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Code No: R22031 **R10** SET - 1

II B. Tech II Semester Supplementary Examinations, April-2018
MECHANICS OF SOLIDS
(Com. to ME, AME, MM)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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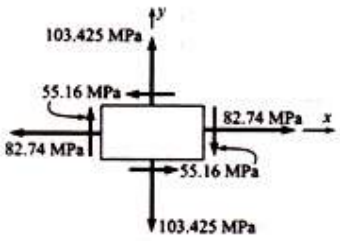
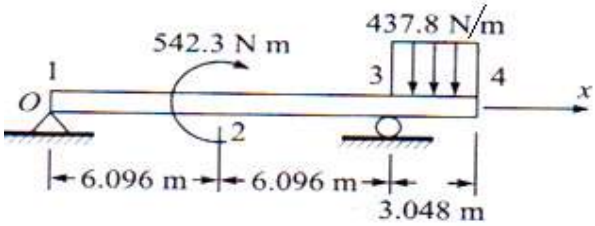
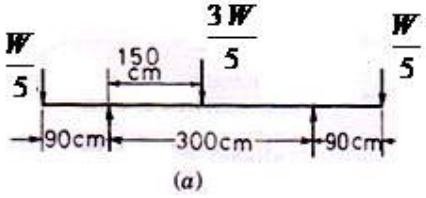
1. For the element, determine the normal and shearing stresses on a plane making an angle of 55º measured counterclockwise from the positive end of the x-axis.



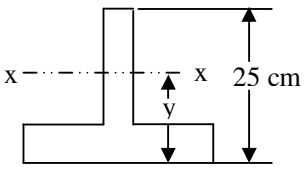
2. A simply supported beam is subject to the uniform load together with the couple shown in figure. Determine shearing forces and bending moments at significant points along the length of the beam. Draw approximate representations of these results.



3. For the beam shown in figure, I_x=4000 cm^4 and $\bar{y}$ =9 cm, find the maximum safe value of W if the working stress in tension is 40 MPa and in compression is 75 MPa.



(a)



(b) Cross-section.

4. A beam has a symmetrical triangular section of breadth B and depth D and is subjected at a certain section to a vertical shearing force S acting in the direction of the axis of symmetry. Deduce in terms of B,D and S the shearing stress q at any depth d from the vertex of the triangular section. Plot a graph showing now q varies over the depth of the section and find the ratio of the average shearing stress over the section to the maximum shearing stress.

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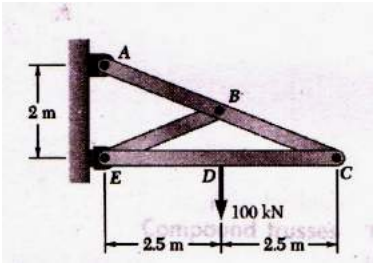
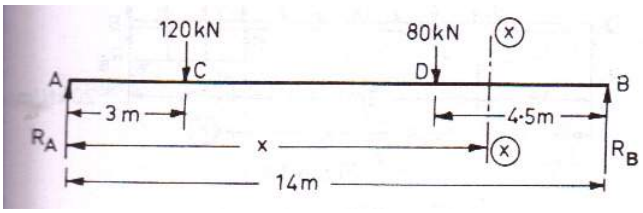
5. Using method of joints, determine the forces in each member of the truss as shown in Fig.

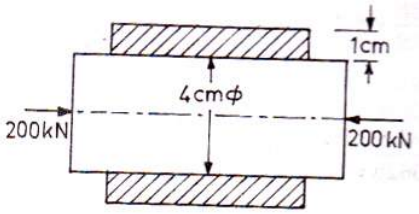


6. A horizontal girder of steel having uniform section is 14 m long and is simply supported at its ends. It carries concentrated loads of 120 kN and 80 kN at two points 3 m and 4.5 m from the two ends respectively. I for the section of the girder is 16×10^4 cm^4 and E for steel is 210 GPa. Calculate the deflection of the girder at points under the two loads.



7. A thin cylindrical pressure vessel has a diameter of 2 m and its wall thickness is 10 mm.
(a) Calculate the hoop and longitudinal stresses in the cylindrical wall caused by an internal pressure of 0.8 MPa. (b) Determine the change in diameter of the cylinder caused by pressurization. Take E = 200 GPa and v = 0.25.

8. A short steel rod 4 cm diameter is subjected to an axial compressive load of 200 kN. It is surrounded by a steel sleeve 1 cm thick, slightly shorter than the rod, so that the compressive load is taken by the rod only. Assuming a close fit between the sleeve and the rod before the load is applied, and neglecting friction, find: (a) the pressure between the sleeve and the rod, amd, (b) the maximum tension in the sleeve. Take poisson's ratio=0.3.



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