

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV EXAMINATION – SUMMER 2016****Subject Code:140201****Date:06/06/2016****Subject Name:Mechanics Of Deformable Bodies****Time:10:30 AM to 01:00 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 relation between slope, deflection and radius of curvature. **07**
- Q.2** (a) Write applicability of Euler theory and limitations of Euler's formula. **07**
 Derive Euler's formula when both ends of column are hinged.
 (b) (i) Explain various mode of failure of riveted connection. **03**
 (ii) Write advantages and disadvantages of welded joints. **04**
- OR**
- (b) Explain centroidal principal axes of a section. **07**
- Q.3** (a) Explain the theory of bending of curved beam with large initial curvature. **07**
 (b) A cantilever 2m long is loaded as shown in FIGURE 1. Find slope and deflection at free end. The cross section of beam is rectangular having 100 mm width and 180 mm depth, $E = 200 \text{ GPa}$. **07**
- OR**
- Q.3** (a) A short column rectangular section 250 mm x 200 mm is subjected to a load of 400 kN. at a point 50 mm from longer side and 100 mm from shorter side. Find maximum and minimum stresses in the column. **07**
 (b) A retaining wall of rectangular section 2.5 m wide and 6.0 m high. It retains earth up to full height. Check the stability for tension in base and for sliding. Take density of soil = 15 kN/m^3 , density of wall material = 30 kN/m^3 , angle of repose = 32° and $\mu = 0.5$. **07**
- Q.4** (a) A shaft has to transmit 105 kW power at 160 rpm. If the shear stress is not to exceed 65 N/mm^2 & the twist in a length of 3.5 m must not to exceed 1° . Find suitable diameter. Take $G = 8 \times 10^4 \text{ N/mm}^2$. **07**
 (b) A hollow cast-Iron section having external diameter 250 mm and thickness 25 mm is used as 4.5 m long column with both ends fixed. Find safe crippling load by (a) Euler's and (b) Rankine's formula. Take factor of safety as 3.5 and maximum compressive stress = 500 N/mm^2 and constant = $\alpha = 1/1600$ and modulus of elasticity = $E = 0.14 \times 10^5 \text{ N/mm}^2$. **07**
- OR**
- Q.4** (a) What is core of section? Determine the core of circular section of diameter D. **04**
 (b) A curved beam circular in plan symmetrically supported on six columns has radius 4 m. The beam carries an uniformly distributed load of 2 kN/m, including self weight of beam. Determine the shear force, bending moment and twisting moment at important locations and plot S.F., B.M. and T.M. diagram. **10**
- Q.5** (a) Write the assumption for design of riveted joint and Explain strength of riveted joint. **07**
 (b) A hook of circular section 25 mm diameter and radius of curvature of its central axis also 25 mm carries a load of 5 kN. Calculate the maximum tensile and compressive stress in the hook. **07**

OR

- Q.5** (a) Define conjugate beam. Give relation between actual beam and conjugate beam. **04**
(b) A beam of channel section $120 \text{ mm} \times 60 \text{ mm}$ has uniform thickness of 10 mm . **10**
Draw distribution of shear stress in flanges and web when a shear force of 100 kN acts through the shear centre of the section. Also locate the shear centre. Also find the ratio between the maximum and mean shear stress.

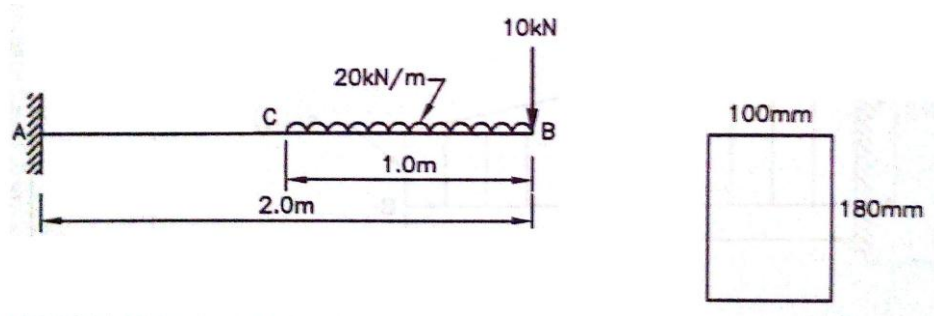


FIGURE:-1 (Q. 3- B)
