

I B. Tech II Semester Supplementary Examinations, July/August - 2021
ENGINEERING MECHANICS

(Com. to ECE, EEE, EIE, Bio-Tech, E Com E, Agri E)

Time: 3 hours

Max. Marks: 70

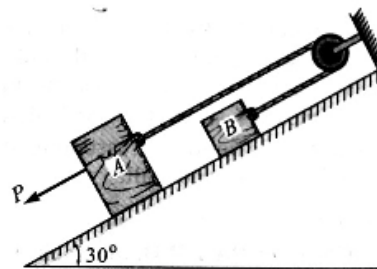
- Note: 1. Question paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is Compulsory
 3. Answer any **THREE** Questions from **Part-B**

PART -A

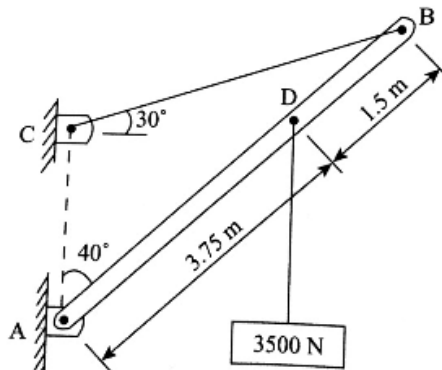
1. a) Define resultant of a system of forces. What are the various methods to determine the resultant of concurrent forces? (4M)
- b) Draw the free body diagram of a block on a smooth inclined plane, is restricted from moving downwards by a string attached to it. (4M)
- c) Calculate the lateral area of a cone of base radius r and slant length l using Pappus theorem. (4M)
- d) Discuss the significance of Radius of gyration and mass moment of inertia. (3M)
- e) State D'Alembert's principle. (3M)
- f) A heavy weight is suspended from a spring. A person raises the weight till the spring becomes slack. The work done by him is W . The energy stored in the stretched spring was E . What will be the gain in the gravitational potential energy? (4M)

PART -B

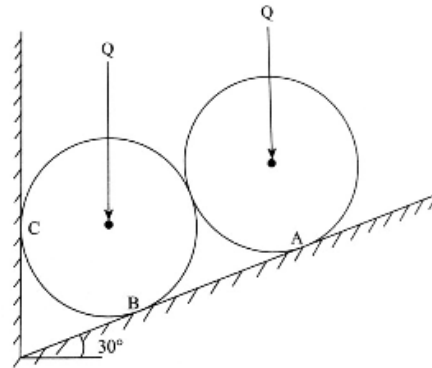
2. a) The resultant of two forces acting at a point is 65kN. It is observed that one force is double than that of the other and if the direction of one of them is reversed the resultant becomes 45kN. Find the magnitudes of forces and the angle between them. (7M)
- b) Determine the force P to cause motion to impend. Take masses of block A and B as 9kg and 4kg respectively and the coefficient of sliding friction as 0.25. The force P and rope are parallel to the inclined plane as shown in figure. Assume pulley to be frictionless. (9M)



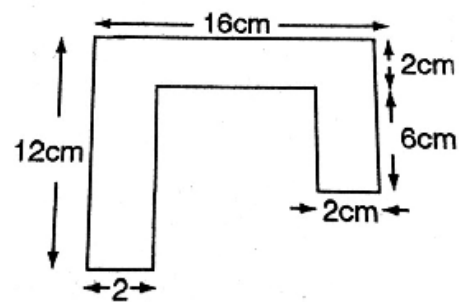
3. a) Determine the tension in cable BC. AB is massless. (8M)



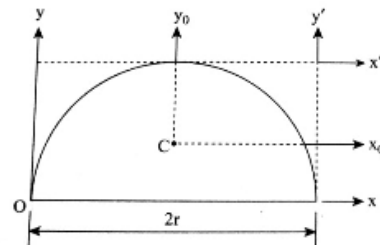
- b) Two identical rollers, each of weight 100N, are supported by an inclined plane and a vertical wall as shown in figure. Assuming smooth surfaces, find the reactions induced at the points of support A, B and C. (8M)



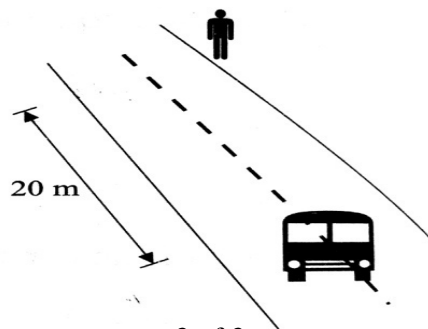
4. a) Locate the center of gravity of the section shown in figure (All Dimensions in cm). (8M)



- b) Determine the distance of the centroid from the base of a triangle of altitude h . (8M)
5. a) Determine the product of inertia of the semicircular area shown in figure with respect to i) the xy -axes and ii) the $x'y'$ axes. (8M)



- b) Determine the mass moment of inertia of a constant-density sphere of radius r and mass m about an axis passing through its origin. (8M)
6. a) A man standing at a bus stand sees that a bus just leaves when he is about 20m from the bus. If the bus accelerates at a constant rate of 1m/s^2 then determine the acceleration with which the man must run to catch the bus within a distance of 30m. Also, determine the speeds of the bus and the man at that instant. (9M)



Code No: R13210

R13

SET-1

- b) Determine the force exerted by the floor of the lift on a passenger of 75kg mass, (7M)
when the lift is
(i) Accelerating upwards at 1m/s^2 , and
(ii) Accelerating downwards at 0.9m/s^2 .
7. a) What are the applications of work Energy method? (8M)
- b) Derive Impulse momentum method. (8M)