# Dr. Babasaheb Ambedkar Technological University Lonere - Raigad

Supplementary Examination – Nov, 2017

Class: B. Tech. (Mech/Civil/Chem/Petro Engineering)

Subject Code: EM205

Semester - II

Subject: Engineering Mechanics

Time: 3 hours

Maximum marks: 70

Question No. 1 is compulsory,

- Attempt any one question from groups, I, II, III, and IV and one from the remaining.
- Assume suitable data wherever necessary and mention it clearly.

Que.1. Write a short note on

(Î0)

- a. Principle of Transmissibility
- b. Law of Triangle of forces
- c. Coefficient of restitution
- d. Centre of gravity
- e. Couple reaction

## Group-I

Que. 2 A) A bar of 2 m long and of negligible weight rests in horizontal position on two smooth inclined planes as shown in the figure 1. Determine the distance x at which the load Q 100 N should be placed from point B to keep the bar horizontal (06)

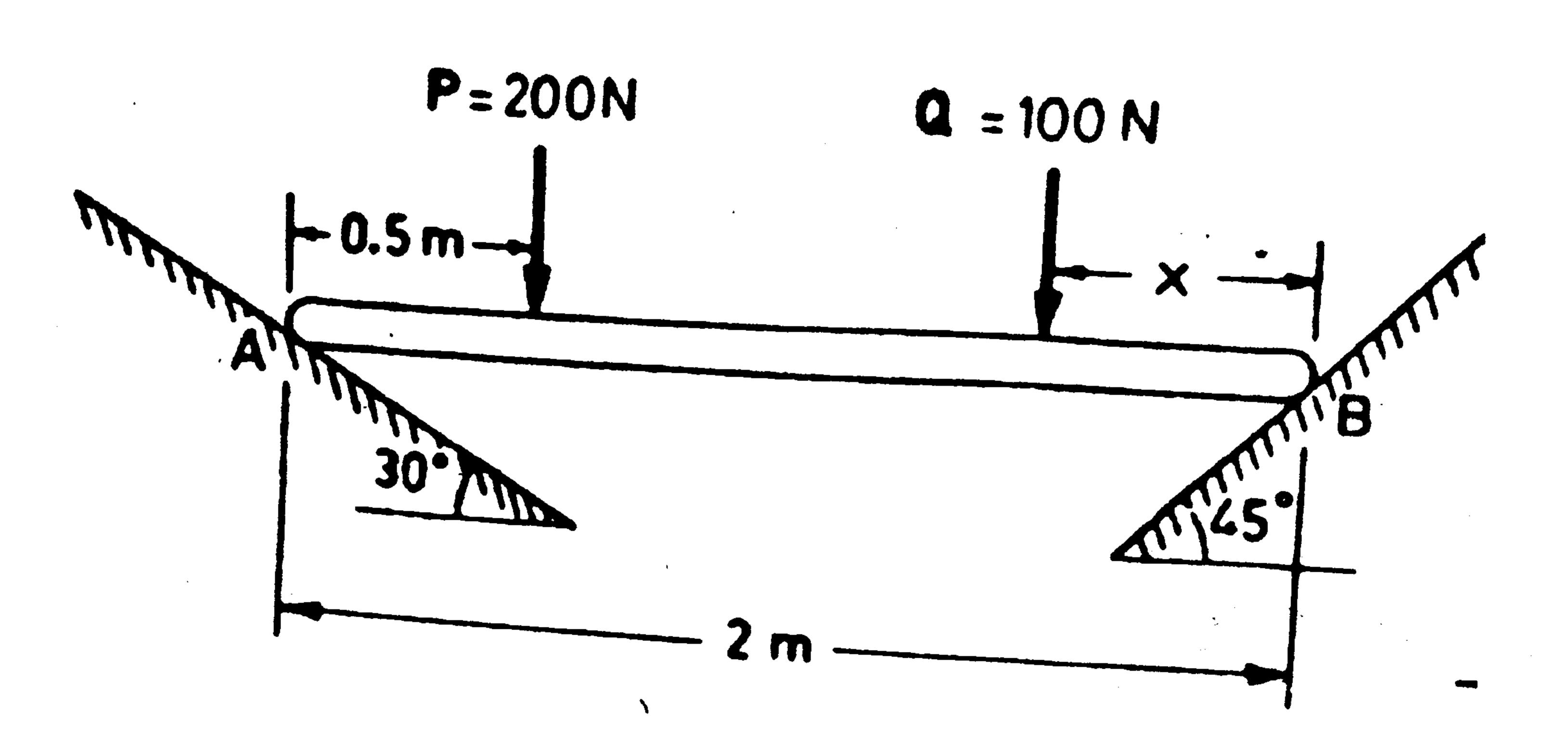


Figure 1

B) Define moment of a force with its unit. State and prove theorem of Varignon.

