R20 Regulation *Subject code: 3P3AD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Regular/Supplementary Examinations, March/April 2023

STRENGTH OF MATERIALS - I

(CIVIL ENGINEERING)

Maximum Marks: 70 Date:04.04.2023 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)

1 State Hooke's law.
2 Define Poisson's ratio.
3 Draw the SFD,BMD for a cantilever loaded with a clockwise couple of 'M' at the free end.
4 What are the different types of loads acting on a beam?
5 What is the flexure formula?
6 What do you understand by terms 'Neutral axis and moment of resistance'?
7 Define slop and deflection.
8 List the cases where Mohr's theorem is conveniently used.
9 Define the terms principal planes and principal stresses
10 Define the term 'obliquity' and write how it is determined.

Part-B

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

11 A hammer is having mass of 10kg falls a height of 1.5 m on a 50mm cube iron block before coming to rest. Find the amount by which the block will be compressed and the instantaneous stress induced in it. Also find the velocity with which the hammer will strike the block. Take 'E' = 200Gpa. 10M

OR

12 Draw the stress strain diagram for mild steel and identity the significant points. 10M

13 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

OR

14 Derive the relation between rate of loading, shear force and bending moment 10M

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 $E=2\times10^5$ N/mm^2. 10M

OR

16 A. 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 = 10Mpa. 5M

	B. Derive the Section modules equation for Circle and Rectangular Section.	5M
17	Derive the deflection equation for a simply supported beam of length L carrying a point load W at the centre.	10M
	OR	
18	What is the usefulness of conjugate beam method over the Macaulay's method?	10M
19	Direct stresses of 120 MPa tension and 90 MPa compressions are applied to an elastic material at a certain point on the planes at right angles. The maximum principal stress is limited to 150 MPa. What is the corresponding shear stress on the given planes and what is the maximum shearing stress at that point.	10M
	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 600 are 8N/mm^2 and 8N/mm^2. Determine the safe value of P.	10M