Code.No: R09A1BS05 | R09 | SET-4

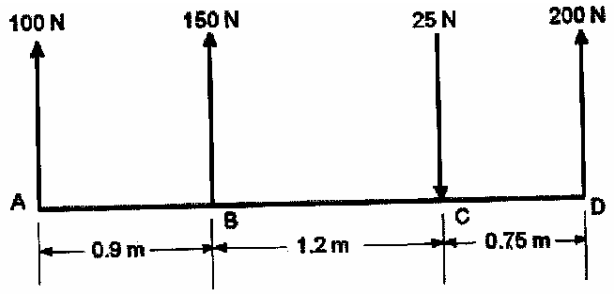
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
I B.TECH – REGULAR EXAMINATIONS, JUNE - 2010
ENGINEERING MECHANICS
(COMMON TO CE, ME, CHEM, MECT, MMT, MEP, AE, AME)

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

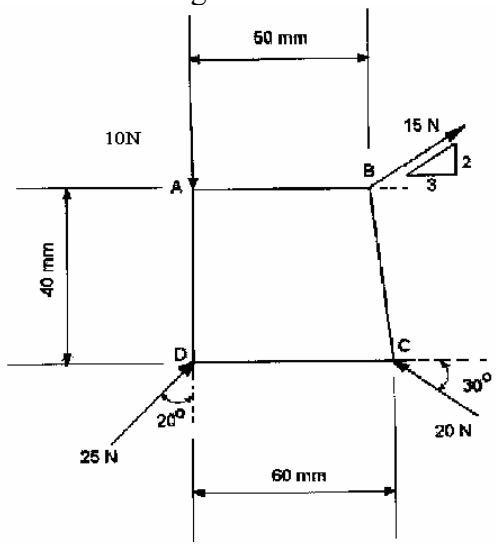
Answer any FIVE questions
All questions carry equal marks

\- - -

1.a) Four parallel forces of magnitudes 100 N, 150 N, 25 N and 200 N are as shown in figure. Determine the magnitude of the resultant and also the distance of the resultant from point A.

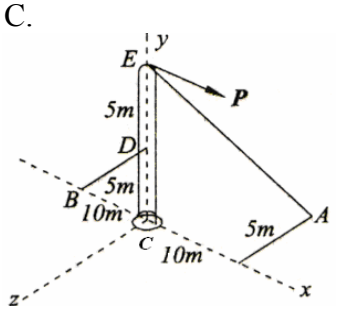


b) Replace the given system of forces acting on a body by a single force and couple acting at the point A as shown in figure. [8+7]



2.a) Write the equilibrium equations for a body in space.

b) A vertical mast CE is supported in a ball and socket joint at C by cables BD and AE as shown in figure. A pull $P = \left(400\bar{i} + 300\bar{k}\right)$ N acts at top of the mast. Find components of reaction at C. [4+11]

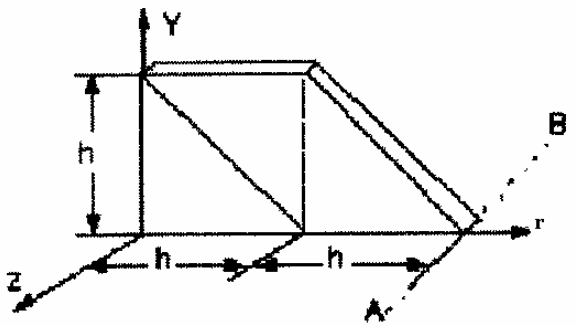


3.a) Locate the centroid of frustum of a cone of height 8 cm and having the diameter of 5 cm and 8 cm at the top and bottom of the frustum of cone respectively.

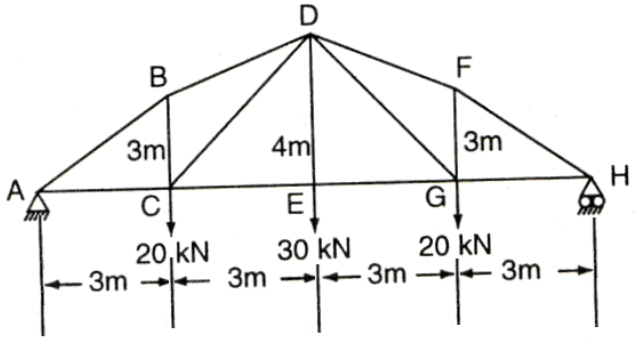
b) Locate C.G of a body formed of a solid sphere of radius 10 cm over a solid cylinder of same radius 10 cm and height 20 cm. Assume that sphere is made of steel (ρ = 7870kg/m^3) and cylinder is made of brass ρ = 8750kg/m^3). [7+8]

4.a) State and explain transfer formula for product of inertia.

b) Calculate the mass moment of inertia of thin plate shown in figure with respect to the axis A-B. Take mass of the plate as m. [6+9]



5. Find the forces in all the members of the truss shown in figure using method of sections. [15]



6. Two bodies of weights 40 N and 25 N are connected to the two ends of a light inextensible string, which passes over a smooth pulley. The weight 40 N is placed on a rough inclined plane while the weight 25 N is hanging free in air. If the angle of the plane is 15 ^{0} determine:

a) Acceleration of the system.

b) Tension in the string.(Take μ for inclined rough surfaces as 0.2).

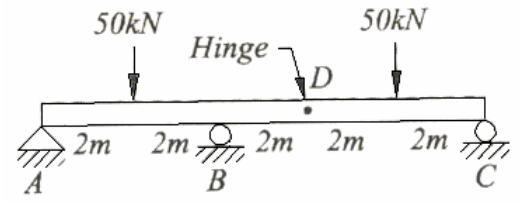
c) The distance moved by the weight 25 N in 3 seconds starting from rest. [15]

7. A grinding wheel has a rated speed of 1400 rpm and can be assumed to be a disc of 0.4 m radius and uniform thickness. It weighs 280 N. It is made to turn at 1400 rpm and then allowed to decelerate uniformly due to bearing friction. If it was allowed to come to rest in 110 seconds, find:

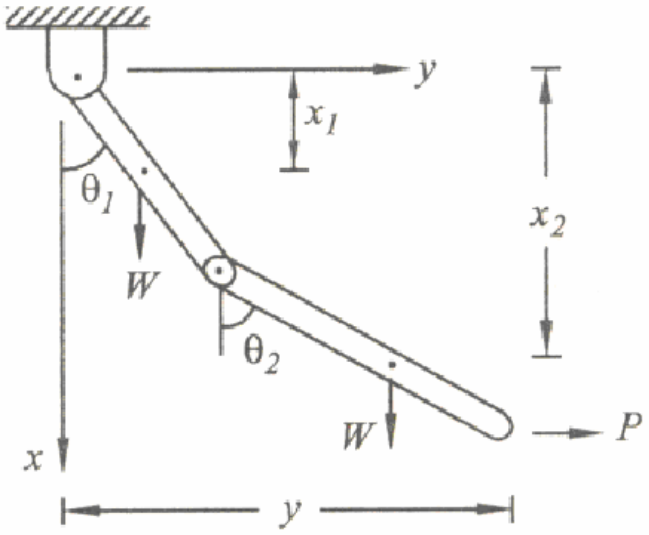
a) The number of revolution it shall execute before coming to rest.

b) The frictional torque. [15]

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



b) Two rods are connected to form a double pendulum as shown in the figure. If the weight of each rod is W and length L and if they are held in position by a horizontal force P, determine equilibrium position as defined by angle θ_1 and θ_2. [7+8]



****