(06)

Que. 3 A) How will you find out the resultant of two parallel forces acting in the same direction. Derive it.

(00)

B) Determine the reaction at the fixed end A of a cantilever for the loading shown in the figure 2.

(06)

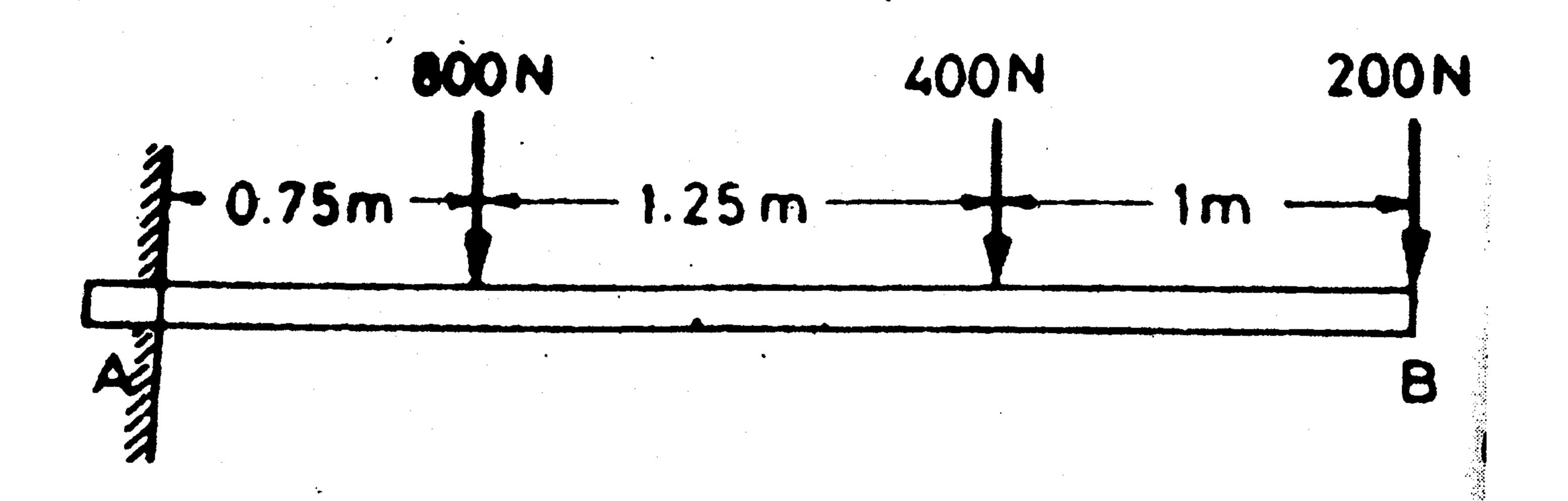


Figure 2

## Group-II

Que. 4 A) How will you find out the centre of gravity of a body by the methods of moments and integration method? (06)

B) Find the coordinates of the centroid of the area left after removing a square area from plate as shown in the figure 3? (06)

