Code No: R13210　　　　　　　(**R13**)　　　　　　　(**SET-1**)

I B. Tech II Semester Supplementary Examinations, Nov/Dec - 2017
ENGINEERING MECHANICS
(Com. to ECE,EEE,EIE,Bio-Tech,E Com E,Agri E)
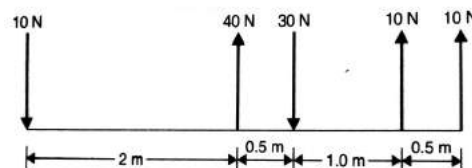
Time: 3 hours　　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 70

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)　Differentiate between:　　　　　　　　　　　　　　　　　　　　　(4M)

　　　　i)　　　Concurrent and non-concurrent forces

　　　　ii)　　　Coplanar and non-coplanar forces

　　b)　A number of forces are acting on a body. What are the conditions of equilibrium,　(4M)
　　　　so that the body is in equilibrium?

　　c)　Determine the area generated by rotating a line of length `l` about x-axis from a　(4M)
　　　　distance `r` using Pappus theorem.

　　d)　Define the terms: moment of inertia and radius of gyration.　　　　　　(4M)

　　e)　Mention the equations of plane motion for rolling bodies.　　　　　　(3M)

　　f)　State the work-energy equation for translation.　　　　　　　　　　(3M)

PART –B

2.　a)　Determine the resultant of the parallel forces shown in figure.　　　　(7M)

　　b)　A body of weight 400N is pulled up along an inclined plane having inclination　(9M)
　　　　30^0 to the horizontal at a steady speed. If the coefficient of friction between the
　　　　body and the plane is 0.3 and force is applied parallel to the inclined plane, find
　　　　the force required. Find also the work done on the body if the distance travelled
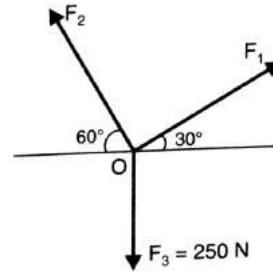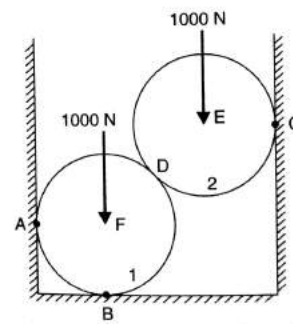　　　　by the body is 10m along the plane.

WWW.MANARESULTS.CO.IN

3. a) Three forces F_1, F_2 and F_3 are acting on a body as shown in figure and the body is in equilibrium. If the magnitude of force F_3 is 250N, find the magnitudes of force F_1 and F_2. (7M)
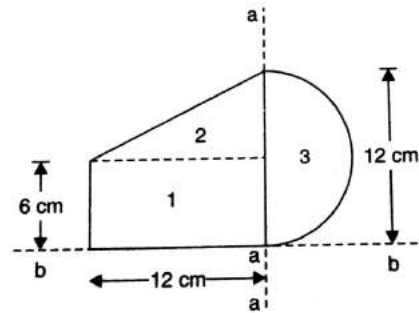

b) Two spheres, each of weight 1000N and of radius 25cm rest in a horizontal channel of width 90cm as shown in figure. Find the reactions on the points of contact A, B and C. (9M)
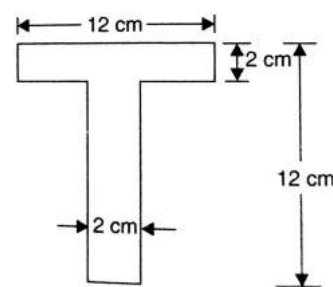

4. a) Determine the centre of gravity of a semi-circle of radius R. (7M)

b) Determine the centroid of area shown in figure (9M)

5. a) For the T-section shown in figure, determine the moment of inertia of the section about the horizontal and vertical axes, passing through the centre of gravity of the section. (9M)
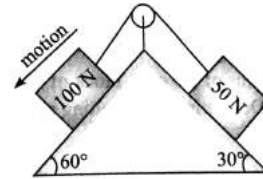

b) Determine the mass moment of inertia of a cylinder shaft of 100mm diameter and 2.5m height about the centre of gravity axes. (density, ρ=8000kg/m^3). (7M)

|"|""||"||""||||

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. (8M)

   b) Find the tension and acceleration of 100N body of the following figure. (coefficient of friction, $\mu=1/3$). (8M)

7. a) A train of weight 2000kN is pulled by an engine on a level track at a speed of 36kmph and with an acceleration of 0.5m/s^2 on the level track. Find the power of the engine? (7M)

   b) Two blocks weighing 200N and 300N are hung to the ends of a rope passing over an ideal pulley. How much distance the blocks will move in increasing the velocity of the system from 3m/s to 5m/s? How much is the tension in the string? Use the work-energy method. (9M)

3 of 3