21/11/13

Roll No.

B.E / B.Tech (Full - Time) DEGREE END SEMESTER EXAMINATIONS, NOV./DEC. 2013

CIVIL ENGINEERING

THIRD SEMESTER

CE 8302 – STRENGTH OF MATERIALS - I

(Regulation 2012)

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

PART-A (10 x 2 = 20 Marks)

1. Distinguish between strength and stiffness.
2. What are principal planes?
3. List the assumptions made in the analysis of a plane truss.
4. What is tension co-efficient?
5. How bending moment, shear force and intensity of loadings are related?
6. Why a square section is more efficient for a beam than a circular section having the same cross sectional area to resist the same bending moment?
7. What is 'Horse Power' (HP) and how is it related with the unit 'Watt'?
8. What are the uses of helical springs?
9. A cantilever of 4 m span carries a uniformly distributed load over the entire span. If the deflection at the free end is 30 mm, find the slope at the free end.
10. Define: Conjugate beam.

Part – B (5 x 16 = 80 marks)

11. Determine the member forces for the truss shown in Fig.Q.11 by method of joints.

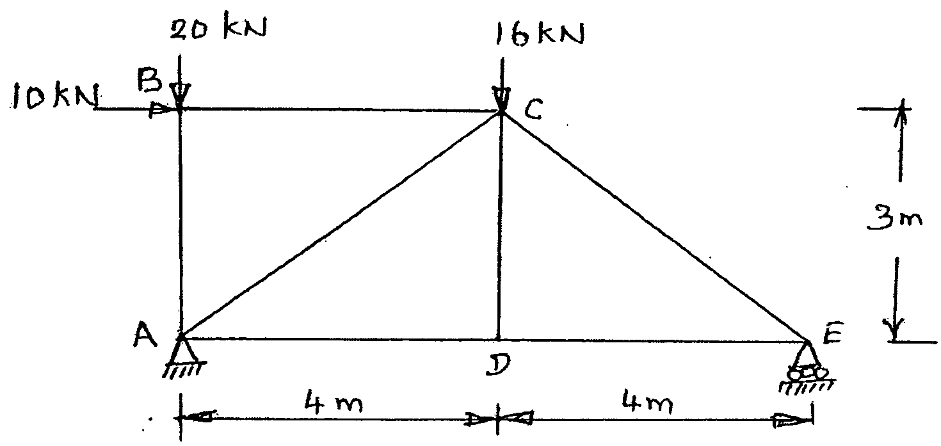

Fig. Q 11.

12. a) A steel rod of diameter 30 mm and length 500 mm is placed inside an aluminium tube of internal diameter 35 mm and external diameter 45 mm which is 1 mm longer than the steel rod. A load of 300 kN is placed on the assembly through the rigid collar. Find the stress induced in steel rod and aluminium tube. Take the modulus of elasticity of steel as 200 GPa and that of aluminium as 80 GPa.

OR

b) At a point in a strained material the resultant intensity of stress across a vertical plane is 120 MPa tensile inclined at 25° clockwise to its normal. The normal component of intensity of stress across the horizontal plane is 60 MPa compressive. Determine the principal stresses, principal planes and maximum shear stress.

13. a) A beam ABC 10 m length is simply supported at A and B over a span of 7 m. It carries a point load of 12 kN at C, and a uniformly distributed load of 6 kN/m over the span AB. Draw the shearing force and bending moment diagrams and indicate all salient values.

OR

b) A channel section with 200 mm overall depth, 100 mm wide flange and 12 mm uniform thickness is subjected to a vertical shearing force of 100 kN. Calculate the shear stress at important layers and draw shear stress distribution diagram across the section.

14. a) Compare the weight of a solid shaft with that of a hollow one having same length to transmit a given power at a given speed, if the material used for the shafts is the same. Take the inside diameter of the hollow shaft as 0.6 times the outer diameter.

OR

b) For a close-coiled helical spring subjected to an axial load of 300 N having 12 coils of wire diameter of 16mm, and made with coil diameter of 250 mm, find:

(i) Axial deflection;

(ii) Strain energy stored;

(iii) Maximum torsional shear stress in the wire.

Take modulus of rigidity as 80 GN/m^2

15. a) A beam AB of span 8 m is simply supported at its ends A and B. It carries a point load of 10 kN at a distance of 2 m from the end A and a uniformly distributed load of 6 kN/m over the right half span length. Determine using Macaulay's method (i) the maximum deflection in the beam and (ii) slope at the ends. Take flexural rigidity (EI) as 10 000 kN-m^2.

OR

b) A cantilever of length 4 m is carrying a load of 10 kN at the free end. Determine the slope and deflection of the cantilever at the free end using conjugate beam method. Take the flexural rigidity for the half length from fixed end as twice that of the remaining length.