Code No: R161216 **R16** SET - 1

I B. Tech II Semester Supplementary Examinations, Nov/Dec - 2017
ENGINEERING MECHANICS
(Com. to CSE, IT, AGE)

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 **FOUR** Questions from **Part-B**

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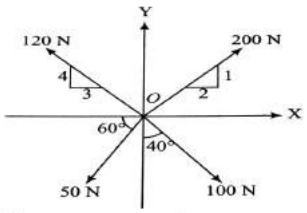
PART –A

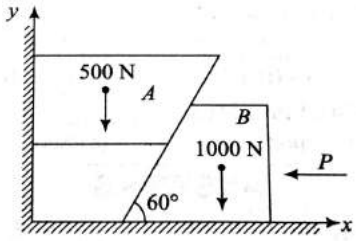
1. a) What is meant by limiting friction and impending motion? (2M)
   b) State Lami`s theorem. (2M)
   c) Distinguish between centroid and center of gravity. (2M)
   d) Define product of inertia. (2M)
   e) What are the differences between ``kinematics`` and ``kinetics``? (2M)
   f) State the work-energy equation for translation. (2M)
   g) When does a given system of parallel forces can be reduced to couple? Discuss. (2M)

PART -B

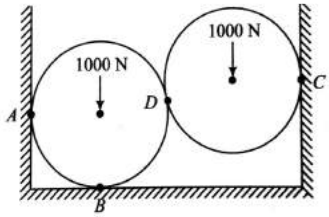
2. a) A system of four forces acting on a body is shown in figure. Determine the resultant force and its direction. (7M)



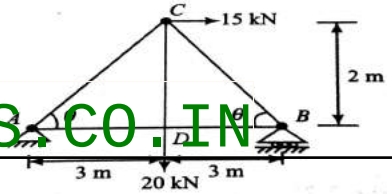
   b) Two blocks A and B are resting against a wall and the floor as shown in figure. Find the value of the horizontal force P applied to the lower block that will hold the system in equilibrium. Coefficients of frictions are 0.25 at the floor, 0.3 at the wall and 0.2 between the blocks. (7M)



3. a) Two spheres each of 1000N and of radius 25cm rest in a horizontal channel of width 90cm as shown in figure. Find the reaction at the point of contact A, B and C. (7M)



   b) Determine the forces in the truss shown in the figure. (7M)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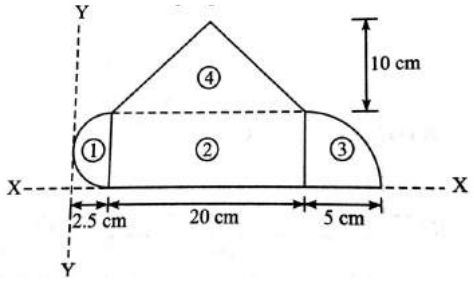
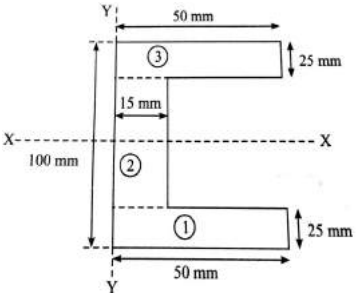
4. a) Determine the area generated by rotating a line of length `l` about x-axis from a distance `r` using Pappus theorem. (7M)

b) Find the centroid of the following figure. (7M)



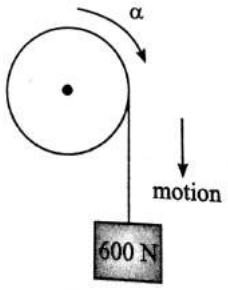
5. a) Determine the mass moment of inertia of a cylinder shaft of 100mm diameter and 2.5m height above the center of gravity axes. (Density,ρ=8000kg/m^3). (7M)

b) Determine moment of inertia of given section about centroidal XX axis. (7M)



6. a) A tower is 90m height. A particle is dropped from the top of a tower and at the same time another particle is projected upward from the foot of the tower. Both the particles meet at a height of 30m. Find the velocity with which the second particle is projected upwards. (7M)

b) A pulley of weight 400N has a radius of 0.6m. A block of 600N is suspended by a rope wound round the pulley as shown in figure. Determine the resulting acceleration of the weight and tension in the rope. (7M)



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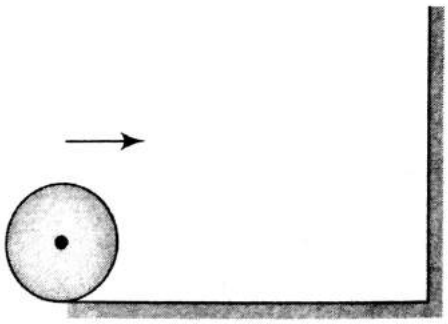
7. a) A ring weighing 350gm and a solid cylinder weighing 450gm, both having radius 110mm are given the same velocity to roll towards the wall, as shown in figure. If they start at the same time, which one will hit the wall earlier? (7M)



b) A train of weight 25,000kg is pulled by an engine on a level track at a constant speed of 54kmph. The frictional resistance is 1kg per 100kg of the weight of the train. Determine the power of the engine. If the train is to move with uniform acceleration of 1.2m/s^2 on the track after attaining the speed of 54kmph, determine the power of the engine. (7M)