Code No.: ME301PC

R20 H.T.No. | | 8 | R | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Supply)- June- 2022
MECHANICS OF SOLIDS
(MECH)

[Time: 3 Hours]   [Max. Marks: 70]

Note: 1. Answer *any FIVE* questions. Each question carries 14 marks.
       2. All questions carry equal marks.
       3. Illustrate your answers with NEAT sketches wherever necessary.

5X14=70

1. a) A Hollow cylinder 2m long has an outside diameter of 50mm and inside diameter   [7M]
      of30mm. If the cylinder is carrying a load of 25kN, find the stress in the cylinder
      and also find the deformation of the cylinder, if the value of E=100Gpa.

   b) Define Strain Energy and Derive equations of Strain Energy when it is subjected   [7M]
      to

           i.   Gradually Applied Load
           ii. Suddenly Applied Load
           iii. Impact Load
           iv. Shock Load

2. a) Draw the shear force and bending moment diagrams for a cantilever beam of   [7M]
      length 'L' carrying a uniformly distributed load of 'w' per meter length over its
      entire length as shown in Figure.1
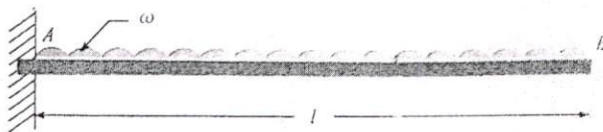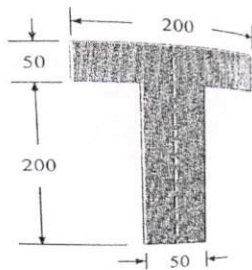

Fig.1

   b) A Simple supported beam with a point load 6kN acting at the center of the beam.   [7M]
      The total length of the beam is 2.5 m. Calculate the magnitudes of shear force
      and bending moment. And also represent these values on the shear force diagram
      and bending moment diagrams.

3. a) A copper wire of 2 mm diameter is required to be wound around a drum. Find the   [7M]
      minimum radius of the drum, if the maximum bending stress in the wire is 80
      MPa. Take E=100GPa

b) The symmetrical I-section shown in Fig.2 is subjected to a shear force of 50kN.   [7M]
    Find the maximum shear stress induced in the beam.
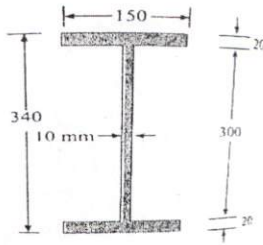
All dimensions are in mm
Fig.2

4. a) The stresses at point of a machine component are 150 MPa and 50 MPa both   [7M]
        tensile. Fine the intensities of normal, shear and resultant stresses on a plane
        inclined at an angle of 55^0 with the axis of major tensile stress. Also find the
        magnitude of the maximum shear stress in the component
    b) Derive the normal stress and shear stress for the two mutually perpendicular   [7M]
        tensile stress using Mohr's circle method

5. a) A solid circular shaft of 100 mm diameter is transmitting power 120 kW at 150   [7M]
        rpm. Find the maximum shear stress in the shaft
    b) What is the relationship between Circumferential and Longitudinal Stresses in   [7M]
        thin cylinders and explain with neat sketches?

6. a) Write a short note on the following terms   [7M]
            i.   Differentiate between the Elasticity and plasticity
            ii. Define working stress
            iii. Factor of safety

    b) Write about three elastic modules with their relations?   [7M]

7. a) A concentrated point load 'P' acts on a simply supported beam of span 'L' at a   [7M]
        distance L/3 from the left support. Determine the magnitude of bending moment
        and shear force at the applied load P
    b) Write a short note on the following terms   [7M]
            (i) Explain about the overhanging beam with neat sketch
        Explain about point of contraflexure

8. a) Derive the bending equation $M/I = \sigma/y = E/R$ [7M]
    b) A T-shaped cross-section of a beam shown in Fig.2 is subjected to vertical shear   [7M]
        force 100 kN. Calculate the shear stress distribution and maximum shear stress.

All dimensions are in mm
Fig.3

****