FACULTY OF ENGINEERING

B.E. I – Year (Supplementary) Examination, December 2016

Subject : Engineering Mechanics

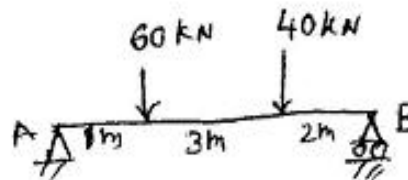**Time : 3 hours**   **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1 State and explain the Varginon's theorem.   2
2 A force F is represented by F = 5i + 2j + 3k. What is the magnitude of force F. What
   are the direction cosines of F.   3
3 Find the reactions at the supports for the figure shown below.   3

4 State laws of friction.   2
5 What are the uses of Pappus theorems?   2
6 What is polar moment of inertia of Hollow rectangular section?   2
7 Obtain mass moment of inertia of a hollow cylinder of mass m and external radius R
   internal radius r.   3
8 A stone is thrown vertically upwards and returns to earth in 5 seconds. How high
   does it go in air.   2
9 Two masses of 40 & 35 kg respectively are attached by a cord that passes over
   frictionless pulley. If the masses start from rest. Find the distance covered by either
   mass in 6 seconds.   3
10 State and prove impulse momentum equation.   3

PART – B (50 Marks)

11 a) Two force F = 100N and P = 200N act on a hooks as shown in figure. Find i)
       component Fx , ii) Component of Px   iii) resultant of F & P and its direction.
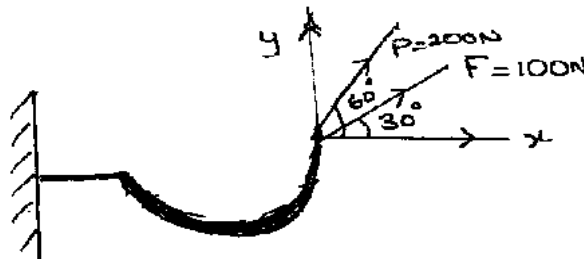
b) Two identical rollers each of weight 100 N are supported by an incline and vertical wall as shown in figure. Assuming smooth surfaces, find the reactions induced at point A, B and C.
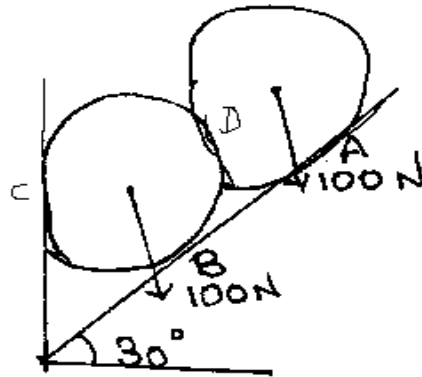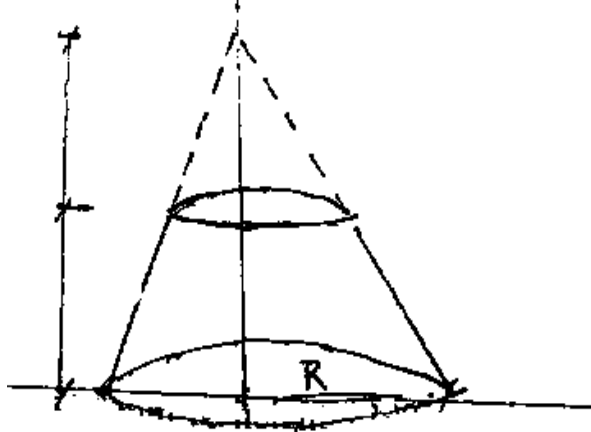

12 A system of forces consist of : force P1 = 5i + 4j + 3k passing through point (1,4,2) force P2 = 3i + 5j – 6k passing through point (2, 1, -3).
units calculate
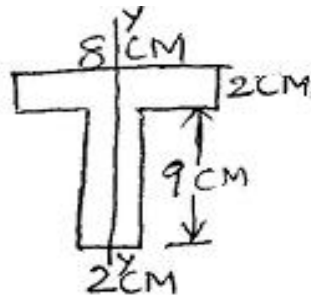i) The component of resultant forces and its direction cosines   5
ii) The total moment of the system about origin O   5

13 a) Determine the centroid of the frustum of a cone of height 60mm, 50mm bottom diameter and 30mm top diameter.
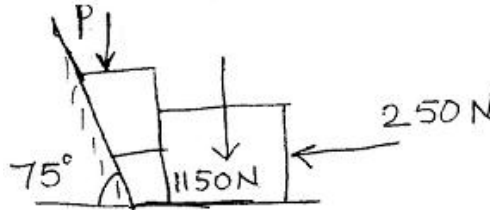

b) Determine the moment of inertia of T-section shown in Fig. about centroidal y-axis.

..3

14 Determine the force 'P required to start the wedge as shown in fig. the angle of friction for all surfaces of contact is 20^0.

15 A bullet is fired from a height of 120m at a velocity of 360 kmph at an angle of 300 upwards. Neglecting air resistance, find
   a) total time of flight,
   b) horizontal range of the bullet,
   c) maximum height reached by the bullet, and
   d) final velocity of the bullet just before touching the ground.

16 Determine the distance moved by A in changing its velocity from 2 m/sec to 4 m/sec.
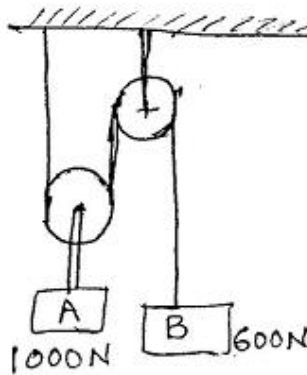
17 The system shown in the figure has a rightward velocity of 10 m/sec. Determine the constant value of P that give it a leftward velocity of 20m/sec in time interval of 20 sec.

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