



R17 Regulation

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

Subject code: 1P4AA

B.Tech II Year II Semester Supplementary Examinations, July 2021

Strength Of Materials – II

(Civil Engineering)

Maximum Marks: 70

Date: 18.07.2021 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 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 State the fundamental assumptions made in the theory of torsion.
- 2 Define spring and mention types of springs.
- 3 Define slenderness ratio, crippling load.
- 4 What are the limitations of Euler's column theory?
- 5 What are the assumptions made in derivation of stresses in curved beams subjected to bending moment?
- 6 Prove that eccentric load causes a direct stress as well as bending stress.
- 7 Write down the expression for circumferential stress and longitudinal stress for longitudinal joint and circumferential joint.
- 8 Differentiate between thin cylinder and thick cylinder.
- 9 Define Flexure or bending axis. Define combined bending and axial loads and write its expression.
- 10 Define Unsymmetrical bending & Shear center.

Part-B

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

- 11 A hollow shaft having an inside diameter 60% of its outer diameter, is to replace a solid shaft transmitting the same power at the same speed. Determine the percentage saving in material, if the material to be used is also the same. (10M)

OR

- 12 A closely-coiled helical spring is to carry a load of 1.5kN. its mean coil diameter is to be 12 times that of wire diameter. Calculate these diameters if the maximum shear stress in the material of spring is to be 95 N/mm². (10M)

- 13 Derive the equation for the Euler's crippling load for a column with one end fixed and other end free. (10M)

OR

- 14 Simplify an expression for crippling load when both ends of the column are hinged. (10M)

- 15 A column is rectangular in cross section of 300 mm * 400 mm in dimensions. The column carries an eccentric point load of 360 kN on one diagonal at a distance of quarter diagonal length from a corner. Calculate the stresses at all four corners. Mark stress distribution diagrams for any two adjacent sides. (10M)

OR

- 16 Determine the location of neutral axis, maximum and minimum stress when a curved beam of rectangular cross section of width 20 mm and of depth 40 mm is subjected to pure bending of moment 600 Nm. The beam is curved in a plane parallel to depth. The mean radius of curvature is 50 mm. Also plot the variation of the stresses across the section. (10M)

- 17 A boiler shell is to be made of 25mm thick plate having a limiting tensile stress of 120 N/mm². If the efficiencies of the longitudinal and circumferential joints are 75% and 40% respectively determine: a) maximum permissible diameter of the shell for an internal pressure of 2 N/mm² b) permissible intensity of internal pressure when shell diameter is 1.5m (10M)

OR

- 18 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/mm². Determine change in diameter, change in length, and change in volume. Take $E = 2 * 10^5$ N/mm² and poisson's ratio = 0.25. (10M)

- 19 Determine the position of shear center of a channel having dimensions: flanges 120mmx25mm and web 10mmx12mm. (10M)

OR

- 20 A cantilever of length 1 m carries a point load of 2000 N at the free end. The cross section of the cantilever is an unequal angle of dimensions 100 mm by 60 mm and 10 mm thick. The small leg of the angle i.e (60 mm) is horizontal. The load passes through the centroid of the cross section. Determine the position of neutral axis. (10M)