PVP 12

Code: **EM1T5**

I B.Tech-I Semester – Regular Examinations-February 2014

ENGINEERING MECHANICS

(For Electronics and Computer Engineering)

Duration: 3 hours Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1 a) Explain different types of supports and the reactions developed in each type. 6 M

b) A Weightless bar AB is supported on a vertical plane by a hinge at A and a tie bar DC as shown in fig 1. Determine the axial force induced in the tie bar by the action of a vertical load P applied at B. 8 M

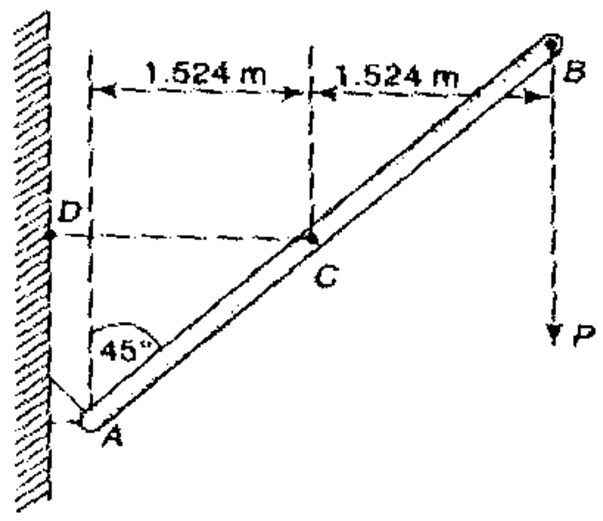

Fig1.

2 a) State the laws of dry friction. 5 M

b) Two rectangular blocks of same weight W_1 are connected by a flexible cord and rest upon a horizontal and an inclined plane, respectively, with the cord passing over a pulley as shown in Fig 2. If the coefficient of static friction μ is the same for all contiguous surfaces, find the angle α of inclined plane at which motion of the system will impend. Neglect friction in the pulley. 9 M

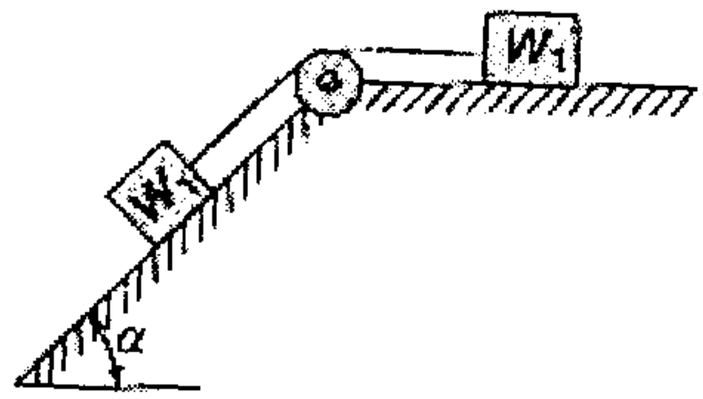

Fig 2.

3 a) State and explain Pappus theorem. 4 M

b) With respect to coordinate axes x and y. Locate the centroid of the shaded area shown in Fig 3. 10 M

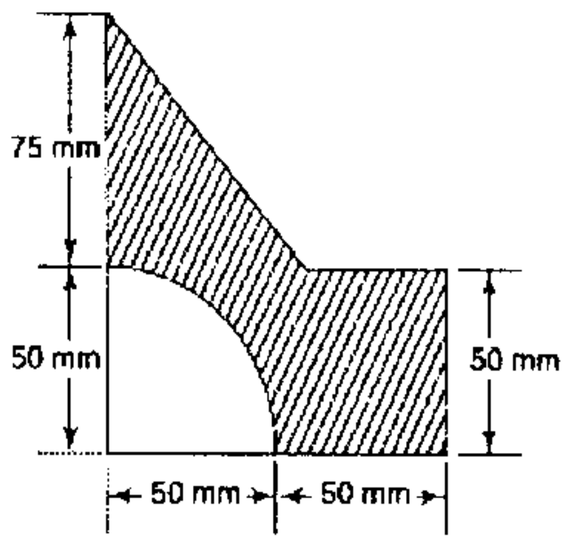

Fig 3.

