Code: R7 210304

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B.Tech II Year I Semester (R07) Supplementary Examinations, May 2012

MECHANICS OF SOLIDS

(Mechanical Engineering)

Time: 3 hours Max Marks: 80

Answer any FIVE questions

All questions carry equal marks

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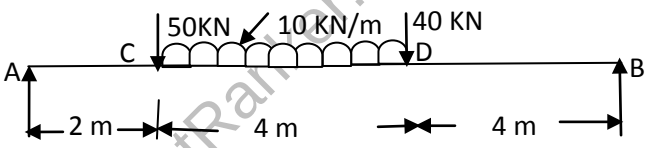
1 (a) A tensile test was conducted on a mild steel bar. The following data was obtained from the test (i) diameter of the steel bar = 3 cm (ii) Gauge length of the bar = 20 cm (iii) Load the elastic limit = 250 KN (iv) Extension at a load of 150 KN = 0.21 mm (v) max load = 380 KN (vi) Total extension = 60 mm (vii) Diameter of the rod at the failure = 2.25 cm. Determine, the young's modules, the stress at elastic limit, the percentage elongation and the percentage decrease in area.

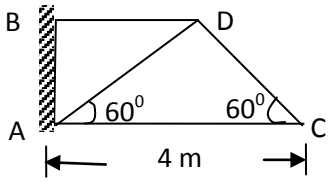
2 Draw S.F. and B.M. diagram for the beam shown in figure. Also calculate the maximum bending moment.



3 Derive $\frac{M}{I} = \frac{f}{y} = \frac{E}{R}$ in detail.

4 An I - section beam 350 mm x 150 mm has a web thickness of 10 mm and a flange thickness of 20 mm. If the shear force acting on the section is 40 KN, find the maximum shear stress developed in the I - section. Sketch the shear stress distribution across the section. Also calculate the total shear force carried by the web.

5 Determine the forces in all the member of a cantilever truss shown in figure using method of joints.



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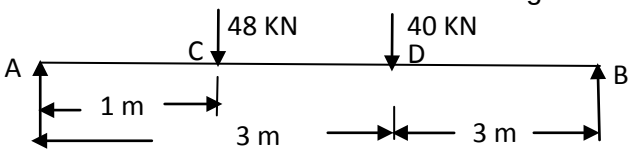
6 Calculate the deflection under each load, maximum deflection and the point at which maximum deflection occurs for the beam shown figure.



7 Calculate (i) The change in diameter (ii) Change in length and (iii) Change in volume of a thin cylindrical shell 100 cm diameter, Km thick and 5 m long when subjected to internal pressure of 3 N/mm^2. Take the value of E = 2 x 10^5 N/mm^2 and poissons ratio $\frac{1}{m}$ = 0.3.

8 Write short notes on:

(a) Lame's equations for thick cylinders.

(b) Initial difference in radii at the junction of a compound cylinder for shrinkage.

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