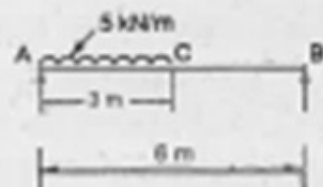


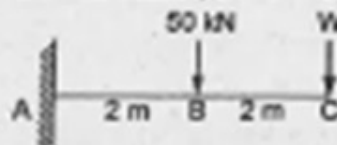


- (b) Find the dimensions of a timber joist span 5 m to carry a brick wall 200 mm thick and 3.2 m high, if the weight of brickwork is  $19 \text{ kN/m}^3$  and the maximum stress is limited to  $8 \text{ N/mm}^2$ . The depth is to be twice the width.
13. (a) A SSB of span 6 m carries UDL  $5 \text{ kN/m}$  over a length of 3 m extending from left end. Calculate deflection at mid-span.  $E = 2 \times 10^5 \text{ N/mm}^2$ ,  $I = 6.2 \times 10^6 \text{ mm}^4$ .



Or

- (b) A cantilever beam 4 m long carries a load of 50 kN at a distance of 2 m from the free end, and a load of  $W$  at the free end. If the deflection at the free end is 25 mm, calculate the magnitude of the load  $W$ , and the slope at the free end.  $E = 200 \text{ kN/mm}^2$ ,  $I = 5 \times 10^7 \text{ mm}^4$ .



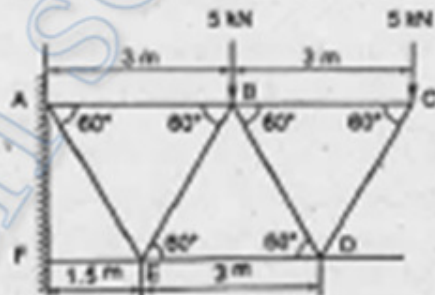
14. (a) A hollow shaft is to transmit 200 kW at 80 rpm. If the shear stress is not to exceed  $70 \text{ MN/m}^2$  and internal diameter is 0.5 of the external diameter. Find the external and internal diameters assuming that maximum torque is 1.6 times the mean.

Or

- (b) A closed coil helical spring is to deflect 1 mm under the axial load of 100 N at shearing stress of  $90 \text{ N/mm}^2$ . The spring is to be made of round wire having rigidity modulus of  $80 \times 10^4 \text{ N/mm}^2$ . The mean diameter of the spring is to be 10 times the diameter of the wire. Find the diameter and length of the wire necessary to form the spring?
15. (a) An element has a tensile stress of  $600 \text{ N/mm}^2$  acting on two mutually perpendicular planes and shear stress of  $100 \text{ N/mm}^2$  on these planes. Find the principal stress and maximum shear stress.

Or

- (b) Determine the forces in all members of a cantilever truss as shown in Fig.



PART C — (1 × 15 = 15 marks)

16. (a) Draw SFD and BMD for a cantilever with single concentrated load at free end.
- Or
- (b) Derive the equations for maximum slope and deflection of a Simply Supported Beam (SSB) with central point load.