.			
15	A steel plate of width 100mm and of thickness 18mm is bent into a circular arc of radius 10m. Determine the maximum stress induced and the bending moment which will be produce the maximum stress. Take $E=2 \times 10^5 \text{ N/mm}^2$.	10M	CO3	L3
	OR			
16	Design the cross section for a beam acted upon by a bending moment of 80KN-m. if width of beam is 230 mm, calculate depth. Take stress $f = 10\text{MPa}$.	10M	CO3	L4
17	A simply supported beam 8 m long carries concentrated loads of 40 KN each at a distance 2 m from the ends. Calculate, (a) Maximum slope and deflection for the beam, and (b) Slope and deflection under each load. Take: $EI = 1.2 \times 10^4 \text{ KN.m}^2$	10M	CO4	L3
	OR			
18	Explain the usefulness of conjugate beam method over the Macaulay's method?	10M	CO4	L2
19	Discuss the concept of Mohr's stress and strain circles in two dimensions.	10M	CO5	L3
	OR			
20	A rectangular bar of cross-sectional area 10000mm^2 is subjected to a tensile load of P. The permissible normal and shear stresses on the oblique plane which is inclined at 60° are 8N/mm^2 and 8N/mm^2 . Determine the safe value of P.	10M	CO5	L4