4 a) Define area moment of inertia. 3 M

b) Calculate the moment of inertia of the shaded area in Fig 4 with respect to x axis. 11 M

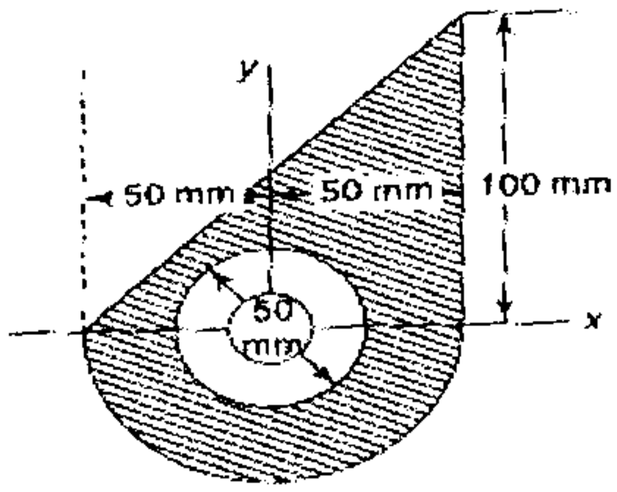

Fig 4.

5 a) State the assumptions made in the analysis of the truss. 4 M

b) Determine the axial force in each bar of the plane truss loaded as shown in Fig5. 10 M

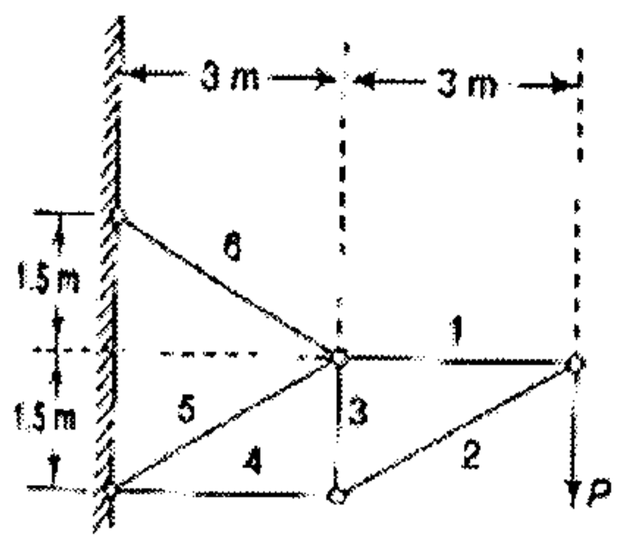

Fig 5.

6 a) Explain the terms 'Virtual work' and 'Virtual displacement' 4 M

b) Using the principle of virtual work, find the value of the angle θ defining the configuration of the equilibrium of the system shown in fig 6. The balls D and E can slide freely along the bars AC and BC but the string DE connecting them is inextensible. 10 M

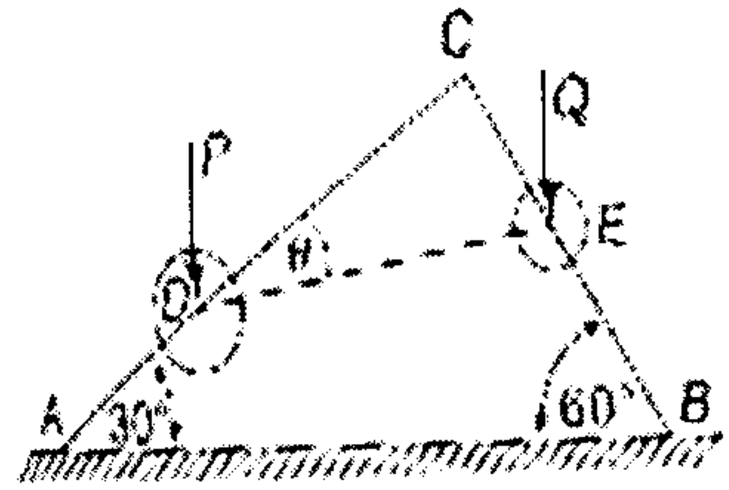

Fig 6.

7 a) Explain displacement-time equation and displacement-time diagram. 4 M

b) The greatest possible acceleration or deceleration that a train may have is *a*, and its maximum speed is *v*. Find the minimum time in which the train can get from one station to the next if the total distance is *s*. 10 M

8 a) State and explain D'Alembert's Principle. 4 M

b) An elevator of gross weight W=4450N starts to move upward with constant acceleration and acquires a velocity v=18m/s, after travelling a distance =1.8m.Find the tensile force S for the cable during this accelerated motion. Neglect friction. 10 M