R20 Regulation *Subject code:3P3AD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, December 2024

STRENGTH OF MATERIALS-I

(Civil Engineering)

Maximum Marks: 70 Date:09.12.2024 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	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 GPa.	1	L1
2	State Hooke's law.	1	L1
3	What are the different types of loads acting on a beam?	2	L1
4	List any three important points to be kept in mind while drawing SFD and BMD.	2	L1
5	What is the flexure formula ? Explain the terms in it.	3	L1
6	Show the shear stress variation in the following : (i) I-section (ii) Hollow circle.	3	L1
7	Differentiate between 'double integration and Macaulay's methods'.	4	L1
8	A simply supported beam subjected to a clockwise couple at the centre. sktech the elastic curve.	4	L1
9	Draw the Mohr's circle for a state of pure shear.	5	L1
10	What is meant by Mohr's circle of stresses?	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
11	Draw the stress strain diagram for mild steel and identity the significant points. [10M]	1	L2
	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 50^0C, 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 12×10^{-6} per ^{0}C and 18×10^{-6} per ^{0}C [10M]	1	L2

13	A beam 6m long is simply supported at the ends and carries a uniformly distributed load of 15 k N/m and three concentrated loads of 10 kN, 20kN and 30 kN acting respectively at the left quarter point, centre point and right quarter point. Draw the shear force and bending moment diagrams and determine the maximum bending Moment. [10M]	2	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 the SF and BM diagrams for cantilever beam. [10M]	2	L2
15	Prove that the rectangular section maximum shear stress is 1.5 times the average stress. [10M]	3	L2
	OR		
16	Explain the development of shear stresses in beams? [10M]	3	L2
17	A cantilever beam carries a point load at the free end. Determine the deflection at the free end, using conjugate beam method. [10M]	4	L2
	OR		
18	A) How will you use conjugate beam method for finding slope and deflection at any section of a beam? [5M] B) What are the limitations of conjugate beam and uses over other method? [5M]	4	L2
19	If the principal stresses at a point in an elastic material are 2f tensile, 1.5f tensile and f compressive, calculate the value of 'f' at failure according to the maximum principal strain theory. The elastic limit in simple tension is 210 N/mm² and Poisson's ratio is 0.30. [10M]	5	L2
	OR		
20	Discuss in detail various prominent theories of failures. [10M]	5	L2