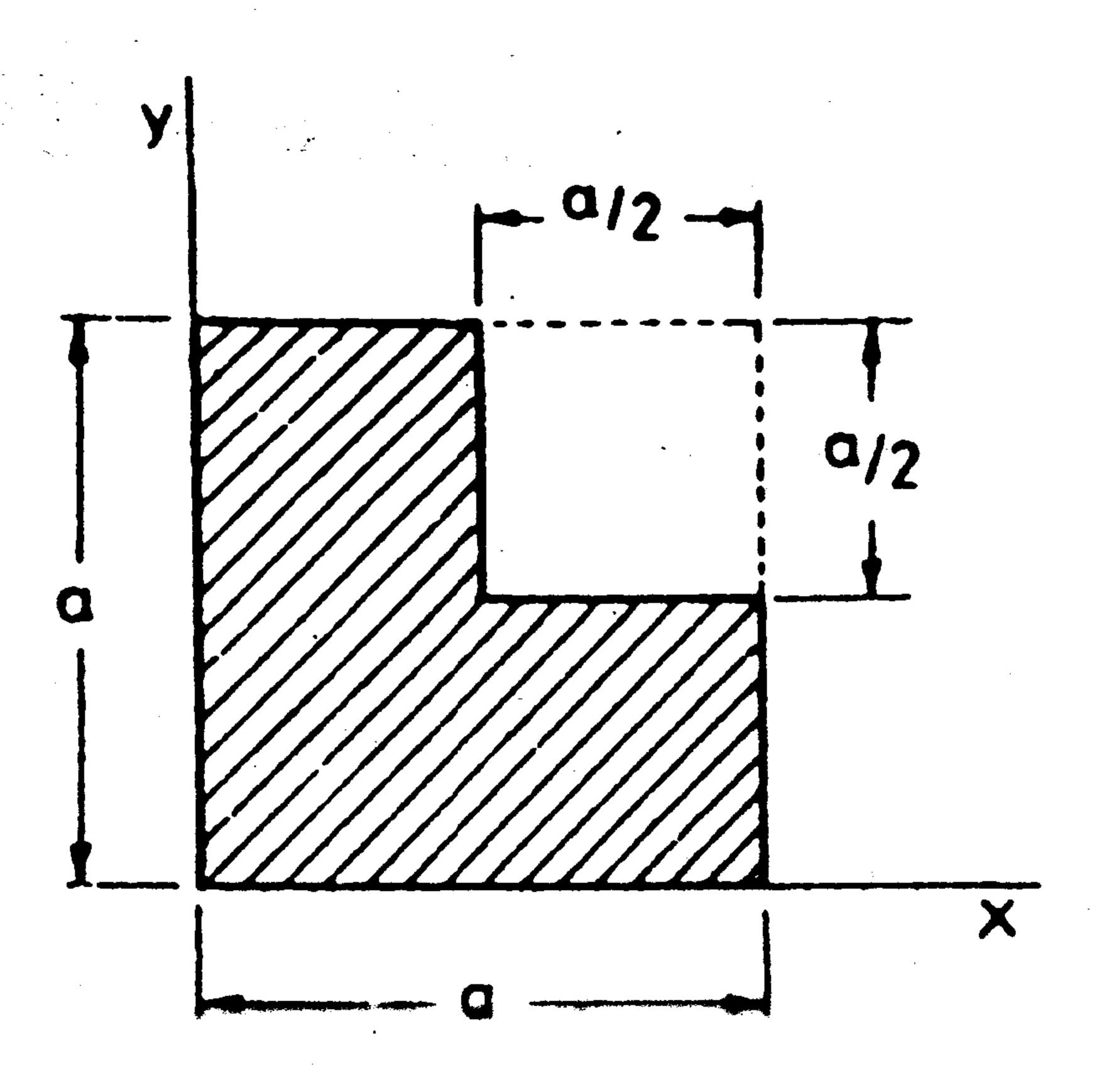


Figure 3

Que. 5 A) What do you understand by dry friction? Explain the laws of dry friction.

(06

B) A wooden block rests on a horizontal plane. Determine the force required to push it. Assume  $\mu = 0.25$  at the floor, 0.3 at the wall and 0.2 between the blocks as shown in figure 4. (06)

