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

I B. Tech I Semester Supplementary Examinations, December - 2021

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. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) What happens when coefficient of friction greater than one? (3M)

   b) State and explain theorem of Varignon. (4M)

   c) What is the importance of theorem of Pappus and Guildinus? (3M)

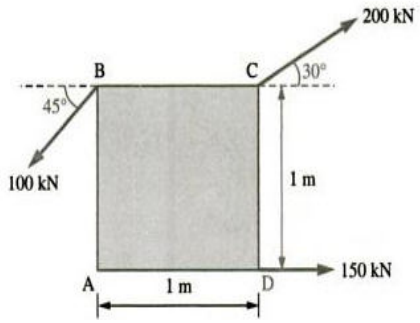
   d) What do you understand from radius of gyration? In which situations we need to find radius of gyration. (4M)

   e) A motorist is travelling on a curved road of radius 20 m at a speed of 80 km/hour. Find the normal and tangential components of acceleration. (4M)

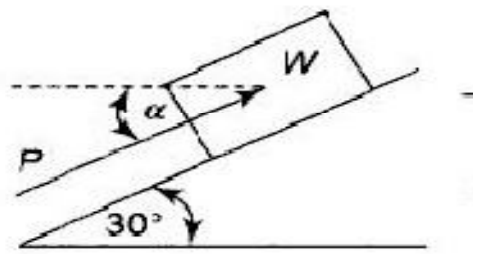
   f) Explain the principle of work and energy. (4M)

PART -B

2. a) A rigid plate ABCD is subjected to the forces as shown in the figure below. Compute the magnitude, direction and line of action of the resultant of the system with reference to the point A. (8M)



   b) Determine the magnitude and direction of the smallest force P which will maintain the body of weight W = 500 N on an inclined smooth plane as shown in fig. below in equilibrium. (8M)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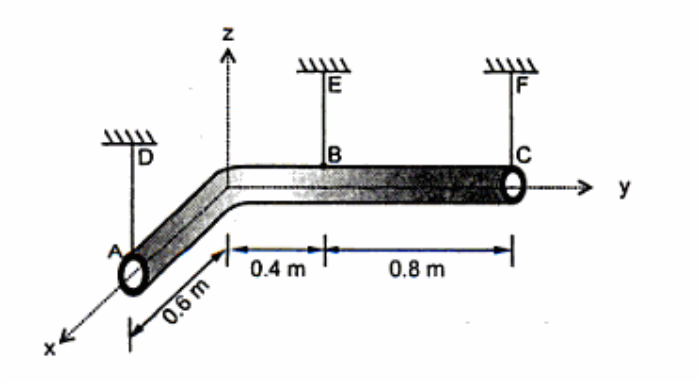
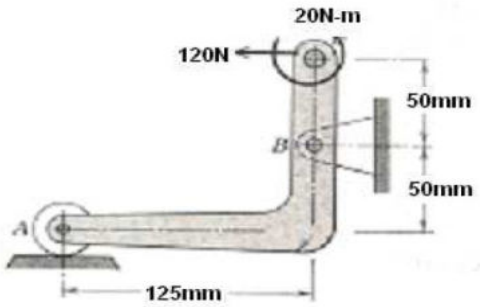
3. a) A uniform pipe having mass per unit length of 8 kg/m is bent into 'L' shape as shown below. Find the tension in each cable for equilibrium. (8M)

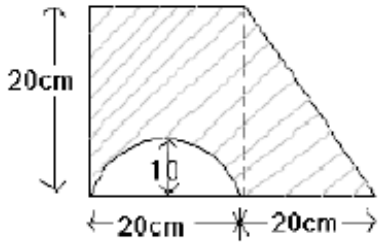


b) Calculate the magnitude of the force supported by the pin at B for the bell crank loaded and supported as shown. (8M)



4. a) From the first principle, find the centroid of a right angle triangle of height h and breadth b. (8M)

b) Find the centroid of the shaded area shown below: (8M)



5. a) Determine the product of inertia of a right angle triangle with respect to x and y axes. (8M)

b) Starting from the first principles determine the moment of inertia of a rectangle with respect to its base. (8M)

6. a) The motion of a particle is defined by the relation $x = t^3 - 12t^2 + 36t + 30$ where x is expressed in meters and t is in sec. Determine the time, position and acceleration when y = 0. (8M)

b) A stone is thrown upwards from the top of a tower 70 m high with a velocity of 19.2 m/s. Determine its position and velocity when t = 6 secs. (8M)

7. Two blocks are joined by an inextensible cable as shown in below figure. If the system is released from rest, determine the velocity of block A after it has moved 2 m. Assume that μ equals to 0.25 between block A and the plane and that the pulley is weightless and frictionless. (16M)