

B.E/ B.Tech (Part Time) DEGREE ARREAR EXAMINATION, NOV/DEC 2013
CIVIL ENGINEERING BRANCH (R2009)
I Semester
PTCE 9201 STRENGTH OF MATERIALS-I

Time: Three Hours

Max Mark: 100 marks

Answer ALL questions
PART-A (10x2=20 marks)

1. Define thermal stresses.
2. What is Mohr's circle?
3. Distinguish between perfect and imperfect frames.
4. What is tension coefficient?
5. Define-point of contraflexure?
6. Draw the SFD and BMD for cantilever beams with the point load 100kN at the free end of the cantilever.
7. Write the assumptions for deriving torsional formulae.
8. Distinguish between open and close coiled helical springs?
9. Write the importance of Moment area method.
10. What is conjugate beam?

PART-B (5x16=80 marks)

11. A 30-m long horizontal beam carries a uniformly distributed load of 1 kN per m on the whole length along with a point load of 30 kN at the right end(Fig.1). The beam is freely supported at the right end. Draw the shear force and bending moment diagrams indicating main values.

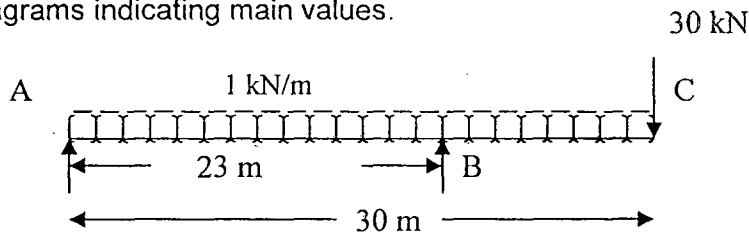


Fig.1

- 12.a) Determine the forces in all the members of the frame shown in Fig.2 by method of joints

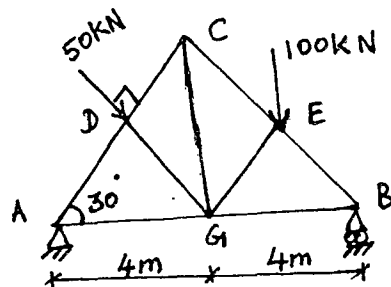


Fig. 2

(OR)

12.b) Determine the forces in all the members of the frame shown in Fig.2 by method of sections.

13.a) A steel tube of 35mm outer diameter and 30 mm inner diameter encloses a gun metal rod of 25mm diameter and is rigidly joined at each end. If at a temperature of 40°C there is no longitudinal stress, determine the stresses developed in the rod and the tube when the temperature of the assembly is raised to 240°C.

For $E_s=205 \text{ GPa}$ $E_g=91.5 \text{ GPa}$ $\alpha_s= 11 \times 10^{-6}/^\circ\text{C}$ $\alpha_g= 18 \times 10^{-6}/^\circ\text{C}$

(OR)

13.b) Derive the relationship between the elastic constants.

14.a) A shaft transmits 800 kW of power at 210 rpm. Determine the actual working stress and the diameter of the shaft if the shaft twists one degree on a length of 18 diameters and the shear stress is not to exceed 50MPa. Take $G=81 \text{ GPa}$.

(OR)

14.b) The mean coil diameter of a helical spring is 8 times the wire diameter. It is made to absorb 200 N.m of energy with a deflection of 100mm. If the maximum shear stress is not to exceed 125 MPa, find the mean diameter of the coils, wire diameter and the number of turns. $G=77 \text{ GPa}$.

15.a) A beam AB of 6m span is simply supported at the ends. It carries a concentrated load of 6 kN at a distance of 6m from the left hand end support and a uniformly distributed load of 2 kN/m at the right half of the beam. Find the deflection at the mid-span and slope at the left-hand end. $E=200 \text{ GPa}$ and $I=400 \times 10^6 \text{ mm}^4$

(OR)

15.b) A simply supported beam of 9m. It carries a load of 72 kN at a distance of 2m and another 45kN at a distance of 5m from the left hand support. Find the deflection and the slope under the loads by the conjugate beam method. $E=200 \text{ GPa}$ and $I=150 \times 10^6 \text{ mm}^4$.