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

I B. Tech I Semester Supplementary Examinations, Oct/Nov - 2018
ENGINEERING MECHANICS
(Com. to CE,EEE,ME,Aero E,Auto E,Chem E,Metal E, Min E, PChem E, Bio-Tech, PE)

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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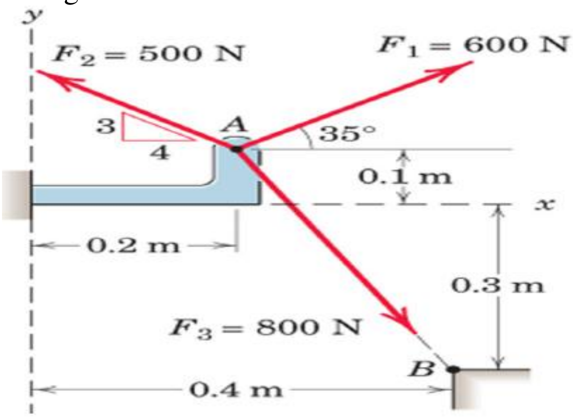
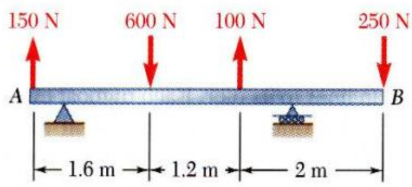
PART –A

1. a) Determine the x and y scalar components of F_1, F_2, and F_3 acting at point A of the bracket in the below figure. (3M)



b) For the beam, reduce the system of forces shown in below figure to (a) an equivalent force-couple system at *A*, (b) an equivalent force couple system at *B*. (4M)



c) Differentiate between centroid, center of gravity and mass center. (4M)

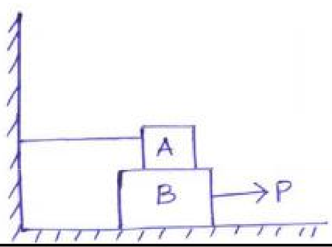
d) State and explain Pappu's theorem I. (4M)

e) Give a brief note on central force motion. (3M)

f) Explain Impulse Momentum method. (4M)

PART -B

2. Block A weighing 1000N rests over block B which weighs 2000N as shown in below figure. Block A is tied to wall with a horizontal string. If the coefficient of friction between blocks A and B is 0.25 and between B and floor is 1/3, what should be the value of P to move the block (B), if (a) P is horizontal. (b) P acts at 30° upwards to horizontal. (16M)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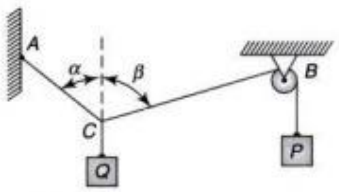
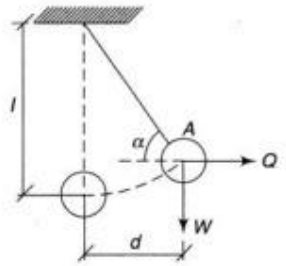
3. a) A weight Q is suspended from a small ring C supported by two cords AC and BC as shown in below figure. The cord AC is fastened at A while cord BC passes over a frictionless pulley at B and carries a weight P. If P = Q and α = 50°, find the value of β. (8M)

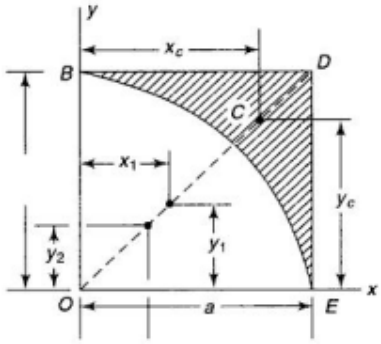


b) A ball of weight W is suspended from a string of length l and is pulled by a horizontal force Q. The weight is displaced by a distance d from the vertical position as shown in below figure. Determine the angle α, forces Q and tension in the string S in the displaced position. (8M)



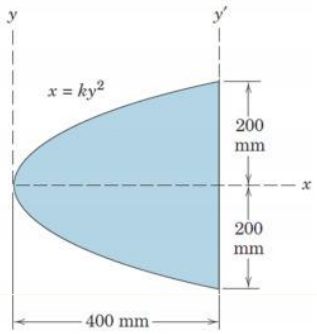
4. a) Determine the centroid of a semicircle using basic principles. (8M)

b) Locate the centroid C of the shaded area of the BDE as shown in below figure. (8M)



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

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



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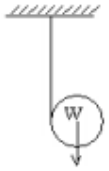
6. a) A right circular cylinder of radius 'r' and weight 'W' is suspended by a cord that is wound around its surface as shown in below figure. If the cylinder is allowed to fall, prove that the center of gravity 'C' will follow a vertical rectilinear path and find the acceleration 'a*c*' along this path. Determine also the tensile force 'S' in the cord. (8M)



b) A pelton wheel attains its operating speed of 900 revolutions per minute 3seconds after it starts from rest. Determine the constant angular acceleration of the pelton wheel. Also find the total number of revolutions the wheel makes before it attains its operating speed. (8M)

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 shown in below figure. Assume that the pulleys are weightless. (16M)