

UNIVERSITY OF GHANA
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SCHOOL OF ENGINEERING SCIENCES

SECOND SEMESTER EXAMINATIONS: 2014/2015
LEVEL 100: BACHELOR OF SCIENCE IN ENGINEERING

FAEN 104: BASIC MECHANICS II (2 credits)

INSTRUCTION:
ANSWER ALL QUESTIONS

TIME ALLOWED: *TWO AND HALF (2 $\frac{1}{2}$) HOURS*

1. a) Define the following terms related to rectilinear motion of a particle:
- i. Displacement
 - ii. Instantaneous velocity
 - iii. Instantaneous acceleration

(6 marks)

- b) A bus starts from rest at point *A* (figure 1) and accelerates at the rate of 0.8 m/s^2 until it reaches a speed of 12 m/s . It then proceeds at 12 m/s until the brakes are applied; it comes to rest at point *B*, 42 meters beyond the point where the brakes were applied. Assuming uniform deceleration and knowing that the distance between *A* and *B* is 300 meters, determine the time required for the bus to travel from *A* and *B*.

(18 marks)

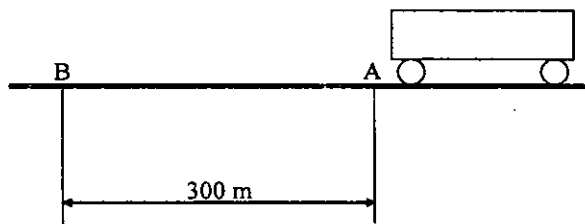


Figure 1

2. a) What is an impulse force? (2 marks)
- b) State the "Principle of conservation of linear momentum" (4 marks)
- c) A 1200 kg package is being moved on the floor of a plant at a speed of 10 m/s under the action of a horizontal force F (figure 2). Suddenly an additional force of 1000 N is applied to the package to retard its motion. Determine the time required to bring the package's speed to 5 m/s. The coefficient of kinetic friction between the package and the floor is 0.35. (14 marks)

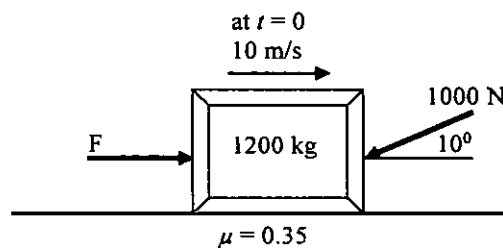


Figure 2

3. a) Define the term "impact" and explain the following:
- Central impact.
 - Eccentric impact.
 - Direct central impact.
 - Restitution period.
- (8 marks)
- b) Two smooth cylinders of the same diameter roll towards each other, on a horizontal surface, such that their centerlines are perfectly parallel (figure 3). Cylinder A has a mass of 10 kg, and cylinder B has a mass of 7.5 kg. At what speed will the cylinders move after collision for the coefficient of restitution to be 0.75? (18 marks)



Figure 3