1. A circular bar ACB of diameter d having a cylindrical hole of length x and diameter $d/2$ from A to C is held between rigid supports at A and B. Obtain formulas for the reactions R_A and R_B at supports A and B, respectively, due to its own weight (Assume mass density ρ and Young's modulus E). (25%)
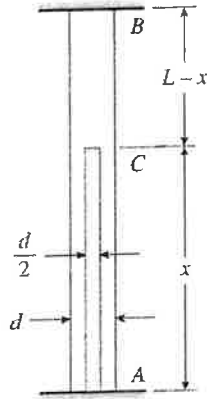

Fig.1

2. For the frame shown below, suppose $M_o = q_o L^2$ and $P = 2q_o L$, draw the shear and moment diagrams for part ABC. (25%)
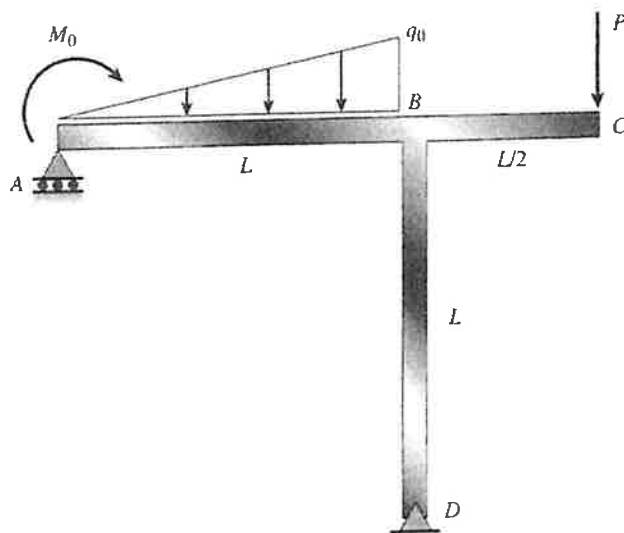

Fig.2

3. A composite beam of aluminum (E_a= 70 GPa) and steel (E_s=210 GPa) has width b =25 mm and heights h_a= 40 mm, h_s= 60 mm. A bending moment is applied about the z axis resulting in a maximum stress in the aluminum of 50 MPa. Determine the maximum stress in the steel. (25%)
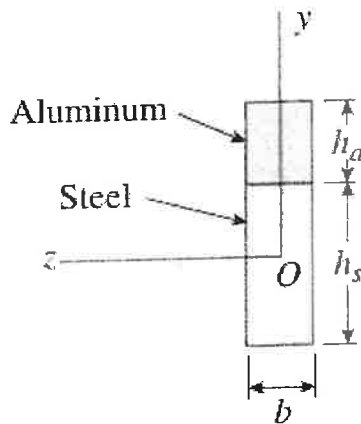

Fig.3

4. For the cantilever beam AB, carrying a triangularly distributed load of maximum intensity w_o as shown in Fig.4, derive the equation of the deflection curve. (Assume the flexural rigidity of beam AB is EI) (25%)
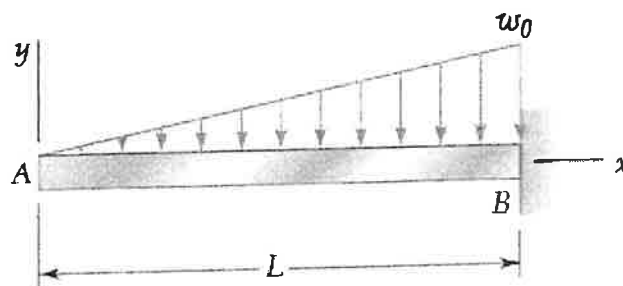

Fig. 4