

**Dr. Babasaheb Ambedkar Technological University, Lonere-Raigad**  
**Supplementary Examinations Nov 2018**

**Course: B. Tech (All Courses)**

**Semester: I/II**

**Subject Name with Subject Code: Engineering Mechanics (ME102/ME202)**

**Date: 28/11/2018**

**Time: 3 Hours**

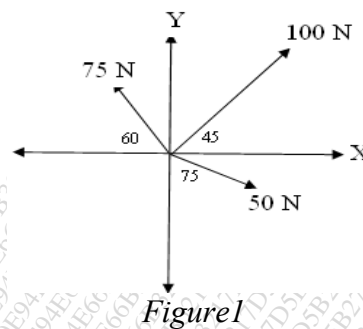
**Max Marks: 60**

**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.
4. Use of non-programmable scientific calculators is allowed.

Q.1. Attempt the following. (06X2=12)

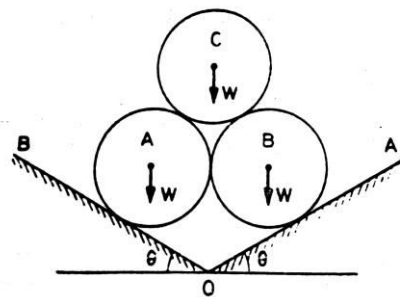
- A) What do you understand by resolution of forces and calculate the resultant of following forces shown in figure 1?



- B) What are the components of accelerations for the curvilinear motion? How will you calculate these components? Explain with some examples.

Q.2. Attempt the following. (06X2=12)

- A) Define constraint, action, reaction and types of supports and support reactions with free body diagram.
- B) Three identical right circular cylinders A, B and C, each weight  $W$  are arranged on smooth inclined surface as shown in figure 2. Determine the least value of angle  $\theta$  that will prevent the arrangement from collapsing.



Q.3. Attempt the following. (06X2=12)

- A) Three spherical balls of mass 2 kg, 6 kg and 12 kg are moving in the same directions with velocities 12 m/s, 4 m/s and 2 m/s respectively. If the ball of mass 2 kg impinges with the ball of mass 6 kg which in turn impinges with the ball of mass 12 kg prove that the balls of masses 2 kg and 6 kg will be brought to rest by the impact. Assume the balls to be perfectly elastic.

- B) What do you understand by trusses and frames? How will you determine the axial forces in the members? Explain method of Joints and method of sections.

Q.4. Attempt the following.

(06X2=12)

- A) What force  $P$  must be applied to the weightless wedges shown in fig 3. to start them under the 1000N block? The angle of friction for all contact surfaces is 10 degree.

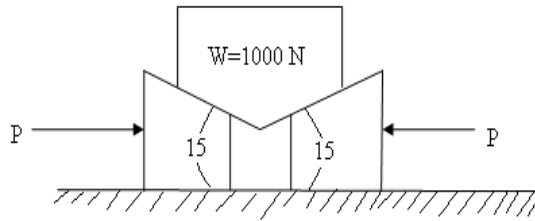


Figure 3

- B) Locate the centroid of the shaded area obtained by removing semicircle of diameter 'a' from a quadrant of a circle of radius 'a' as shown in Figure 4.

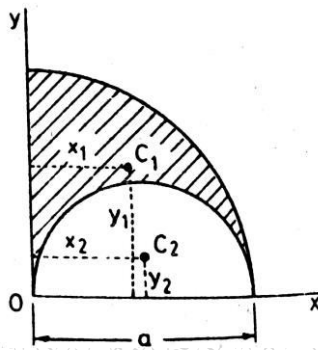


Figure 4

Q.5. Attempt the following.

(06X2=12)

- A) Explain the direct central impact, nature of impact and coefficient of restitution.
- B) A gun of mass 3000 kg fires horizontally a shell of mass 50 kg with a velocity of 300 m/s. What is the velocity with which the gun will recoil? Also determine the uniform force required to stop the gun in 0.6 m. In how much time it will stop.

Q.6. Attempt the following.

- A) Define and explain the D'Alemberts principle. Write and elaborate the equation of this, for rectilinear and curvilinear motion. (04)
- B) If the coefficient of kinetic friction is 0.25 under each body in the system shown in fig. 5, how far and in what direction will body B move in 5 sec. starting from rest. Pulleys are frictionless. (08)

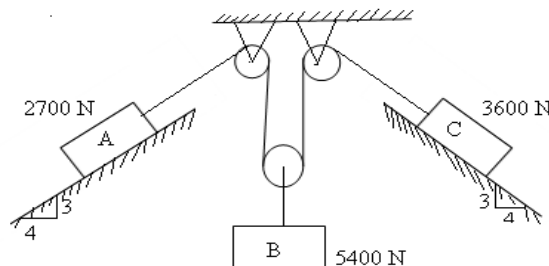


Figure 5

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