



R17 Regulation

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous, Accredited by NAAC with 'A' Grade)

Subject code:1P3AB

B.Tech II Year I Semester Supplementary Examinations, February 2021

STRENGTH OF MATERIALS –I

(Civil Engineering)

Maximum Marks: 70

Date:22.02.2021

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 Define stress
- 2 State Hooke's law.
- 3 Define the term point of contraflexure
- 4 What are SF and BM diagram.
- 5 What is the value of maximum shear stress in a rectangular cross section
- 6 State the main assumption while deriving general formula for shear stress
- 7 State the two theorems in Moment area method.
- 8 Calculate area of BMD of a cantilever carrying UDL of W/m for the full span of 'L'.
- 9 Define Principal stresses.
- 10 Define Guest theory.

Part-B

Answer All the following questions.

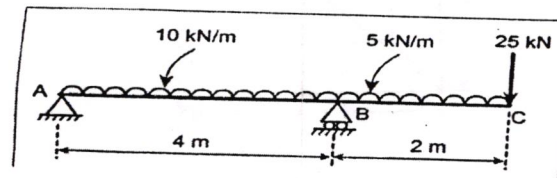
(10M X 5=50Marks)

11 A bar of 20mm diameter is tested in tension. It is observed that when a load of 40 KN is applied the extension measured over a gauge length of 200mm is 0.12 mm and construction in diameter is 0.0036mm. Find Poisson's ratio and elastic constants E, G, K. (10M)

OR

12 A steel tube of 50mm external diameter and 50mm internal diameter encloses a copper rod of 25mm diameter. The tube is closed at each end by rigid plates of negligible thickness. If a temperature of 20°C there is no longitudinal stresses in the rod and tube when the temperature is raised to 220°C. Take $E_s=200 \text{ GN/m}^2$; $E_c=100 \text{ GN/m}^2$; $\alpha_s=12 \times 10^{-6}/^\circ\text{C}$; $\alpha_c=18 \times 10^{-6}/^\circ\text{C}$. (10M)

13 Draw the shear force and bending moment diagram of the beam loaded as shown in fig. Also determine the point of contraflexure if any.



OR

- 14 A simply supported beam of 7m span has a load of 12kN/m uniformly distributed over 3 m. It is 1.5 m away from the right. In addition, it has a point load of 8 KN at 2.5 m from the left-hand support. (10M)
- 15 A rectangular beam of 15cm wide and 20cm deep is subjected to load 2500kg. Calculate the maximum shear stress. If load is distributed uniformly over the beam calculated maximum shear stress? (10M)

OR

- 16 A beam of triangular cross section having base width of 150 mm and a height of 250mm is subjected to a shear force of 10 kN. Find the value of maximum shear stress, and shear stress in neutral axis. (10M)
- 17 A beam is simply supported as its ends over a span of 10 m and carries two concentrated loads of 100 KN and 60 KN at a distance of 2 m and 5 m respectively from the left support. Calculate (i) slope at the left support; (ii) slope and deflection under the 100 KN load. Using Macaulay's method. Assume $EI=36 \times 10^4 \text{ kN-m}^2$. (10M)

OR

- 18 A beam ABCD is simply supported at its ends A and D over a span of 30 meters. It is made up of three portions AB, BC and CD each 10 m in length. The moments of inertia of the section of these portion are $I, 3I, 2I$ respectively, where $I=2 \times 10^{10} \text{ mm}^4$. The beam carries a point load of 150 KN at B and a point load of 300 KN at C. Neglecting the weight of the beam calculate the slopes and deflections at A, B, C, D. Take $E=2 \times 10^2 \text{ KN/mm}^2$. (10M)

19 At a point in a strained material the principal stresses are 100 N/mm^2 (tensile) and 60 N/mm^2 (compressive). Determine the normal stress, shear stress and resultant stress on a plane inclined at 50° to the axis of major principal stress. Also determine the maximum shear stress at the point. (10M)

OR

- 20 A small block of 4cm long, 3 cm high and 0.5 cm thick. It is subjected to uniformly distributed tensile forces of resultants 1200 N and 500 N as shown in fig. below. Compute the normal and shear stress developed along the diagonal AB. (10M)

