FACULTY OF ENGINEERING & TECHNOLOGY
B.E. (Bridge Course) II – Semester (Backlog) Examination, December 2016
Subject: Engg. 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 The angle between resultant (35 N) of two forces and one of the force (15 N) is 38°, 21'. Find the other force and its inclination with the resultant.
2 State and prove Varignon's theorem.
3 Differentiate between static friction and kinetic friction.
4 Define surface of revolution and volume of revolution.
5 Differentiate between polar moment of inertia and product of inertia.
6 Define radius of gyration of mass moment of inertia.
7 The position of a particle in rectilinear motion is defined by the relation $x = 2t^3 – 8t^2 + 4t – 2$ where x is in meters and t is in seconds. Determine its position, velocity acceleration when t = 3 sec.
8 State D'Alembert's principle.
9 A man of 5 kg when attached to a spring extends it vertically by 10 cm. Determine the work done in stretching the same spring horizontally by 5 cm.
10 The period of a simple pendulum whose length is 0.3 m is found to be 1.1 sec. Determine the acceleration due to gravity at that place.

PART – B (50 Marks)

11 A smooth pulley supporting a load of 3000 N is mounted at B on a horizontal beam AC as shown in Figure. If the beam weighs 1000 N find the support reaction at A & C. Neglect the weight and size of the pulley.
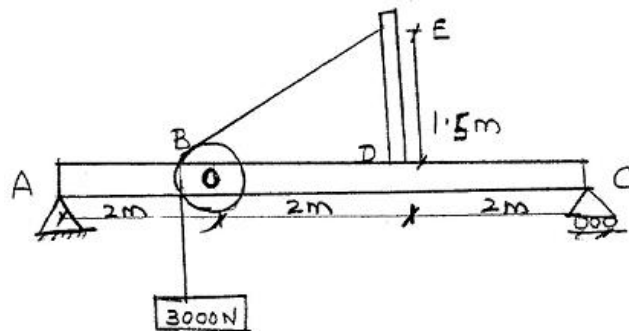
12 In the system of blocks shown in Fig if the weight of the block B is 150 N, determine the range of the weight of the block A for which motion is impending. Take coefficient of fraction for all contact surface to be 0.25. Assume the pulley, at top to be frictionless.

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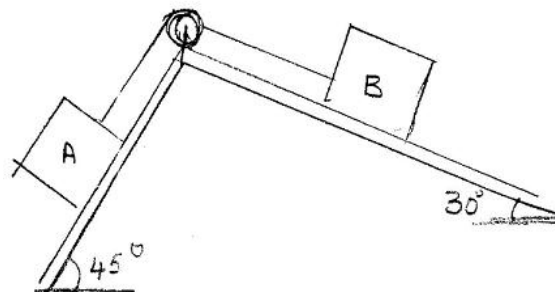
13 Find the centroid of volume of a solid formed by a right circular cone of 100 mm base radius and a height of 150 mm placed over a cylinder having same radius and 75 mm height.

14 A compound pendulum consist of a circular metallic disc welded to a thin metallic rod and suspended as shown in figure. If their respective masses are 0.4 kg and 0.2 kg determine their mass moment of interia of the pendulum about the axis of rotation.
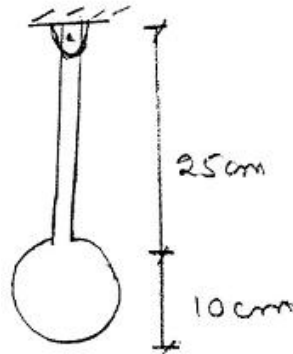
15 A truck moving along a curved road with a speed of 36 kmph begins to accelerate at a constant rate to reach a speed of 54 kmph in 5 seconds. Determine the total acceleration
   i)   At the instant it is accelerated
   ii) After 3 second radius of curvature of road 90 m.

16 A lift can operate under a maximum of 8 persons mass of the lift is 800 kg. Determine the limits of tension if the lift accelerates at a constant rate of 1 m/s^2 either upwards or downwards. Take average weight of a person as 750 N.

17 A car of 2 ton mass traveling at 45 kmph approaches a traffic junction. When the car is 100 m before the signal the driver realizes that the green light is about to turn into red in 6 seconds and hence, he accelerates the car uniformly and crosses just before the light turns red. If the frictional resistance is 0.6 kN/ton determine the power impacted by the engine at that instant.

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