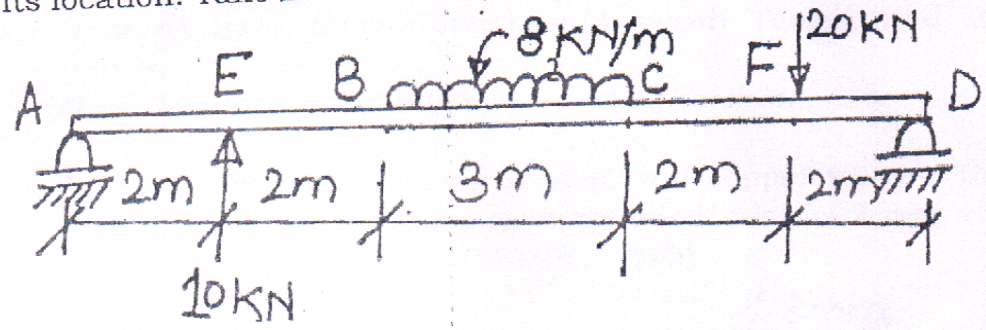
Q5 a) Determine the diameter of the shaft to transmit 1MW rotating at 220 rpm and the working conditions to be satisfied are: **10**

a. that the shaft not twist more than 1^0 on length of 12 diameters and

b. the shear stress must not exceed 60N/mm2. Take C=84KN/mm2

b) Find Euler's crippling load for hollow cylindrical column of 200 mm external diameter and 25 mm thick. Both ends of the column are hinged and length of the column is 6 m. Take E= 8 X 10^4 N/mm^2. Compare Euler's crippling load with Rankine's crippling load for the same column. Take f_c=550 MPa & α = 1/1600. For what length of the column the critical loads by Euler's and Rankine's formula will be equal to each other. **10**

Q.6 a) Determine the deflection at B and the slop at D for simply supported beam as shown. Also find the maximum deflection and its location. Take E= 2 X 10^5 N/mm^2 and I=300 X10^8 mm^4. **10**



b) The compound bar shown in figure consists of a 30mm diameter steel rod encased in a copper tube of internal diameter 30mm and external diameter 40mm. Find the stresses produced in steel and copper rod when a load of 100 N falls from a height of 40mm. Take E_s=2 X 10^5 N/mm^2, E_c= 1X 10^5 N/mm^2 **10**