Code :9A01301 **R9**

II B.Tech I Semester(R09) Supplementary Examinations, May 2011
MECHANICS OF SOLIDS
(Aeronautical Engineering, Mechanical Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE questions
All questions carry equal marks
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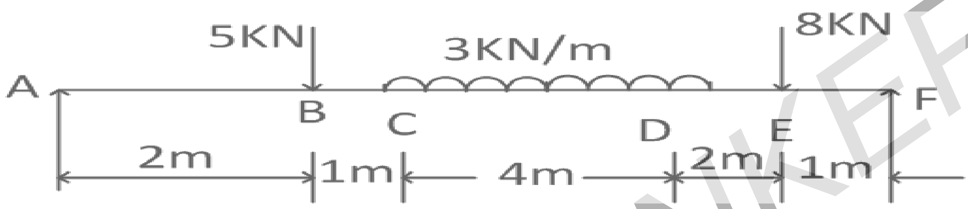
1. (a) Derive the relationship between elastic modules E, N and K.
   (b) The modulus of rigidity for a material is $0.5 \times 10^5 N/mm^2$. A 12 mm diameter rod of the material was subjected to an axial pull of 14 KN and the change in diameter was observed to be $3.6 \times 10^{-3} mm$. Calculate Poisson's ratio and the modulus of elasticity.

2. Draw the SFD and BMD for the simply supported beam shown in figure.



3. A timber beam of rectangular section is to support a load of 30KN over a span of 4m. If the depth of the section is to be twice the breadth and the stress in the timber is not to exceed 60 N/mm^2, find the dimensions of the cross section. How would you modify the cross section of the beam if it were a concentrated load placed at the centre with the same ratio of breadth to depth?

4. A beam of triangular cross-section with base b and height h, is used with the base horizontal. Calculate the intensity of max shear stress and plot the variation od shear stress intensity over the section.

5. (a) Explain the types of leaf springs with sketches.
   (b) A close-coiled helical compression spring is made of 10 mm steel wire closely coiled to a mean diameter of 100 mm with 20 coils. A weight of 100N is dropped on to the spring. If the maximum instantaneous compression is 60 mm, calculate the height of the drop. Take $N = 0.85 \times 10^5 N/mm^2$.

6. (a) Derive the differential equation for the elastic line of a beam.
   (b) Write short notes on moment area method.

7. (a) Derive the formula for longitudinal and circumferential stresses.
   (b) Write short notes on riveted boilers shells.

8. A compound cylinder formed by shrinking one tube onto another is subjected to an internal pressure of 50N/mm^2. Before the fluid is admitted the internal and external diameter of the compound cylinder are 100mm and 180mm and the diameter at the junction is 150mm. If after shrinking on the radial pressure at the common surface is 8N/mm^2. Calculate the final stresses setup by the section.

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