Code No: R13110 **R13** SET - 1

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**

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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)

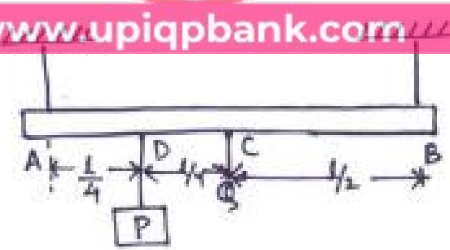
   f) Explain Work-Energy method. (4M)

PART –B

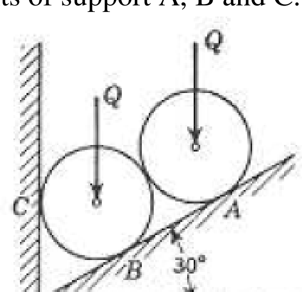
2. a) A 400lb block is resting on rough horizontal surface for which the coefficient of friction is 0.40. Determine the force P required to cause motion to impend if applied to the block (12M)
   (i) Horizontally or
   (ii) Downward at 300 with the horizontal

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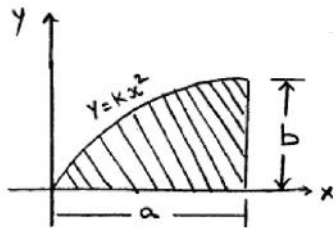
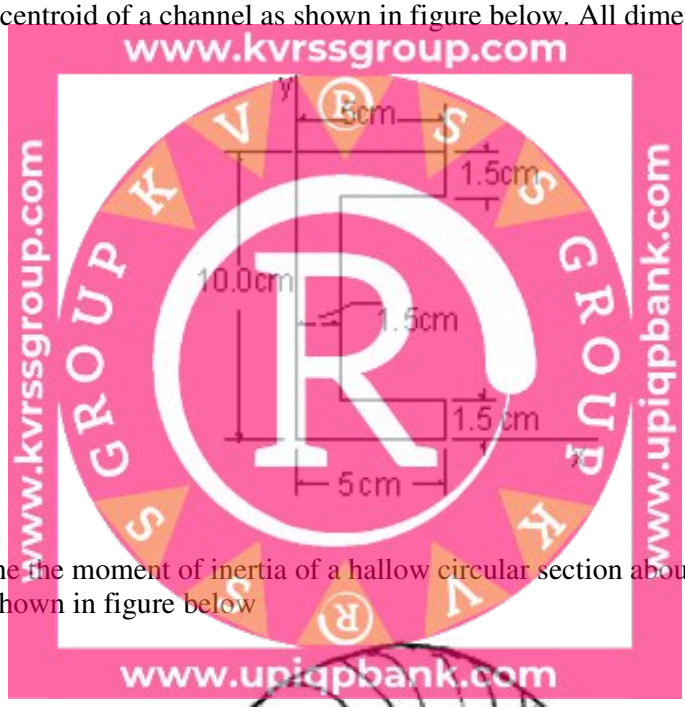
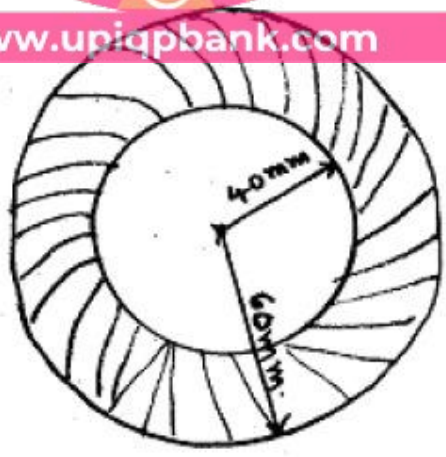
4. a) Locate the centroid of given parabola bounded by x- axis the line x = a. (8M)



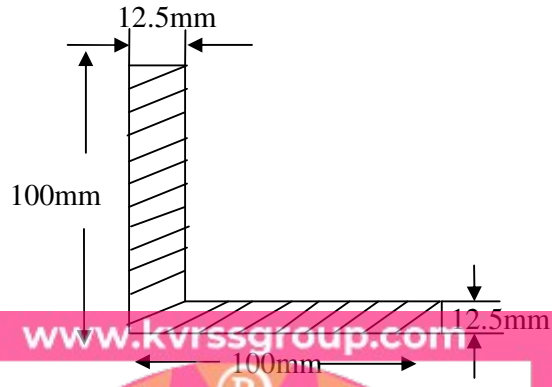
b) Find the centroid of a channel as shown in figure below. All dimensions are incm. (8M)



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 4seconds 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)
(i) The maximum distance S, that the body will move up the inclined plane
(ii) Velocity of the body when it returns to its original position.

7. If Wa:Wb:Wc is in the ratio of 3:2:1 , find the accelerations of the blocks A, B, andC. Assume that the pulleys are weightless. (16M)