Reg. No. : | | | | | | | | | | | | |

Question Paper Code : X 60243

B.E./B.Tech. DEGREE EXAMINATIONS, NOV./DEC. 2020
Third Semester
Civil Engineering
CE 2201/CE 1202 A/10111 CE 304/080100010/CE 34 – MECHANICS OF SOLIDS
(Regulations 2008/2010)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions.

PART – A **(10×2=20 Marks)**

1. Define modulus of Elasticity and Modulus of rigidity.

2. Explain upper yield point, Lower yield point and plastic range in a stress-strain curve. For what type of steel do you expect upper and lower yield points.

3. A thin cylindrical shell has an internal dia of 250 mm and thickness of 6 mm. It is subjected to an internal pressure of 3 MN/m^2. Estimate the circumferential and longitudinal stresses if the ends of the cylinder are closed.

4. What is meant by perfect frame and deficient frame ?

5. Where will be the maximum bending moment in a beam ?

6. What is meant by point of contraflexure ?

7. How do you determine the maximum deflection in a simply supported beams ?

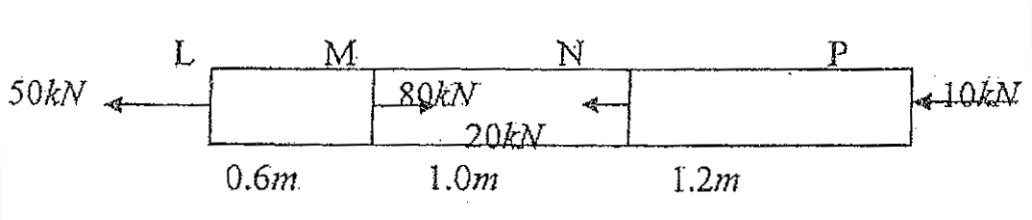
8. What is meant by shear centre ?

9. Give any two uses of leaf springs.

10. Write the equation of torsion in shafts.

PART – B **(5×16 = 80 Marks)**

11. a) A brass bar having a cross-sectional area of 1000 mm^2 is subjected to axial forces as shown in fig. Find the total change in length of the bar, Take $E_s = 105 \times 10^3$ MPa.



(OR)

b) A steel bar is placed between two copper bars, each having the same area and length as steel bar at 20°C. At this stage, they are rigidly connected together at both the ends. When the temperature is raised to 320°C, the length of the bars increases by 1.5 mm. Determine the original length and final stresses in the bars. Take E_s = 220 GN/m^2, and E_c = 110 GN/m^2.

12. a) Determine the forces in all the members of the truss shown in Figure 12 (a) using the method of joints.

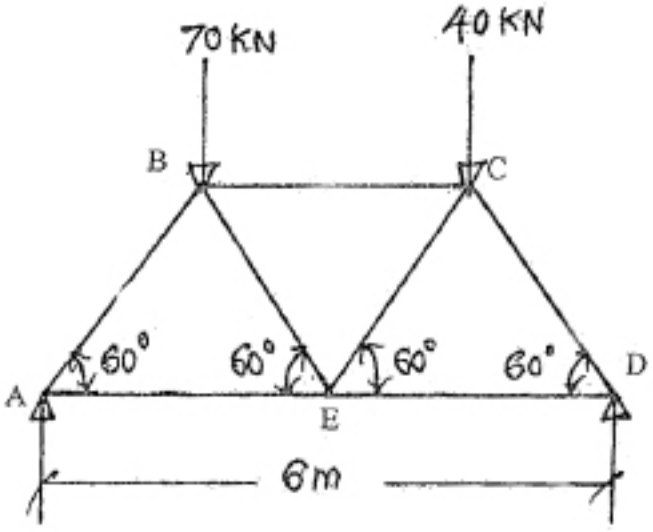


Figure 12(a)

(OR)

b) A cylindrical shell 3 m long which is closed at the ends has an internal diameter of 1 m and a wall thickness of 15 mm. Calculate the circumferential and longitudinal stresses induced and also change in the dimensions of the shell if it is subjected to an internal pressure of 1.5 MN/m^2.

13. a) Draw the B.M. and S.F diagrams for the overhanging beam shown in fig. (iii).

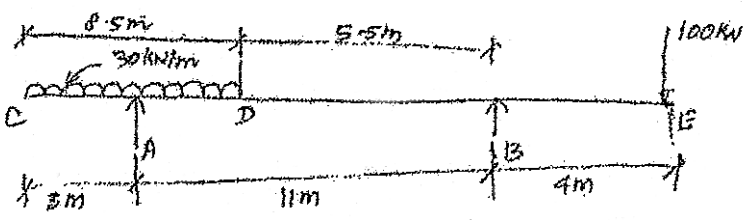


Fig. (iii)

(OR)

b) A cast iron water main 12 metres long, of 500 mm inside diameter and 25 mm wall thickness runs full of water and is supported at its ends. Calculate the maximum stress in the metal if density of cast iron is 7200 kg/m^3 and that of water is 1000 kg/m^3.

14. a) A beam, simply supported at ends A and B is loaded with two point loads of 30 kN each at a distance of 2m and 3m respectively from end A. Determine the position and magnitude of the maximum deflection. Take E = 2×10^5 N/mm^{2}and I = 7200 cm4. Span of eh beam = 6m. Fig (iv).

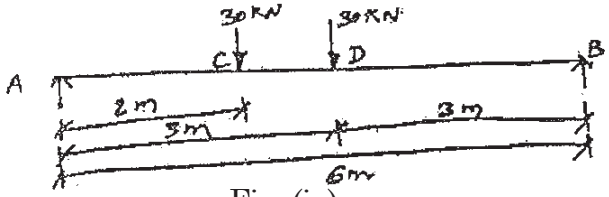


Fig. (iv)

(OR)

b) A steel beam of I-Section, 200 mm deep and 160 mm wide has 16 mm thick flanges and 10 mm thick web. The beam is subjected to a shear force of 200 kN. Determine the shear stress distribution over the beam section if the web of the beam is kept horizontal as shown in Fig. (v).

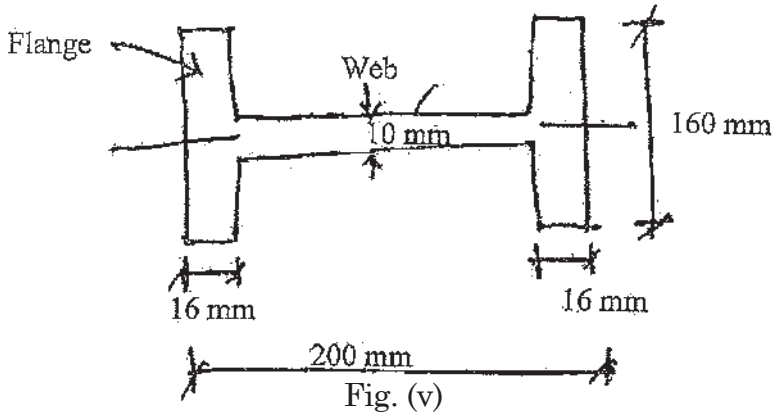


Fig. (v)

15. a) Derive torsional formula. Also explain how do you analyse the shafts fixed at both ends.

(OR)

b) Derive expressions for the deflection, bending stress and shear stress induced in an open coiled helical spring subjected to an axial load 'w'.
