Code.No: R09A1BS05 | R09 | SET-2

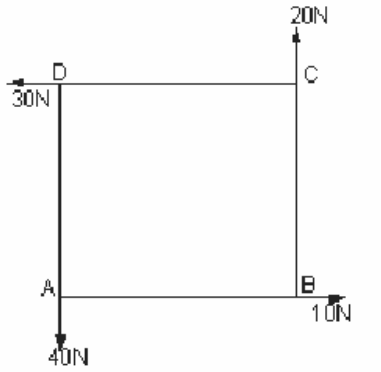
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
I B.TECH – REGULAR EXAMINATIONS, JUNE - 2010
ENGINEERING MECHANICS
(COMMON TO CE, ME, CHEM, MECT, MMT, MEP, AE, AME)

Time: 3hours **Max.Marks:80**

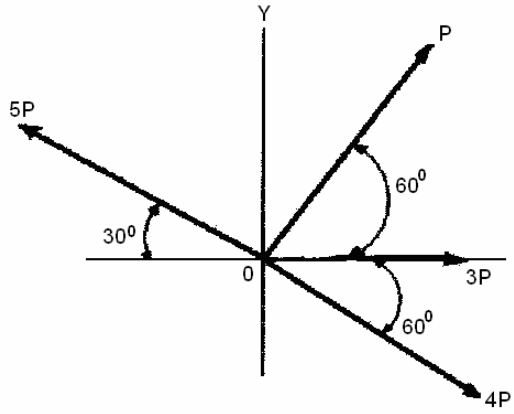
Answer any FIVE questions
All questions carry equal marks

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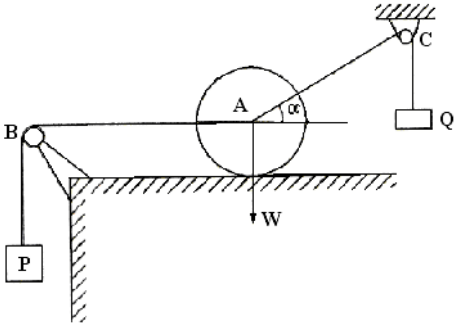
1.a) Four forces of magnitudes 10 N, 20 N and 30 N and 40 N are acting respectively along the four sides of a square ABCD with dimensions 500 mm × 500 mm as shown in Figure. Determine the magnitude and direction of the resultant force.



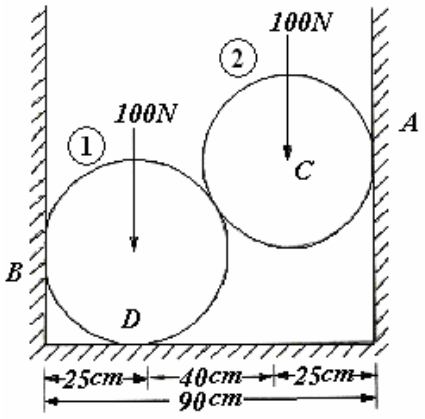
b) Find the magnitude and direction of the resultant R of four concurrent forces acting as shown in figure. [8+7]



2.a) A ball of weight W rests upon a smooth horizontal plane and has attached to its center two strings AB and AC which pass over friction less pullies at B and C and carry loads P and Q, respectively, as shown in the figure. If the string AB is horizontal, find the angle α that the string AC makes with the horizontal when the ball is in a position of equilibrium. Also find the pressure R between the ball and the plane.

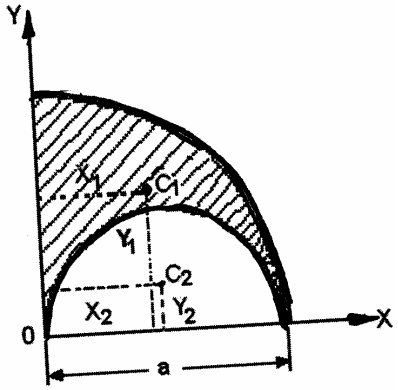


b) Two smooth spheres, each of radius r and weight Q, rest in a horizontal channel having vertical walls, the distance between which is 90 cm. Find the pressures exerted on the walls and floor at the points of contact A, B and D. The following numerical data are given: r =25cm, Q =100N. [8+7]



