Roll No. | | | | | | | | | | |

B.E. / B.Tech (Part Time) End Semester DEGREE EXAMINATION, APRIL / MAY 2012

Second Semester

Civil Engineering

PTCE 236 / PTCE 281 – STRENGTH OF MATERIALS

(Regulation 2002/ 2005)

Time : 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Calculate the strain energy stored in a bar 2 m long and 25 mm diameter, when it is subjected to a tensile load of 60 kN. Take E = 2 x 10^5 N/mm^2.
2. State Engessor's theorems.
3. A fixed beam of span 5 m carries point load 10 kN at the centre of the beam. Find the reactions at the supports.
4. Mention the suitability of 'Clapeyron's Theorem of Three moments".
5. What is the significance of core of a section?
6. Differentiate a long column and a short column in terms of its mode of failure.
7. Define principal planes.
8. Enumerate the various theories of failures.
9. Define shear centre?
10. What is stress concentration? Give an example.

Part –B (5 x16 = 80 Marks)

11. A continuous beam ABCD covers three spans, AB = 1.5 L, BC = 3 L and CD = L. It carries uniformly distributed loads of 2w, w and 3w per metre run on AB, BC and CD respectively. If the girder is of the same cross section throughout, find the bending moments at supports B and C. Also plot the B.M and S.F diagrams.

12 (a) Determine the vertical displacement of the pin jointed frame shown in Fig.Q.No.12(a)

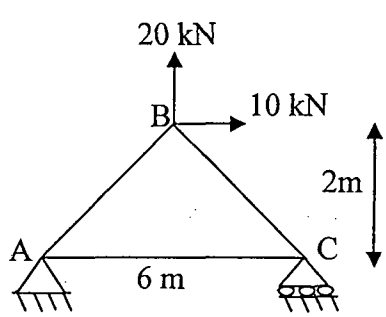
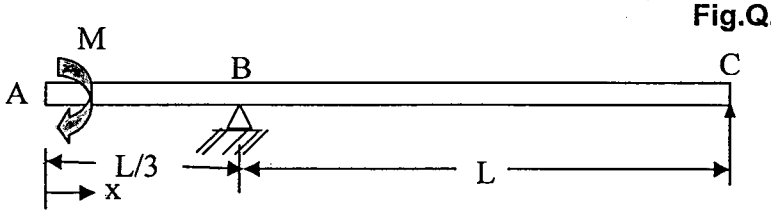


Fig.Q.No:12(a)

OR

12(b) Using Castigliano's first theorem, determine the deflection and rotation of the overhanging end A of the beam loaded as shown in Fig.Q.No: 12(b).

Fig.Q.No:12(b)



13 (a) Derive the Crippling load for a column when one end of it is fixed and the other end is free.

OR

13(b) A hollow cast iron cylindrical column, 4 m long with both ends firmly fixed carries an axial load of 200 kN. The internal diameter of the column is equal to 0.8 times the external diameter. Determine the section of the column, taking f_c = 600 N/mm^2 ,Rankines constant = 1/1600 and a factor of safety of 3.

14 (a) A cylinder of outer diameter 280mm and inner diameter 240 mm shrunk over another cylinder of outer diameter slightly more than 240 mm and inner diameter 200 mm to form a compound cylinder. The shrink fit pressure is 20 N/mm^2 .If an internal pressure of 60N/mm^2 is applied to the compound cylinder; find the final stresses across the thickness. Draw sketches showing their variation.

OR

14 (b) Find the principal centroidal moments of inertia of the angle shown in Fig.Q.No:14(b). Thickness of the section is 25mm.

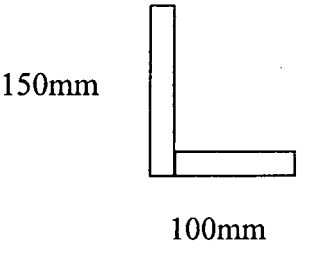


Fig.Q.No:14(b)

15 (a) The load on a bolt consists of an axial pull of 20 kN together with a transverse shear of 7.0 kN.Determine the diameter of the bolt according to (i)maximum principal stress theory (ii)Maximum strain theory (iii) Maximum shear stress theory (iv) strain energy theory.

OR

15 (b) The state of stress at a point is given below as stress tensor. Determine the principal stresses.

$$\begin{bmatrix} 12 & 6 & 8 \\ 6 & 10 & 2 \\ 8 & 2 & 7 \end{bmatrix}$$ MPa.