Code :9A01302 **R9**

II B.Tech I Semester(R09) Supplementary Examinations, May 2011
STRENGTH OF MATERIALS-I
(Civil Engineering)

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

Answer any FIVE questions
All questions carry equal marks

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1. (a) A bar of length L tapering in diameter uniformly from (D+a) at one end to (D-a) at the other is subjected to an axial load P. Prove that the error involved in using the mean diameter in calculating the Young's modulus is $(100/D)^2$ percent.
   (b) A steel bar of length 20cm and 5cm x 5cm in section is connected at its end to an aluminum bar of 25cm length and 8cm x 8cm in section, such that they have a common longitudinal axis. Find the load which will reduce the total length by 0.25mm. Find also the total work done Take E_s = 200 GPa and E_a = 70 GPa
2. (a) Define the 'Beam' and the type of action and deformation it undergoes.
   (b) Draw the S.F and B.M diagram for a S.S.B of span L loaded with UDL of W KN/m.
3. What do you understand by section modulus? Obtain the dimensions of the strongest rectangular section that can be cut from a circular log of wood of 30cm diameter.
4. Find the maximum shear stress induced by a load of 4KN in the vertical section of a hollow beam of a square section if the outside width is local and the thickness of material is 2 cm.
5. A 6.5m long cantilever carries a uniformly distributed load over the entire length. If the slope at the force end is 1^0 (one degree), what is the deflection at the free end?
6. Write the expressions for maximum slope and deflection of a cantilever beam with a point load at free end.
7. Draw Mohrs circle for direct stresses of 45N/mm^2 (tensile) and 25N/mm^2 (compressive) and find the magnitude and direction of resultant stresses on planes making angles of 30^0 & 60^0 with the plane of first principal stress. Also find normal & tangential stress.
8. According to theory of max shear stress, determine the diameter of bolt which is subjected to an axial pull of 9KN together with a transverse shear force of 4.5 KN. Elastic limit in tension is 225 N/mm^2. F.S = 3 & 1/m = 0.3.

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