Code No: R13210 **R13** **SET-1**

I B. Tech II Semester Supplementary Examinations, NOVEMBER - 2021
ENGINEERING MECHANICS
(Com. to ECE, EEE, EIE, Bio-Tech, E Com E, Agri E)

Time: 3 hours Max. Marks: 70

Note: 1. Question paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) What is the difference between collinear and concurrent forces? (3M)

   b) What do you mean by action and reaction? Give examples. (4M)

   c) What are the conditions under which the centre of gravity of a body becomes the same as its centriod? (4M)

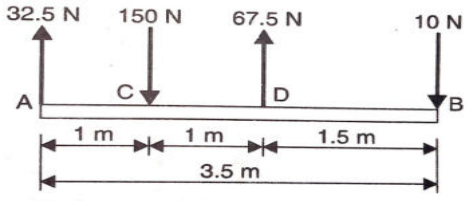
   d) Explain the transfer formula for mass moment of inertia. (4M)

   e) Distinguish kinematics & kinetics. (4M)

   f) State the work-energy equation for translation. (3M)

PART –B

2. a) A system of parallel forces are acting on a rigid bar as shown in figure 1 reduce this system to (8M)
   a) a single force
   b) a single force and a couple at A
   c) a single force and a couple at B



   b) A block weighing 100 N is resting on a rough plane inclined 20^0 to the horizontal. It is acted upon by a force of 50N directed upward at angle of 14^0 above the plane. Determine the frictional force. If the block is about to move up the plane, determine the co-efficient of friction. (8M)
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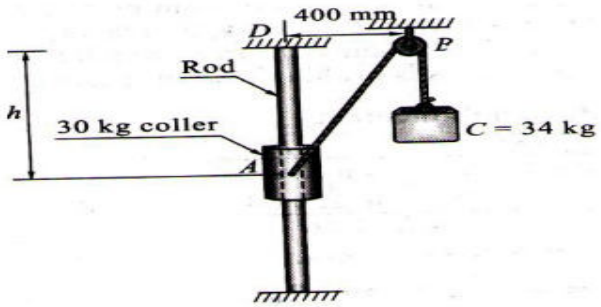
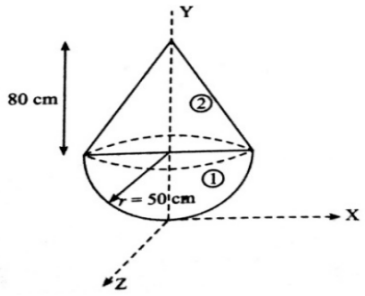
3. a) A 30 kg collar may slide on a frictionless vertical rod and is connected to a 34 kg counter weight as shown in the figure. Find the value of h for which the system is in equilibrium. (8M)

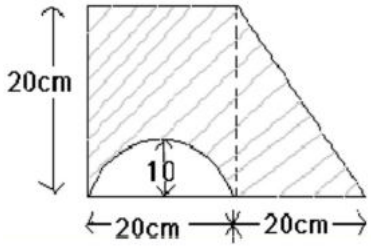


b) The resultant of two concurrent forces is 2500N and the angle between the forces is 90^0. The resultant makes an angle of 46^0 with one of the forces. Find the magnitude of each force. (8M)

4. a) Determine the centre of gravity of the following figure. (8M)



b) Locate the centroid of the hatched area shown in figure. (8M)



5. a) Find the moment of inertia of a T-section with flange as 150 mm × 50 mm and web as 150 mm × 50 mm about X-X and Y-Y axes through the centre of gravity of the section. (8M)

b) State and prove the theorem of perpendicular axis applied to moment of inertia. (8M)

6. a) A 600mm diameter flywheel is brought uniformly from rest to a speed of 350 rpm in 20 seconds. Determine the velocity and acceleration of a point on the rim 2 seconds after starting from rest. (8M)

b) The initial angular velocity of a rotating body is 2 rad/s and initial angular acceleration is zero. The rotation of the body is according to the relation $\alpha = 3t^2 - 3$. Find (a) angular velocity and (b) angular displacement when t = 5 seconds. Consider the angular displacement in radians and time in seconds. (8M)

7. a) Discuss impulse momentum method with the help of a suitable example. (8M)

   b) An automobile moving with a uniform velocity of 40Kmph is accelerated by increasing the traction force by 20%. If the resistance to motion is constant, find the distance traveled before it acquires 50Kmph.Use work-energy method. (8M)