

**II B. Tech I Semester Supplementary Examinations, May - 2018****MECHANICS OF SOLIDS**

(Com to ME, AE &amp; AME)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. Answer **ALL** the question in **Part-A**  
 3. Answer any **FOUR** Questions from **Part-B**
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**PART -A**

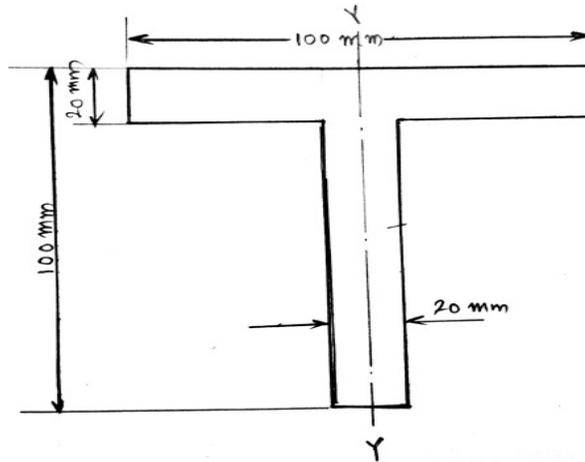
1. a) Draw the Stress- Strain diagram for Cast Iron and mention the Salient points? (2M)
- b) What are the effects of inclined load on the Beam? (2M)
- c) What is the section modulus and how it will affect the strength of the beam? (2M)
- d) State the Mohr's theorem I & II to determine the Deflection of the beam? (3M)
- e) A vessel in the shape of spherical shell of 1.20 m internal diameter and 12 mm shell thickness is subjected to pressure of  $1.6 \text{ N/mm}^2$ . Determine the stresses induced in the material of shell? (3M)
- f) Define the torsional rigidity of the shaft? What does it represent? (2M)

**PART -B**

2. a) A weight of 10 KN falls by 30 mm on a collar rigidly attached to a vertical bar 4 m long and  $1000 \text{ mm}^2$  in section. Find the instantaneous expansion of bar. Take  $E = 210 \text{ Gpa}$ . (7M)
- b) An elemental cube is subjected to tensile stresses of  $30 \text{ N/mm}^2$  and  $10 \text{ N/mm}^2$  acting on two mutually perpendicular planes and a shear stress of  $10 \text{ N/mm}^2$  on these planes. Draw the Mohr's circle of stresses and hence or otherwise determine the magnitudes and directions of principal stresses and also greatest shear stress. (7M)
3. A simple supported beam of length 8m rests on supports 6m apart, the right hand end is overhanging by 2 m. The beam carries a uniformly distributed load of  $1500 \text{ N/m}$  over the entire length. Draw the shear force and bending moment diagrams and find the point of contra flexure, if any? (14M)



4. The Shear force acting on a section of a beam is 50 kN. The section of the beam is T shaped of dimensions 100 mm x 100 mm x 20 mm as shown in the fig. The moment of inertia about the horizontal neutral axis is  $314.221 \times 10^4 \text{ mm}^4$ . Calculate the shear stress at the neutral axis and at the junction of the web and flange? (14M)



5. A cantilever of length 2m carries a point load of 20 kN at the free end and another load of 20 kN at its center. If  $E = 10^5 \text{ N/mm}^2$  and  $I = 10^8 \text{ mm}^4$  for the cantilever then determine by moment area method, the slope and deflection of the cantilever at the free end. (14M)
6. Determine the maximum and minimum hoop stress across the section of a pipe of 400 mm internal diameter and 100 mm thick, when the pipe contains a fluid at a pressure of  $8 \text{ N/mm}^2$ . Also sketch the radial pressure distribution and hoop stress distribution across the section? (14M)
7. a) A simply supported beam of length 4m is subjected to a uniformly distributed load of 30 kN/m over the whole span and deflects 15 mm at the center. Determine the crippling load when the beam is used as column with both the ends pin jointed? (7M)
- b) Derive the relation for a circular shaft when subjected to torsion as  $T/J = \tau/R = G\theta/L$  (7M)  
Where T is torque transmitted, J = polar moment of inertia,  $\tau$  = Max. Shear stress, R = radius of shaft, G = modulus of rigidity,  $\theta$  = angle of twist, L = length of shaft.

