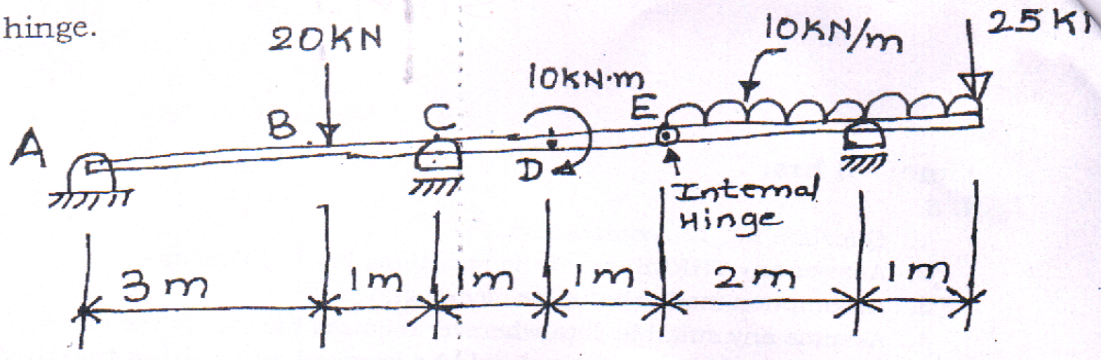
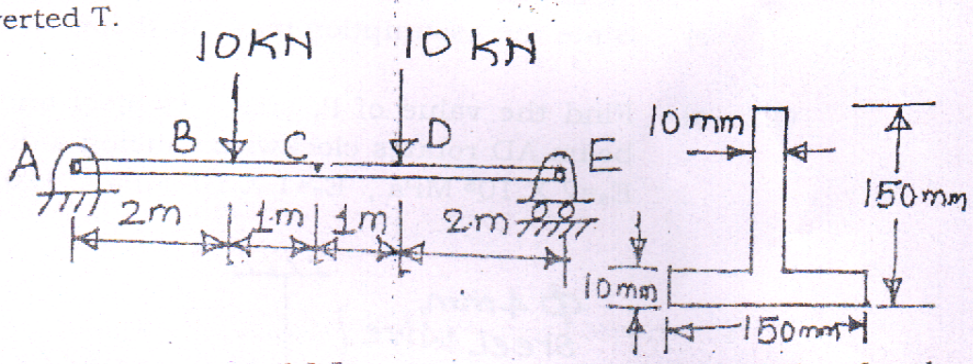
Q.3 a) Draw S.F.D. and B.M.D for the beam shown. E is an internal hinge.



b) The end of thin cylinder, 180 mm internal diameter and wall thickness 4 mm are closed by rigid plates and it is then filled with liquid. The cylinder is now subjected to an axial compressive force of 40 kN. Due to this the liquid pressure rises by 0.1 N/mm². Assume E=2.1 X 10^5 N/mm² and 1/m=0.3, calculate the bulk module of liquid. **10**

Q.4 a) Find maximum bending stress at point C on the beam AE shown in figure. Note that the cross section of the beam is in the form of inverted T. **10**



b) At 20° C, a gap of 0.5 mm exists between the ends of rods as shown. Taking for aluminum E_{AL} =70GPa, α_{AL} =23 X 10^{-6} / °C, A_{AL}=2000 mm² and for steel E_s=190 GPa, α_s =18 X 10^{-6}/°C, A_s=800 mm². When the temperature reaches 140°C determine: **10**

a) Normal stress in aluminum.

b) Exact length of aluminum rod.