

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV(OLD) – EXAMINATION – SUMMER 2019****Subject Code:140201****Date:20/05/2019****Subject Name: Mechanics Of Deformable Bodies****Time:02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Distinguish between arch, cable, net, membrane, framed and grid structures. **07**
(b) Derive the torsion formula for Hollow circular shafts. **07**

- Q.2** (a) Write a note on shear centre. **07**
(b) A ring is made of round steel bar 30 mm diameter and the mean radius of the ring is 180 mm. Calculate the maximum tensile and compressive stresses in the material of the ring if it is subjected to a pull of 12kN. **07**

OR

- (b) Derive relation between slope, deflection and radius of curvature. **07**

- Q.3** (a) Explain Macaulay's method in brief. **07**
(b) Derive the EULER'S formula when **07**
Case -1 : when both ends of the column are hinged
Case -2: when one end is fixed and other is free.

OR

- Q.3** (a) The maximum normal stress and the maximum shear stress analyzed for a shaft of 150 mm diameter under combined bending and torsion were found to be 120 MN/m² and 80 MN/m² respectively. Find the bending moment and torque to which the shaft is subjected. **07**

If the maximum shear stress to be limited to 100 MN/m² find how much torque can be increased if the bending moment is kept constant.

- (b) Write a note on columns and brackets and explain with neat sketch. **07**

- Q.4** (a) Explain wind pressure on chimney in brief. **07**
(b) A beam of T-section (flange: 100 mm X 20 mm; web: 150mm X 10mm) is 2.5 meters in length and is simply supported at the ends. It carries a load of 3.2 kN inclined at 20 degree to the vertical and passing through the centroid of the section. If $E = 200 \text{ GN/m}^2$ calculate : **07**

- 1) Maximum tensile stress 2) maximum compressive stress 3) deflection due to the load.

OR

- Q.4** (a) Explain the theory of stresses in curved beam in brief. **07**
(b) A steel strut has an outside diameter of 180mm and inside diameter of 120mm and is 6 m long. It is hinged at both ends and is initially bent. Assuming the centre line of the strut as sinusoidal with maximum deviation of 9 mm , determine the maximum stress developed due to an axial load of 150 kN **07**
Take $E = 208 \text{ GN/m}^2$

- Q.5 (a) Explain earth pressure on retaining walls in brief. 07
(b) Write a note on transversely loaded circular beams in brief. 07
- OR**
- Q.5 (a) Write down the types of riveted joints and explain with neat sketch. 07
(b) Explain limit of eccentricity and core of a section. Draw “core” for Rectangular and circular section. 07

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