PVP 17

Code: **17MEMD1T1**

I M.Tech - I Semester – Regular / Supplementary Examinations
February 2020

ADVANCED MECHANICS OF SOLIDS
(MACHINE DESIGN)

Duration: 3 hours Max. Marks: 60

Answer the following questions.

1. a) Compute the principal stresses, if the state of stress at a point is categorized by the components
σ_x= 10.9 N/mm^2, σ_y= 8.2 N/mm^2, σ_z= 4.34 N/mm^2
τ_{xy}= 4.10 N/mm^2, τ_{yz}= 5.36 N/mm^2 and τ_{zx}= 0.76 N/mm^2. 7 M

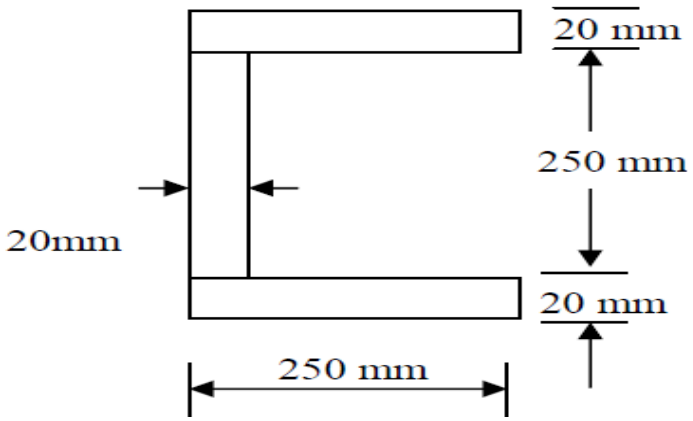
b) Derive the strain displacement relations. 8 M

(OR)

2. a) Describe the maximum shear stress and Strain energy density Criterions. 7 M

b) Differentiate maximum principal stress criterion and distortion energy density criterion. 8 M

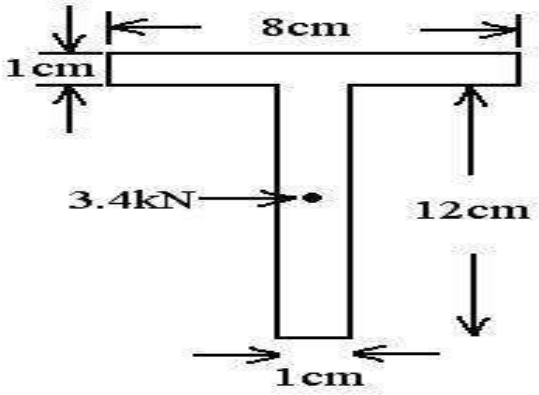
3. Locate the position of shear centre for thin channel section as shown in Figure below. 15 M



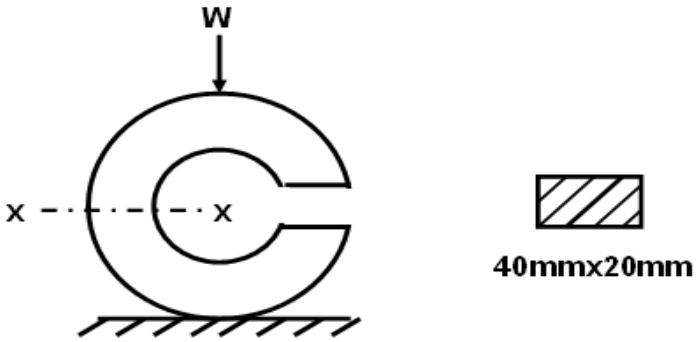
(OR)

4. a) What is Unsymmetrical bending? How can it be avoided? 5 M

b) A simply supported beam of length 1.8m carries a central load of 3.4kN inclined at 30^0 to the vertical and passing through the centroid of the section as shown in Figure. Estimate the maximum tensile stress and maximum compressive stress. 10 M



5. A ring is made of stock with rectangular cross-section is subjected to a load of 10 kN as shown in Figure. The inside diameter of the ring is 120mm. Compute the critical stress in the ring. 15 M



(OR)

6. Derive the equation for the circumferential stress acting on a rotating disk of uniform thickness with a hole in the middle. 15 M

7. a) How is torsion of a non-circular shaft different from that of circular shaft? 7 M

   b) Discuss Prandtl's Membrane Analogy. 8 M

(OR)

8. A cantilever beam with a rectangular cross section and is subjected to equal loads P at the free end and at the center as shown in Figure. Estimate the deflection of the free end of the beam using Castigliano's theorem. 15 M