

This exam measures the following ILOs (a1,a2,a3,b1,b2,b3,c1,c2,c3)

Answer all the following questions:

Question No.1 (12 marks)

Draw the shear force and bending moment diagrams for the beam shown in Fig.1 .

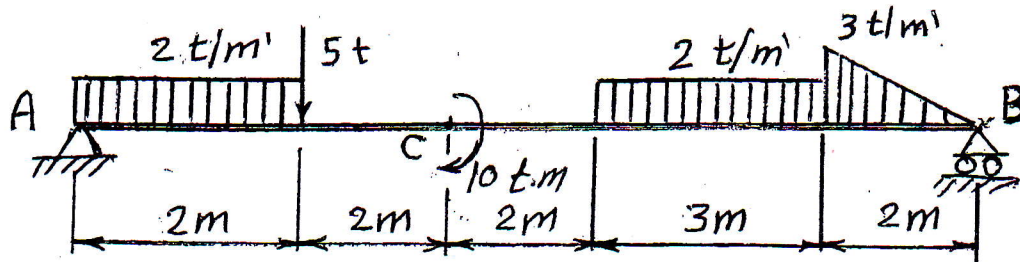


Fig.1

Question No.2 (10 marks)

ABC is a vertical smooth wire as shown in Fig.2 . The ring A of mass $m_A = 0.25$ kg is attached with a spring of stiffness $k = 300$ N/m and unstretched length of 0.45 m. If the ring A is released from rest at the position shown to strike another ring B of mass $m_B = 0.15$ kg, which at rest, determine :-

- The velocity of the ring A just before impact with the ring B
- The velocity of the ring B after the impact if the coefficient of restitution $e = 0.85$
- The maximum height , h , reached by the ring B after the impact

Question No. 3 (8 marks)

The four spheres each of masse 20 kg are rigidly attached to the cross bar frame having a negligible weight . If a couple moment $M = 0.5 t^3 + 0.8 t^2 + 0.6 t$ N.m , where t is time in seconds , is applied as shown in Fig.3 , determine the speed of each of the spheres in 4 seconds that starting from rest . Negligent the size of the spheres .

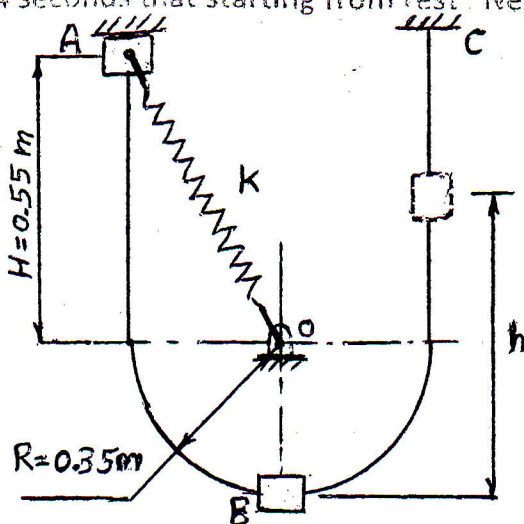


Fig. 2

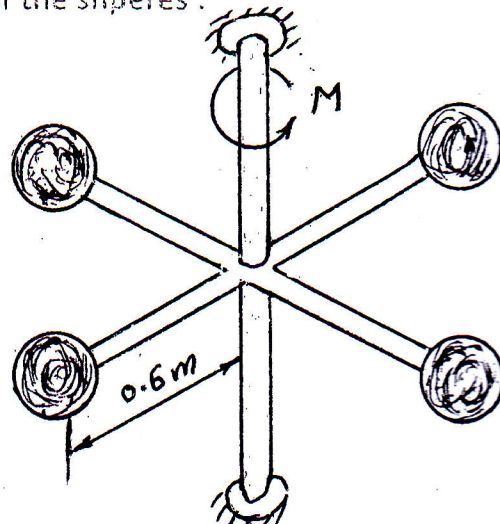


Fig. 3

