No. of Printed Pages : **3 + Drawing Sheet** **BICE-008**

B.TECH. CIVIL ENGINEERING

Term-End Examination

June, 2012

BICE-008 : STRUCTURAL ANALYSIS I

01685

Time : 3 hours *Maximum Marks : 70*

Note : *(i) Students to write answers in English only.*

*(ii) Select **any seven** questions.*

(iii) Programmable calculator allowed.

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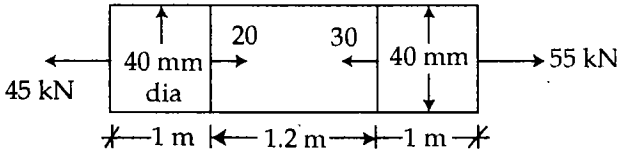
1. (a) Define Hook's Law and Poisson's Ratio. **3+7**

(b) A steel bar of section given below is subjected to force as shown in figure. Use $E = 205\ kN/m^2$. Determine total elongation of the bar.



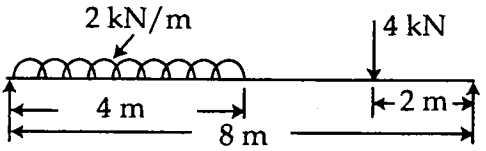
2. (a) Define Principal stresses and Principal planes. **3+7**

(b) At a point is an elastic material under strain, there are normal stresses of $60\ N/mm^2$ and $40\ N/mm^2$. Find :

(i) Principal stresses and position of principal planes

(ii) Maximum shear stress and its plane.

3. Draw S.F. and B.M. Diagram for the section given below. State the value of maximum B.M. and S.F. on the diagram. **10**



4. A metal piece having size of 50 mm × 50 mm section is subjected to a tensile load of 320 kN. The extension of a 250 mm gauge length is found to be 0.20 mm. Find the value of Young's modulus of elasticity and Poisson's Ratio. **10**

5. (a) What are the assumption of simple Theory of Bending. **2+8**

   (b) A 100 mm × 200 mm rolled steel joist of I section has flanges 12 mm thick and wet 10 mm thick. Find the safe uniformly distributed load that this section can carry over a span of 6 metre if permissible skin stress is limited to 160 N/mm^2.

6. (a) State different modes of failures of a columns. **5+5**

(b) Write the Euler's formula for buckling loads is different types of columns for following

Case I : When both ends of the members are pinned.

Case II : When one end is fixed and the other is free.

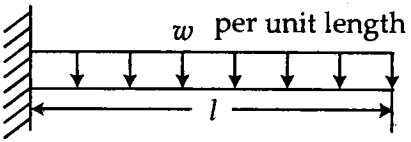
Case III : When both ends are fixed.

Case IV : When one end is fixed and the other is pinned (hinged).

7. (a) Define unsymmetrical bending. 3

(b) Find the maximum torque that can be safely applied to a shaft of 200 mm dia if the permissible angle of twist is 1° in a length of 5 m and the permissible shear stress is 45 N/mm^2. Take $N = 0.80 \times 10^5$ N/mm^2. 7

8. Draw S.F. and B.M. diagram for cantilever Beam UDL over whole span. Show the Maximum S.F. value and B.M. value on the sketch. 10



9. Write short notes : 5+5

(a) Statically determinate and Statically Indeterminate beam.

(b) Destructive and Non destructive Testing methods.