

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV (OLD) EXAMINATION – WINTER 2018****Subject Code:140201****Date: 10/12/2018****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) Define the following Term. Truss, Column, Strut, Radius of gyration, Polar moment of Inertia, Lap Joint, Butt Joint, **07**
- (b) Define The term Torsion. Write assumptions in the theory of pure torsion. **07**
- Q.2** (a) Calculate the diameter of the solid shaft to transmit 25 kW power at 1000 rpm. The maximum shear stress should not exceed 80 N/mm². **07**
- (b) Write the difference between “ beam straight in plan and beam curved in plan” **07**
- OR**
- (b) A rectangular column size 200 x 150 mm is fixed at both ends. The length of column 7 m. Find Euler’s crippling load. Take modulus of elasticity is 2×10^5 N/mm². **07**
- Q.3** (a) Explain Rankine’s Formula. **07**
- (b) A curved beam of rectangular section 30 x 60 mm is subjected to pure bending with couple of 500 N.m The mean radius of curvature is 50 mm. Find the maximum and minimum stresses. Also find the position of the neutral axis. **07**
- OR**
- Q.3** (a) Explain Shear Centre for Channel Section. **07**
- (b) A rectangular column size 200 x 150 mm is fixed at both ends. The length of column 7 m. Find Slenderness ratio of the column. **07**
- Q.4** (a) Explain the different form of structures with sketch. **07**
- (b) A Simply supported beam of span 10 m subjected to central point load of 150 kN. Calculate the slope at supports and deflection at centre. Use Macaulay’s Method or Conjugate beam method. Take $E = 2 \times 10^5$ N/mm² and $I = 7 \times 10^8$ mm⁴. **07**
- OR**
- Q.4** (a) A cantilever beam of span 5 m is subjected to uniformly distributed load 25 kN/m over entire span. Find slope and deflection at free end using Conjugate beam method. Take $E = 2 \times 10^5$ N/mm² and $I = 3 \times 10^8$ mm⁴. **07**
- (b) Explain the change of support conditions from real beam to the conjugate beam. **07**
- Q.5** (a) Explain the “limit of eccentricity” and “no tension condition” in the column subjected to axial load. **07**
- (b) A hollow circular column 200 mm external diameter and 150 mm internal diameter subjected to axial load 200kN at centre of the column and eccentric load 80 kN with the eccentricity of 75 mm from centroid of the column. Find maximum and minimum stress in the column. **07**
- OR**
- Q.5** (a) Explain the difference between Riveted joint and Welded joint. **07**
- (b) Two plates 12 mm thick and 350 mm wide are joined by lap joint using 16 mm diameter rivets. (Single Riveted) Find load carrying capacity of the joint. Take permissible shear stress 80 N/mm², permissible tearing stress 100 N/mm² and permissible bearing stress 200 N/mm². **07**