R07

Code: R7210304

B.Tech II Year I Semester (R07) Supplementary Examinations December 2015

MECHANICS OF SOLIDS

(Mechanical Engineering)

(For 2008 Regular admitted batch only)

Time: 3 hours Max. Marks: 80

Answer any FIVE questions

All questions carry equal marks

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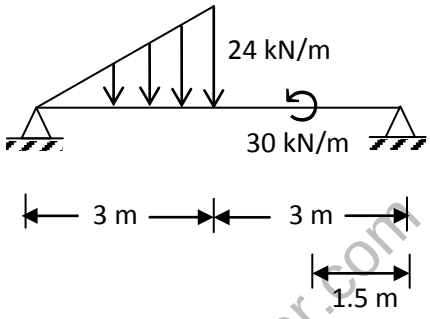
1 (a) Define and explain the term proof stress.

(b) A railway signal is operated by a 5 mm diameter steel wire 500 m long. At the signal end a moment of 200 mm is required for the proper orientation of the signal. A pull of 2.0 kN is applied at the signal box end of the wire what should be the moment so that the specified moment is available at the signal. Take E = 200 GPa for steel.

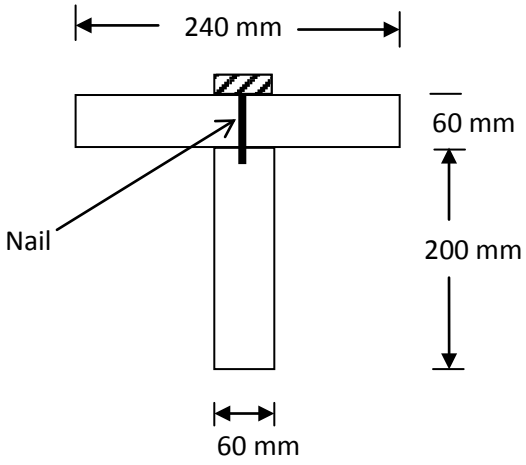
2 A simply supported beam carries loads as shown figure below. Draw SFD and BMB diagrams.



3 (a) Explain the difference between pure bending and ordinary bending.

(b) The diameter of an overhung crank is 150 mm and length of the overhang is 250 mm. Assume that the crank has a uniformly distributed load 120 N/mm. Calculate the stresses in the material.

4 A beam of T – cross section is formed by nailing together two boards having the dimensions shown in figure below. If the total shear force 'V' acting on the cross section 1500 N and each nail may carries 750 kN in shear. What is the allowable nail spacing and also draw shear stress diagram.



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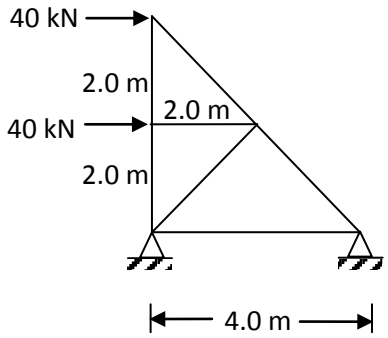
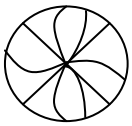
Code: R7210304 **R07**

5 Analyze the pin-jointed frame show below.



6 The deflection curve for a cantilever beam AB (show below) is given by the following equation: $y = \frac{-q_0 x^2}{120\, LEI}(10\, L^3 - 10\, L^2(x) + 5\, L(x)^2 - x^3)$. Describe the load acting on the beam.

7 A rubber ball (shown in figure below) is inflated to a pressure of 60 KPa. At this pressure the diameter of the ball is 230 mm and wall thickness is 1.2 mm. The rubber has modulus of elasticity E = 3.5 MPa, and Poisson's ratio = 0.45.
Determine the maximum stress and strain in the ball.



Ball

8 A thick cylinder of internal diameter 200 mm is subjected to an internal fluid pressure of 40 N/mm^2. If the allowable stress in tension for the material is 120 N/mm^2. Find the thickness required.

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