(Please write your Exam Roll No.) *Exam Roll No.* [redacted]

END TERM EXAMINATION

THIRD SEMESTER [B.TECH.] DECEMBER-2010

Paper Code: ETCE201	*Subject: Structural Analylsis-I*
Time : 3 Hours	*Maximum Marks :75*

Note: Attempt five questions. Graph paper is required.

Q1 (a) Express 2.0GN/m^2 in N/mm^2 units. **(3)**

(b) What is the deformation in a metal bar, hanging freely along the vertical axis, under its own weight? Total weight of the bar=W, Length of the bar=L, Youngs modulus of elasticity=E. **(3)**

(c) Distinguish between centre of gravity and centroid. **(3)**

(d) Explain the term redundant frame. **(3)**

(e) Draw the shear force and bending moment diagram for a simply supported beam loaded as shown in fig.1. **(4)**

(f) Sketch the distribution of shear stress over a T-section shown in fig.2. **(3)**

(g) In what form is a fixed end of the actual beam? **(3)**

(h) The polar modulus for a solid shaft is $\frac{\pi D^3}{16}$. What is the polar modulus for a hollow shaft? **(3)**

UNIT-I

Q2 A steel tube of 32mm external diameter and 20mm internal diameter encloses a copper rod of 16mm diameter, to which it is rigidly joined at each end, at a temperature of 10^{0}C, when there is no longitudinal stress. Calculate the stresses in the rod and the tube when the temperature is raised to 200^{0}C. E_s=2.1x10^{5}MN/m^2, α_s=11x10^{-6}/^{0}C, E_c=1x10^{5}MN/m^2, α_c=18x10^{-6}/^{0}C. **(12.5)**

OR

Two steel rods and one copper rod, each of 20mm diameter, together support a load of 200kN as shown in fig.3. Find the stresses in the rods. E_s=205GN/m^2, E_c=110GN/m^2. **(12.5)**

UNIT-II

Q3 A simply supported beam of span 4m is loaded as shown in fig.4.

(a) Determine the maximum tensile and compressive stresses at a section 2.2m from the left support. **(10)**

(b) Calculate the section modulus. **(2.5)**

OR

A timber beam 150mmx200mm is to be reinforced by bolting on two steel flitches: 150x12.5mm^2 each. Calculate the moment of resistance when- **(12.5)**

(a) The flitches are attached at the top and bottom.

(b) The flitches are attached symmetrically at the sides. $f_{t\ max}$=6N/mm^2, find $f_{s\ max}$ in each case. E_S=2x10^{5}N/mm^2, E_t=1x10^{4}N/mm^2.

UNIT-III

Q4 Determine θ_A, θ_B y_A and y_B for the cantilever beam loaded as shown in fig.5 using Macaulay's method E=2x10^{5}N/mm^2, I=2x10^{8}mm^4. **(12.5)**

OR

Determine θ_A, θ_B, θ_D and y_{max} for the beam loaded as shown in fig.6 using conjugate beam method. E=2x10^{5}N/mm^2, I=1.5x10^{8}mm^4. **(12.5)**

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UNIT-IV

Q5 A solid shaft of 19cm diameter has the same cross-sectional area as a hollow shaft of the same material with inside diameter of 14cm.

(a) Find the ratio of horse powers transmitted by the two shafts at the same angular velocity. **(6)**

(b) Compare the angles of twist in equal lengths of these shafts, when stressed to the same intensity. **(6.5)**

OR

Determine the nature and magnitude of the forces in the members of the trees shown in fig.7. **(12.5)**

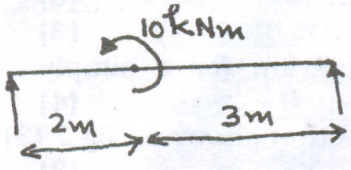


Fig 1

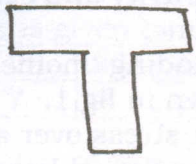


Fig 2

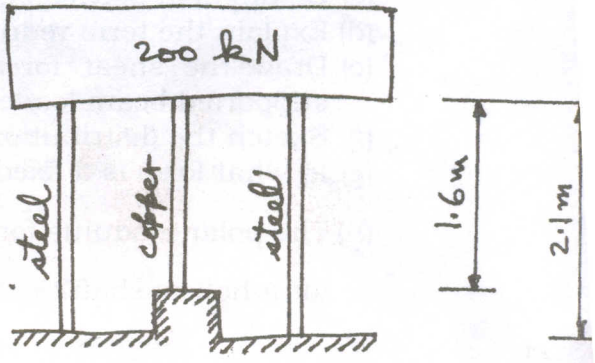
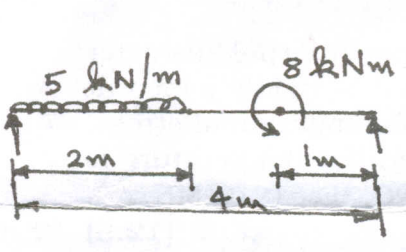


Fig 3



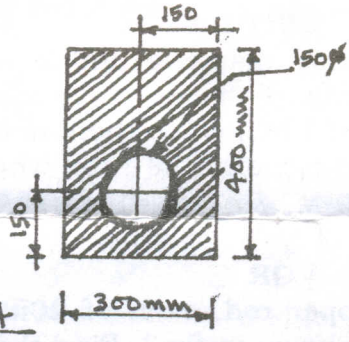


Fig 4

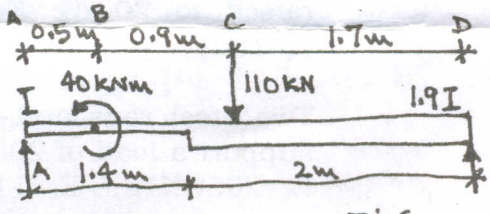


Fig 6

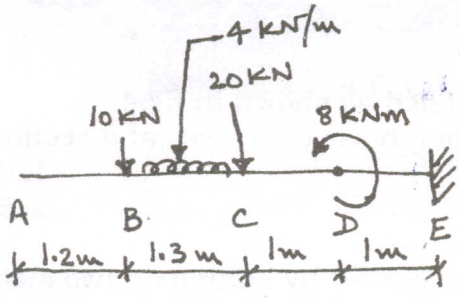


Fig 5

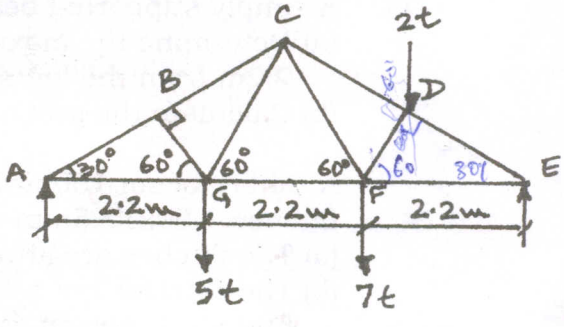


Fig 7

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