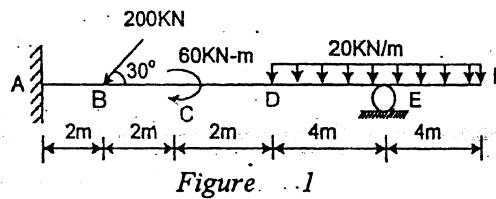


Exam.	Regular / Back		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT	Pass Marks	32
Year / Part	I / I	Time	3 hrs.

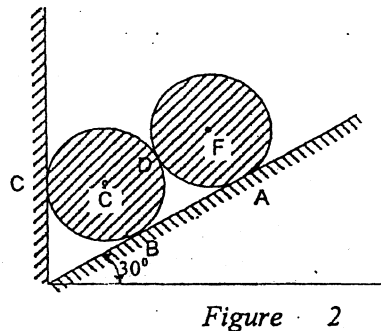
Subject: - Applied Mechanics

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt any Five questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

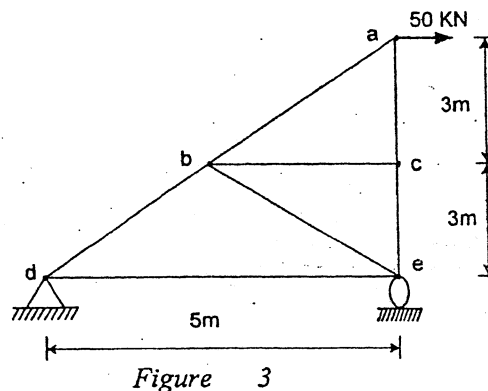
1. a) Define free body diagram with a suitable example. Also mention the points to be considered while drawing free body diagram. [4]
- b) Draw bending moment, shear force and axial force diagrams for the given Figure 1. And also indicate the salient points. [12]



2. a) Two identical rollers, each of weight (W) = 100N, are supported by an inclined plane and vertical wall as shown in Figure 2. Find the reaction at the contact points. Assume all surfaces to be smooth. [8]



- b) Determine the forces in the truss shown in Figure 3 which carries a horizontal load of 50 kN. [8]



3. a) Prove that centre of pressure is always below the centroid of plane surface submerged in the liquid. [6]
- b) Determine the moment of inertia and radius of gyration of the given area as shown in Figure 4 about centroidal axis. [10]

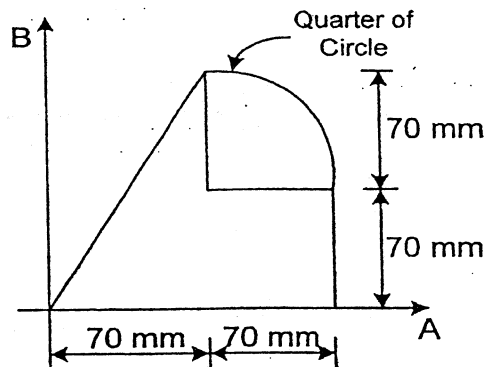


Figure 4

4. a) The acceleration of the particle is directly proportional to the time (t). At $t = 0$, the velocity of the particle (v) = 16 m/sec . Knowing that velocity (v) = 15 m/sec and that $x = 20 \text{ m}$ when $t = 1 \text{ sec}$, determine the velocity, the position and the total distance travelled when $t = 7 \text{ sec}$. [8]
- b) An aeroplane used to drop water on bushfire is flying horizontally in a straight line at 315 km/hr at an altitude of 80 m . Determine the distance (d) at which the pilot should release water so that it will hit the point whereat fire starts. [8]
5. a) A 30 kg block is dropped from a height of 2 m onto the 10 kg pan on the top of a spring scale. Assuming the impact to be perfectly plastic, determine the maximum deflection of the pan. The constant of spring (K) = 20 kN/m . [10]
- b) What is meant by kinetic energy of a particle? Show that the kinetic energy of a particle also represents the capacity to do work. [6]
6. a) Describe general plane motion briefly with suitable figure. [4]
- b) A 20 gm bullet 'B' is fired with a horizontal velocity of 450 m/sec into the side of a 10 kg square panel suspended from a hinge as 'A' as shown in Figure 5. Knowing that the panel is initially at rest, determine (i) angular velocity of the panel immediately after the bullet becomes embedded, (ii) the impulsive reaction at 'A', assuming that the bullet becomes embedded in 0.6 mins . [12]

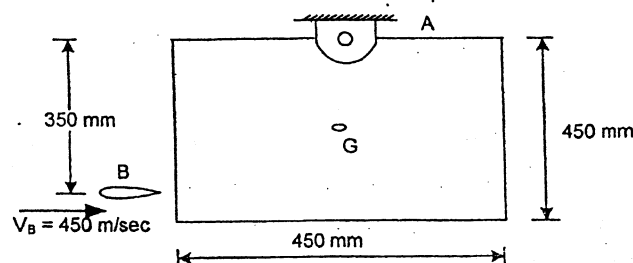


Figure 5
