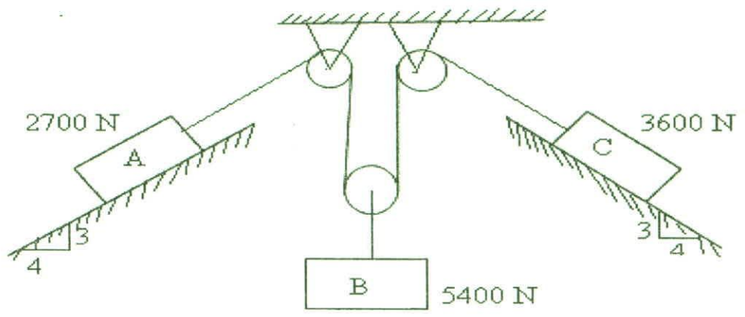
B) If the coefficient of kinetic friction is 0.35 under each body in the system shown in fig., how far and in what direction will body B move in 6 sec. starting from rest. Pulleys are frictionless.



END OF QUESTION PAPER

4/4

E M 102

Dr. Babasaheb Ambedkar Technological University, Lonere-Raigad

END SEMESTER **Examinations – APRIL - 2017**

I Semester: B. Tech Course (Computer, Electrical, EXTC and IT)

Subject: Engineering Mechanics (EM)

Date: 28 APR 2017 Time: 3 Hours Max Marks: 60

Instructions to the Students:

1. **Attempt ANY FIVE Questions from Question No 1 to Question No 6.**
2. **Illustrate your answers with neat sketches, diagrams etc. wherever necessary.**
3. **Necessary data is given in the respective questions. If such data is not given, it means that the knowledge of that part is a part of examination.**

Q.1. Attempt the following (04X3=12)

A) Explain various types of loads.

B) State Law of Parallelogram of forces. Two forces of 22 N and 45 N act away from a point. If the angle between the forces is 50 °. Find the magnitude of the resultant and the angle made by it with the 22 N force.

C) The rectilinear motion of a particle has its position defined by the relation $X=t^3-8t^2+24t-15$ m

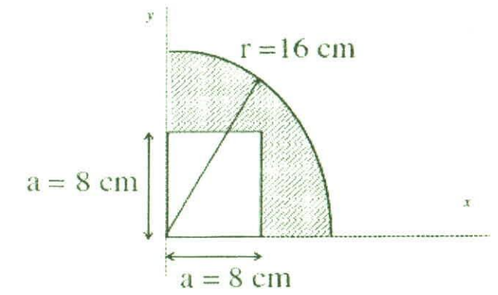
Determine 1) Position, velocity and acceleration at t = 3 sec

2) Maximum Velocity and the corresponding time

Q.2. Attempt the following (04X3=12)

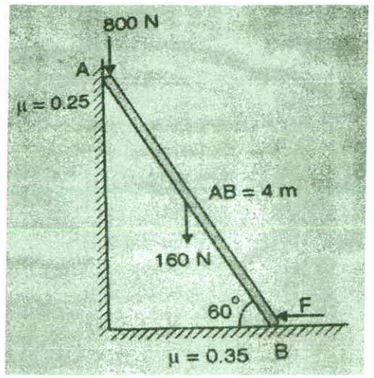
A) State and prove Lami's Theorem

B) Find the location of centroid for shaded area with respect to reference axis X-Y.



1/4

C) A 4 m long ladder, weighing 160 N is resting as shown, making a 60 degree angle with the ground. A man weighing 800 N is standing at the top of the ladder. Find the minimum force F required to keep the ladder in equilibrium.



Q.3. Attempt the following (04X3=12)

A) State and Derive the Impulse Momentum Equation.

B) A stone is dropped into a deep well. The splash/sound is heard after 2.5 seconds. Assuming the speed of sound to be 330 m/s ,Find the depth of the well (take g = 9.81 m/s^2).

C) Ball A of mass 0.5 Kg moving to the right with a velocity of 5 m/s has a direct central impact with ball B of mass 0.2 Kg moving to left with a velocity of 2 m/s. If after impact the velocity of ball B is observed to be 4 m/s to the right. Determine the coefficient of restitution between the two balls.

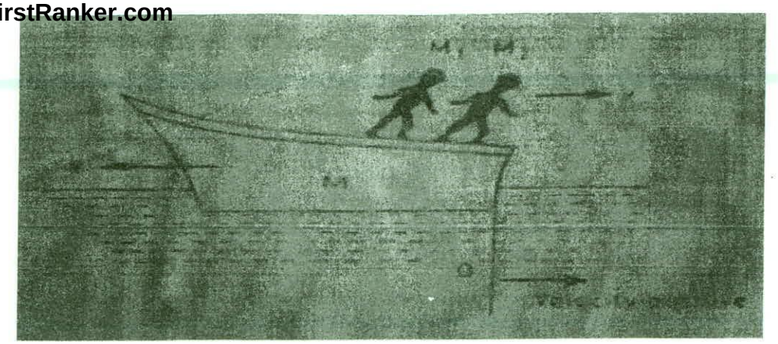
Q.4. Attempt the following (06X2=12)

A) Two men,M_1 of mass 50 kg and M_2 of mass 75 kg, dive off the end of a boat of mass M= 250 kg so that their relative velocity with respect to the boat is 4 m/s. If the boat is initially at rest, find its final velocity if

i) two men dive simultaneously,

ii) the man of mass 75 kg dives first followed by the man of mass 50 kg ,

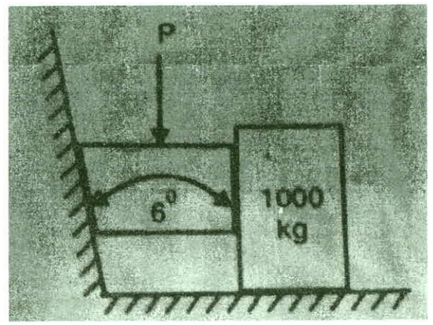
iii) the man of mass 50 kg dives first followed by the man of mass 75 kg



B) Write a note on Free Body Diagram (FBD). Explanin the various types of supports in detail with neat FBD.

Q.5. Attempt the following (06X2=12)

A) The horizontal position of the 1000 kg block is adjusted by 6 degree wedge .If coefficient of friction for all surfaces is 0.6 . Determine the least value of force P required to move the block.



B) Explain and prove D'Alembert's principle. How will you explain the concept of dynamic equilibrium.

Q.6. Attempt the following (06X2=12)

A) Define and Explain following terms related to friction.

i) Angle of Friction

ii) Angle of Repose

iii) Coefficient of friction