Regulation R20 *Subject code: 3P3AD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Regular Examinations, JULY-2022

Strength of Materials-I

(Civil Engineering)

Maximum Marks: 70 M **Date: 27.07.2022** 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)**

1 Define Poisson's ratio and what is its maximum value.

2 A circular bar of diameter 50mm is subjected to a tensile force of 120KN. Find longitudinal strain and lateral strain. take 'E' = 200GPa and 1/m = 0.3.

3 Define point of contraflexure.

4 List any three important points to be kept in mind while drawing SFD and BMD.

5 What is the flexure formula ? Explain the terms in it.

6 What do you understand by terms 'Neutral axis and moment of resistance' ?

7 What is the differential equation of deflected curve of a beam?

8 List the cases where Mohr's theorem is conveniently used.

9 Draw the Mohr's circle for a state of pure shear.

10 What is meant by Mohrs circle of stresses?

Part-B

Answer All the following questions. **(10MX 5=50Marks)**

11 A load of 2 MN is applied on a short column 500 mm × 500 mm. The column is reinforced with four steel bars of 10 mm dia, one in each corner. Find the stresses in the concrete and steel bars. Take E for steel as 2.1×10^5 N/mm^2 and for concrete as 1.4×10^4N/mm^2

OR

12 A reinforced concrete column 500 mm x 500 mm has Four Reinforcement bars of steel each 18 mm in diameter one in each corner. Find the stresses in concrete and steel bars when the column is subjected to a load of 2MN. Take E for steel is 2.1×10^5 N/mm^2 and for concrete as 1.4×10^4N/mm^2.

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.

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.

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=2×10^5 N/mm^2.

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 = 10MPa.

17 A cantilever of uniform cross-section of length l carries two point loads, W at the free end and 2W at a distance 'x' from the free end. Find the maximum deflection due to this loading.

OR

18 Derive the deflection equation for a simply supported beam of length L carrying a point load W at the centre.

19 At a point in a strained material, the principal stresses are 400 N/mm² and 300 N/mm².The first one is tensile in nature and the second one is compressive in nature. Determine the following stresses on a plane inclined at 60° to the direction of the larger stress.
(i) Normal stress
(ii) Shear stress
(iii) Resultant stress.

OR

20 Discuss in detail various prominent theories of failures.