24763

B.Tech. 4th Semester (FT)

Examination, May–2016

STRENGTH OF MATERIALS

Paper–FT-206-F

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt **five** questions. **Question No. 1 is compulsory** and attempt at least **one** question from each section.*

1. Explain the following :

(a) Define Shear Strain.

(b) Define Poisson's Ratio.

(c) Define Modulus of Rigidity.

(d) Explain Principle Stresses.

(e) Define Shear Force.

(f) Difference between Columns and Struts.

(g) Explain different types of beams.

(h) Explain Point of Contra-flexure. 2½×8=20

Section–A

2. A solid steel bar of 70 mm diameter and 0.5 m long is placed inside the aluminium tube having 75 mm inside diameter and 100 mm outside diameter. The aluminium cylinder is 0.15mm longer than the steel bar. An axial compressive load of 600 kN is applied to the bar and the cylinder through the rigid cover plates. Find the stresses developed in the steel bar and the aluminium cylinder. Take $E_S = 200$ GN/m^2 and $E_{Al} = 70$ GN/m^2. 20

3. A bar of 40 mm diameter is subjected to a pull of 80 KN. The measured extension on gauge length of 300 mm is 0.12 mm and the changes in diameter is 0.004 mm. Calculate the Poisson's ratio and the values of the three modulü. 20

Section–B

4. At a certain point in a strained material the principle stresses are 100 MN/m^2 and 40 MN/m^2, both tensile. Find the normal, tangential and resultant stresses across a plane through the point at 48° to the major principle plane, using Mohr's circle of stress. 20

5. Three beams have the same length, allowable stress and the bending moment. The cross sections of the beam are a square, a rectangle with depth twice the width and a circle. Determine the ratios of weights of the circular and the rectangular beams with respect to the square beam. 20

Section–C

6. An overhanging beam ABC is simply supported at A and B over a span of 6 m and BC overhangs by 3 m. If the supported span AB carries central concentrated load of 8 KN and overhanging span carries 2 KN/m completely. Draw the shear force and Bending Moment diagrams. 20

7. Derive the Torsion equation for solid and hollow circular shafts. 20

Section–D

8. Calculate the slope and deflection of the AB simply supported beam of length 'L' carrying U.D.L. of 'w' per unit run for a distance a from the end A. 20

9. A fixed beam of 6m span is subjected to a concentrated couple of 150 KNm applied at a section 4 m from the left end. Find the moments from the first Principles. Draw S.F. and B.M. diagrams also. 20