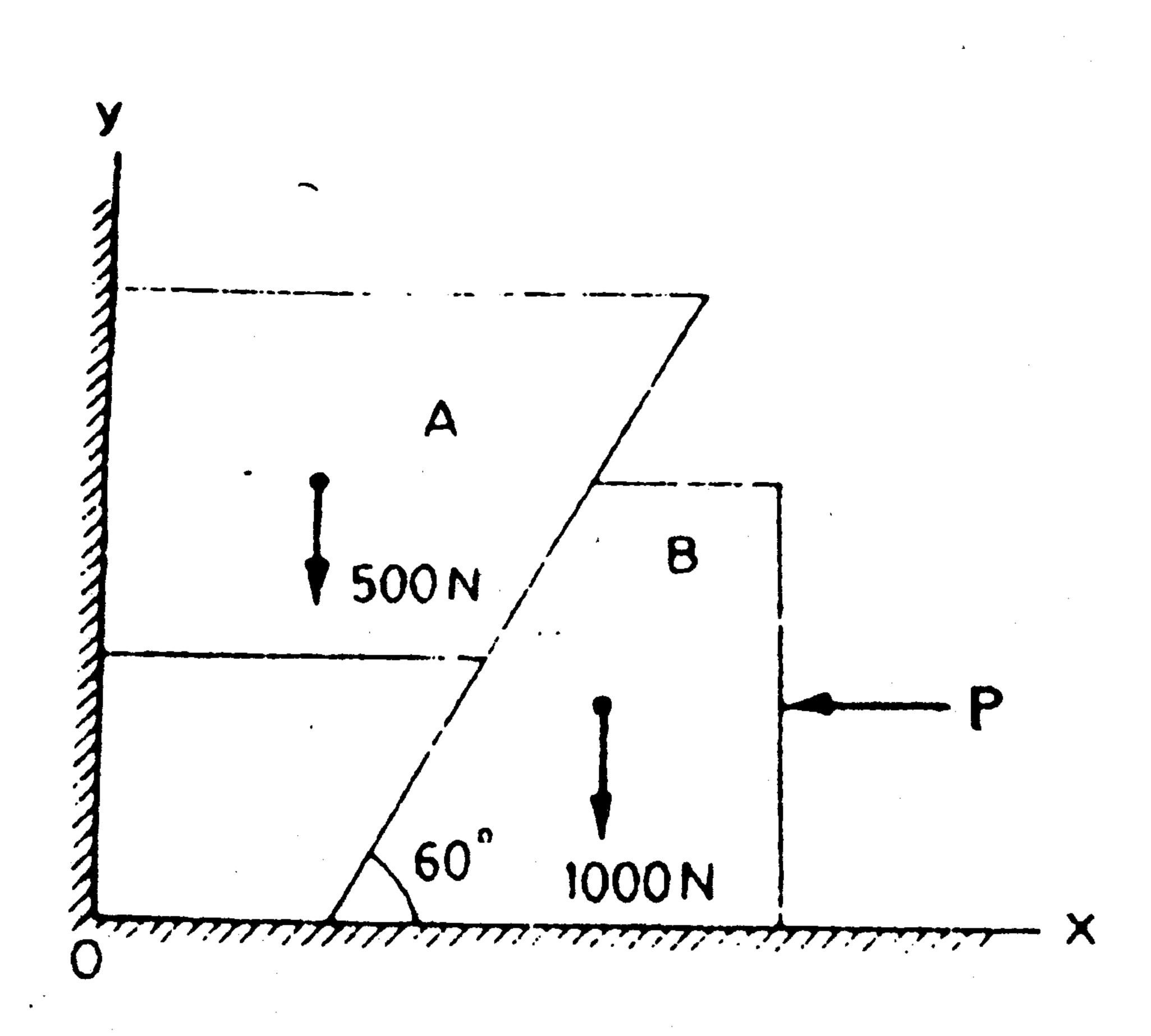


Figure 4

### Group-III

- Que. 6 A) What do you understand by dynamics? Explain the types of motion in detail. (06)
- B) A stone is dropped from the top of a tower 60 m high. At the same time another stone is thrown up from the foot of the tower with a velocity of 30 m/s. At what distance from the top and after how much time the two stones cross each other.
- Que. 7 A) Define and explain the D'Alemberts principle. Also write the equation of this, for rectilinear and curvilinear motion. (06)
- B) What are the components of accelerations for the curvilinear motion? How will you calculate these components? Explain with some examples. (06)

### Group-IV

- Que. 8 A) Find out the work done by a constant force in rectilinear motion? Explain the work of the force of spring. (06)
  - B) What is meant by impulse of a force and momentum? State and prove the principle of impulse and momentum. (06)
  - Que. 9. A) Explain the oblique central impact, motion along the line of impact x axis and y axis. (06)
  - B) The masses of two balls are in the ratio of 4:2 and their respective velocities are in the ratio 4:8 but in opposite directions before impact. If the coefficient of restitution is 5/6, prove that after impact each ball will move back with 5/6<sup>th</sup> of the original velocity. (06)

-----END PAPER-----