

I B. Tech I Semester Supplementary Examinations, May/June - 2019
ENGINEERING MECHANICS

(Com. to CE,ME,CSE,PCE,IT,Chem E, Aero E, AME, Min E, PE, Metal E, Textile Engg)

Time: 3 hours

Max. Marks: 70

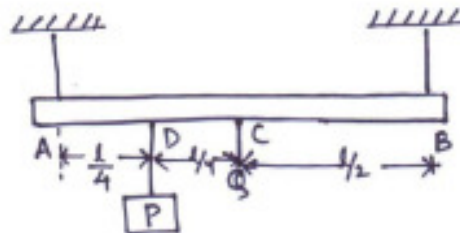
- Note: 1. Question paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is Compulsory
 3. Answer any **THREE** Questions from **Part-B**

PART -A

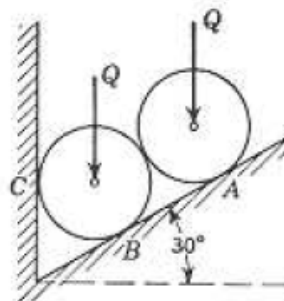
1. a) Compare between moment and a couple. (3M)
- b) What is the converse of the law of triangle of forces? (3M)
- c) Explain Pappu's first theorem. (4M)
- d) Define mass moment of inertia with a simple example. (4M)
- e) What is fixed axis rotation? Give example. (4M)
- f) Explain Work-Energy method. (4M)

PART -B

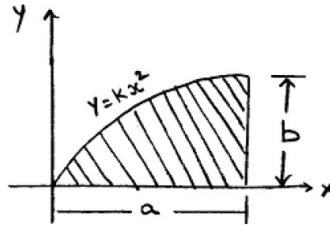
2. a) A 400lb block is resting on rough horizontal surface for which the coefficient of friction is 0.40. Determine the force P required to cause motion to impend if applied to the block (12M)
 - (i) Horizontally or
 - (ii) Downward at 300 with the horizontal
- b) Define Cone of friction. (4M)
3. a) A prismatic bar AB of weight Q = 44.5 N is supported by two vertical wires at its ends and carries at D a load P = 89 N as shown in figure. Determine the forces Sa and Sb in the two wires. (8M)



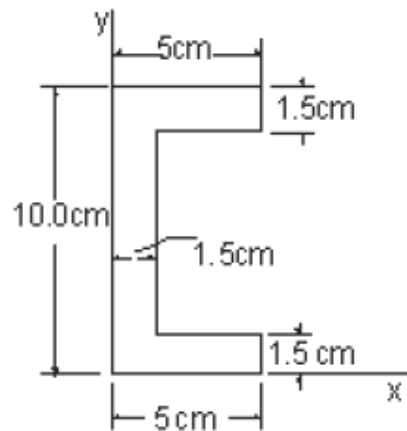
- b) Two identical rollers each of weight Q = 445 N are supported by an inclined plane and a vertical wall as shown in the figure. Assuming smooth surfaces, find the reactions induced at the points of support A, B and C. (8M)



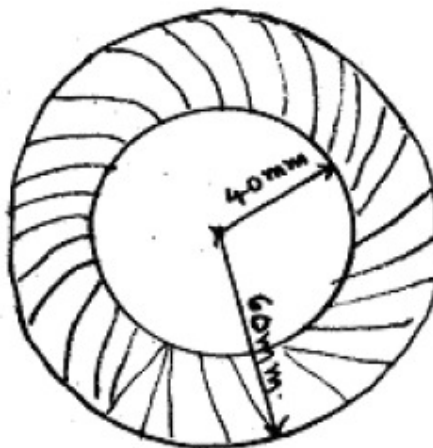
4. a) Locate the centroid of given parabola bounded by x- axis the line $x = a$. (8M)



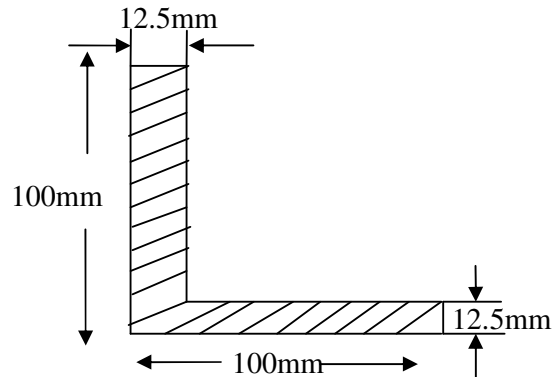
- b) Find the centroid of a channel as shown in figure below. All dimensions are incm. (8M)



5. a) Determine the moment of inertia of a hallow circular section about its centroidal axes as shown in figure below (8M)



- b) Calculate moment of Inertia of angle section about x-axis. (8M)



6. a) A ball projected vertically upwards attains a maximum height of 400 m. Calculate the velocity of projection and compute the time of flight in air. At what altitude will this ball meet a second ball projected vertically upwards 4 seconds later with a speed of 120 m per second? (8M)
- b) A body weighing 20 N is projected up a 200 inclined plane with a velocity of 12 m/s, coefficient of friction is 0.15. Find (8M)
- The maximum distance S , that the body will move up the inclined plane
 - Velocity of the body when it returns to its original position.
7. If $W_a:W_b:W_c$ is in the ratio of 3:2:1, find the accelerations of the blocks A, B, and C. Assume that the pulleys are weightless. (16M)

