



R18 Regulation

Subject code: 2P4AB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, September 2023

Strength of Materials-II

(CE)

Maximum Marks: 70

Date: 15.09.2023 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 Define Torsion.
- 2 What is the polar modulus for solid shaft and circular shaft.
- 3 What are the assumptions made in the Euler theory?
- 4 Define slenderness ratio.
- 5 What is the most suitable section for a crane?
- 6 Define eccentric load of a beam.
- 7 When will you call a cylinder as thin cylinder?
- 8 Define longitudinal stress.
- 9 Define unsymmetrical bending?
- 10 What do you mean by stress concentration?

Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 Two shafts of the same material and of same length are subjected to the same torque, if the first shaft is of a solid circular section and the second shaft is of hollow circular section, whose internal diameter is $\frac{2}{3}$ of the outside diameter and the maximum shear stress developed in each shaft is the same, compare the weights of the shafts.
(10M)

OR

- 12 A leaf spring carries a central load of 3000 N. The leaf spring is to be made of 10 steel plates 5 cm wide and 6 mm thick. If the bending stress is limited to 150 N/mm^2 determine length of the spring and deflection at the centre of the spring. Take $E = 2 \times 10^5 \text{ N/mm}^2$.
(10M)
- 13 Simplify an expression for crippling load when both ends of the column are fixed.
(10M)

OR

- 14 Using Euler's formula, Find the critical stresses for a series of struts having slenderness ratio of 40, 80, 120, 160 and 200 under both ends hinged condition. Take $E = 2.05 \times 10^5 \text{ N/mm}^2$.
(10M)
- 15 A short column of rectangular cross section 80 mm by 60 mm carries a load of 40 kN at a point 20 mm from the longer side and 35 mm from the shorter side. Determine the maximum compressive and tensile stresses in the section. (10M)

OR

- 16 A closed ring of mean radius of curvature 90 mm is subjected to a pull of 3 kN. The line of action of the load passes through the centre of the ring. Find the maximum tensile and compressive stresses in the material of the ring if the ring is circular in cross section with diameter equal to 15 mm. (10M)
- 17 A cylindrical thin drum 80 cm in diameter and 3 m long has a shell thickness of 1 cm. If the drum is subjected to an internal pressure of 2.5 N/mm^2 . Determine change in diameter, change in length, and change in volume. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and poisson's ratio = 0.25. (10M)

OR

- 18 A pipe of 200 mm internal diameter and 50 mm thickness carries a fluid at a pressure of 10 MN/m^2 . Determine the maximum and minimum intensities of circumferential stresses across the section. (10M)
- 19 A simply supported beam of span 3 m carries a load of 500 N at its centre. The section of the beam is an equal angle of size 100 mm by 100 mm and 12.5 mm thick. The load line passes through centroid of the section. Determine the position of neutral axis. (10M)

OR

- 20 Explain shear center and locate shear center for various cross section with neat sketch. (10M)