9. A fixed beam of 6 m span is loaded with point loads of 150 KN at distance 2 m from each support. Draw the B.M. and S.F. diagrams. Find also the maximum deflection. Take $E = 2 \times 10^8$ KN /m² $I = 8 \times 10^8 mm^4$.

20



*Roll No.* .....

# 24763

## B. Tech. 4th Semester (FT)

## Examination – May, 2017

### STRENGTH OF MATERIAL

**Paper : FT-206-F**

*Time : Three Hours ]* *[ Maximum Marks : 100*

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

*Note :* Attempt *five* questions. Question number 1 is ***compulsory*** and attempt at least ***one*** question from each Section. All questions carry equal marks.

1. Explain the following :

   (a) Explain difference type of stresses.

   (b) Define Bulk modular of elasticity.

   (c) Define Principal planes.

   (d) Define Bending Moment.

(e) Explain different types of load.

(f) Define point of contra-flexure.

(g) Define Column & Strats.

(h) Define Torque. $2.5 \times 8 = 20$

## SECTION – A

**2.** A steel rod 18 mm in diameter passes centrally through a steel tube of 30 mm in external dia and 2.5 mm thickness. The tube is 0.75 m long and is closed by rigid washers of negligible thickness which are fastened by nuts threaded on the rod. The nuts are tightened until the compressive load on the tube is 20 KN. Calculate the stress in the tube & rod. 20

**3.** A bar of 30 mm dia is subjected to a pull of 60 KN. The measured extension on gauge length of 200 mm is 0.09 mm and the change in dia is 0.0039 mm. Calculate the Poisson's ratio and the values of the three modulii. 20

## SECTION – B

**4.** Mutually perpendicular fases of a square element of a thin plate are subjected to normal & shear stresses of 63MN/m² (tensile), 47.2 MN/m² (compressive) & 39.4 MN/m² (shear). Determine graphically the magnitude & directions of the principal stresses and the greatest shearing stress. 20



**5.** If the beam cross-section is rectangular having width of 75 mm, determine the required depth much that maximum bending stress induced in the beam does not exceed 40mm/m². 20

## SECTION – C

**6.** A Horizontal beam of length 8 m is simply supported at A and B. It carries U.D.L. of 3 KN/m over the entire span and a clockwise moment of 12 KNm is applied in the plane of beam at a point C, 5 m from A. Draw the share force and Bending moment diagrams and determine the position and magnitude of maximum bending moment. 20

**7.** A hollow circular shaft 20 mm which transmitt 294KW at 200 rpm. Determine the diameters of the shaft if the shear strain due to torsion is not to exceed $8.6 \times 10^{-4}$. Take modulus of rigidity as 80 GN/m². 20

## SECTION – D

**8.** Calculate the slope and deflection of the cantilever beam of length 'L' carrying U.D.L of 'w' per unit run for a distance a from the fixed end. 20