

Code No: 153BE

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, October - 2020

MECHANICS OF SOLIDS

(Common to ME, MIE)

Time: 2 hours

Max. Marks: 75

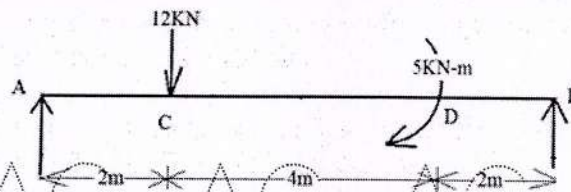
Answer any five questions
All questions carry equal marks

1. A vertical bar 3.5 meter long and 1500 mm^2 cross sectional area is fixed at the upper ends and has a collar at the lower end. Determine the maximum stress induced when a weight of a) 2500N falls through a height of 15cm on the collar b) 25KN falls through a height of 3cm on the collar. Take $E = 2.0 \times 10^5 \text{ N/mm}^2$. [15]

2. A rectangular plate made of steel is 4 m long and 20 mm thick and is subjected to an axial tensile load of 40 kN. The width of the plate varies from 30 mm at one end to 80 mm at the other end. Find the elongation, if $E = 2 \times 10^5 \text{ N/mm}^2$. [15]

3. A cantilever of length 7m carries a gradually varying load, zero at the free end to 5KN/m at the fixed end. Draw the S.F and B.M diagrams for the cantilever. [15]

4. Draw Shear force and bending moment diagram. Locate the position of maximum bending moment in the beam. [15]



5. Derive the equation $M/I = \sigma/y = E/R$
 M =B.M, I = Plane M.I, σ = bending stress, y = distance of a layer from N.A, E = elastic modulus and R =radius of curvature. [15]

6. For a T - section with dimensions flange width 100mm, Depth = 200mm and uniform thickness of 40mm. obtain shear stress distribution and calculate maximum and average shear stresses if it is subjected to a S.F. = 100 KN. [15]

7. An element is subjected to tensile stresses of 60 N/mm^2 and 20 N/mm^2 acting on two perpendicular planes and is also accompanied by shear stress of 20 N/mm^2 on these planes. Draw the Mohr's circle of stresses and determine the magnitudes and directions of principal stresses and also the greatest shear stress. [15]

8. A cylindrical shell is 3m long, and having 1cm internal diameter and 1.5mm thickness. Calculate the maximum intensity of the shear stress and also the change in the dimensions of the shell if it is subjected to an internal fluid pressure of 1.5 N/mm^2 . [15]

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