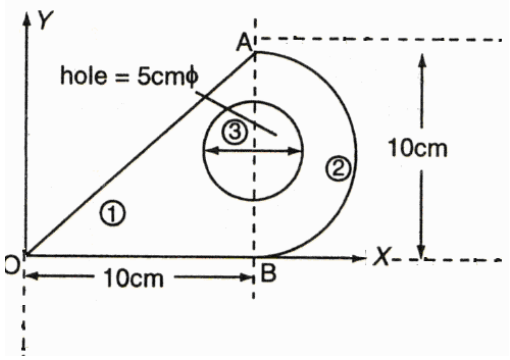
3.a) State and explain Pappus theorem.

b) Locate the centroid of shaded area obtained by removing a semicircle of diameter 'a' from a quadrant of a circle of radius 'a' as shown in figure. [6+9]



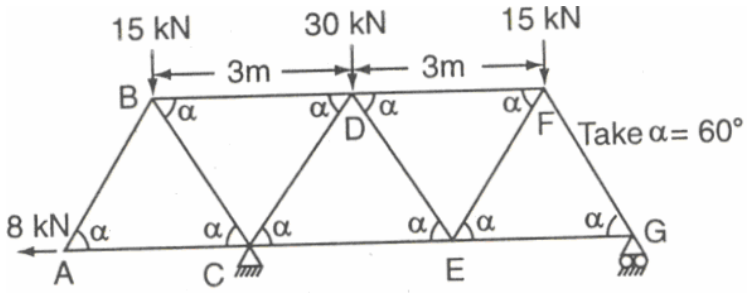
4.a) State and prove perpendicular axis theorem.

b) Find the moment of inertia of the area in the given figure about the axis 'AB' [4+11]



5.a) Explain the force table with suitable example.

b) Find the forces in all the members of the truss shown in the figure using method of sections. [4+11]



6. A ball is thrown vertically upward from 15 m level in an elevator shaft with an initial velocity of 20 m/sec. At the same instant an open platform elevation passes the 5 m level, moving upward with a constant velocity of 2 m/sec. Determine:

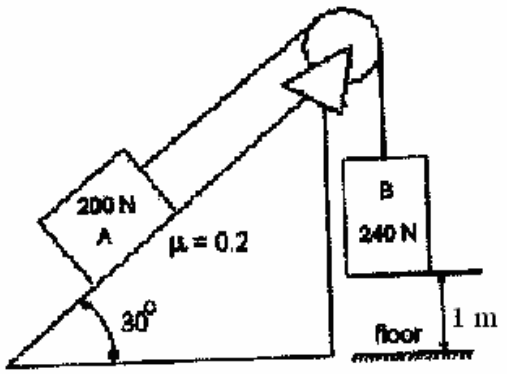
a) When and where the ball will hit the elevator.

b) The relative velocity of the ball with respect to the elevator when the ball hit the elevator. [15]

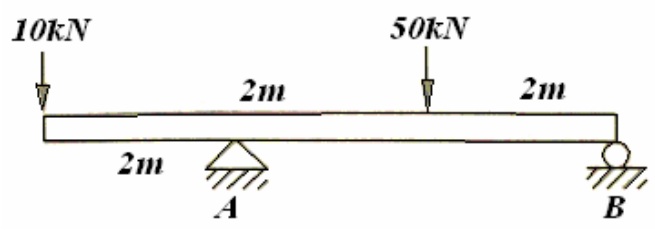
7. Two blocks of A (200 N) and B (240 N) are connected as shown in figure. When the motion begins, the block B is 1 m above the floor. Assuming the pulley to be frictionless and weightless, determine:

a) The velocity of block A when the block B touches the floor and

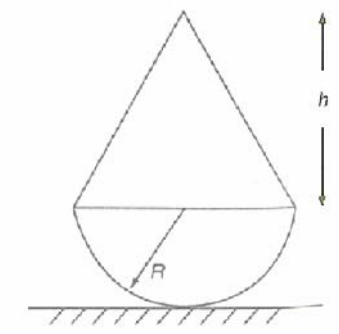
b) How far the block A will move up the plane. [15]



8.a) Determine reaction at supports as shown in figure using the principle of virtual work.



b) A karagam dancer balances a karagam on her head. The karagam pot consists of hemispherical vessel consisting of lead and aluminium hollow cone as shown in the figure. Use appropriate densities to determine the ratio of h/R for stable equilibrium. [7+8]



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