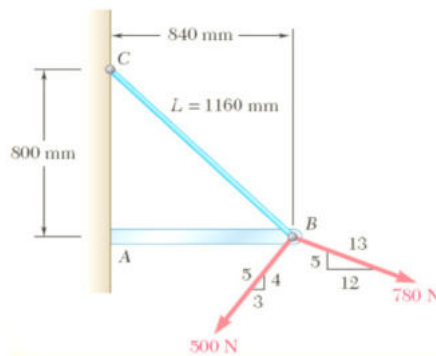**I B. Tech I Semester Supplementary Examinations, January - 2020**
ENGINEERING MECHANICS
Com. to CE,ME,CSE,PCE,IT,Chem E, Aero E, AME, Min E, PE, Metal E, Textile Engg)
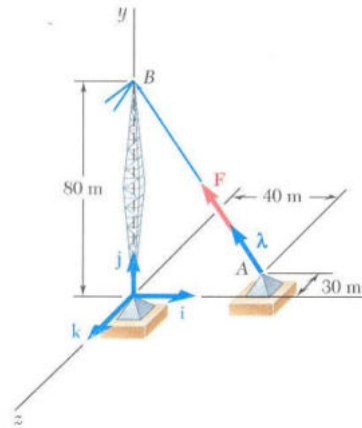Time: 3 hours　　　　　　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 70

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) Tension in cable BC is 725-N, determine the resultant of the three forces exerted　(3M)
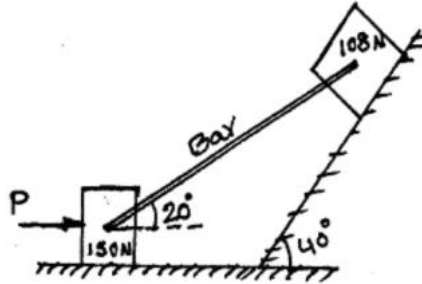at point B of beam AB.

   b) Determine the unit vector pointing from A towards B.　　　　　　　　　　　(4M)
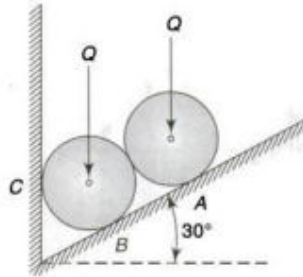

   c) State and explain Pappu's theorem II.　　　　　　　　　　　　　　　　　(4M)

   d) State and explain Transfer theorem.　　　　　　　　　　　　　　　　　　(4M)

   e) Give a brief note on general motion.　　　　　　　　　　　　　　　　　(3M)
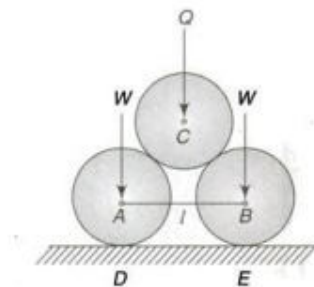
   f) Explain Work Energy method.　　　　　　　　　　　　　　　　　　　　(4M)

PART -B

2. A 108 N block is held on a 40^0 incline by a bar attached to a 150 N block on a   (16M)
    horizontal plane Figure as shown below. The bar which is fastened by smooth pins
    at each end is inclined 20^0 to the horizontal. The co-efficient of friction between
    each block and its plane is 0.325. For what horizontal force P applied to 150 N
    block will motion to the right be impending?

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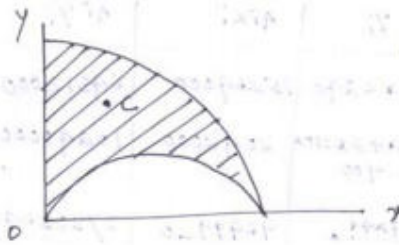   reactions induced at the points of support A, B and C.

    b) Two smooth circular cylinders each of weight W = 445 N and radius r = 152 mm   (8M)
    are connected at their centres by a string AB of length l = 406 mm and rest upon a
    horizontal plane, supporting above them a third cylinder of weight Q = 890 N and
    radius r = 152 mm. Find the forces in the string and the pressures produced on the
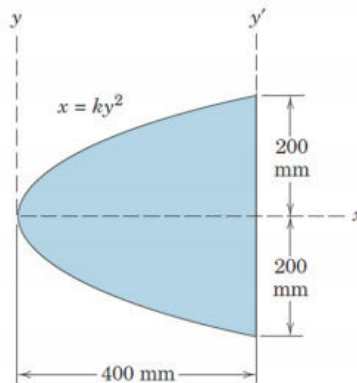   floor at the point of contact.

4. a) Determine the centroid of a triangle from base using basic principles.   (8M)

www.manaresults.co.in

b) Locate the centroid C of the shaded area of the figure below. Assume any data if required. (8M)

5. a) Determine the moment of inertia of a semicircle about its centroidal axis from basic principles. (8M)

b) Determine the moments of inertia of the shaded area about the **y** axis. (8M)

6. a) With an initial velocity of 126m/s, a bullet is fired upwards at an angle of elevation of 35° from a point on a hill and strikes a target which is 100m lower than the point of projection. Neglecting air resistance, calculate (i) the maximum height to which it will rise above the horizontal plane from which it is projected (ii) Velocity with which it will strike the target. Take $g=9.81m/s^2$. (8M)

b) A weight 'P' attached to the end of a flexible rope of diameter d=5mm, is raised vertically by winching the rope on a reel. The reel is turned uniformly at the rate of 2 revolutions per second. Find the tension in the rope. Neglect the inertia of the rope and the lateral motion of the weight 'P'. (8M)

7. a) 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)

b) A solid cylinder and a sphere are started top of an inclined plane, at the same time, and both roll without slipping down the plane. If, when the sphere reaches the bottom of incline, the cylinder is 12m, what is the total length 'S' of the incline? (8M)