



**Global College of Engineering and Technology**  
**الكلية العالمية للهندسة والتكنولوجيا**

**Sample Placement Test – Academic Year (2017 – 18)**

**PHYSICS**

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Answer as directed. Show complete work.**

1. The relationship is described by the equation below is the Newton's equation of motion which describes the relationship between the *distance covered*  $x$  of an object and its *initial velocity*  $u$ , *acceleration*  $a$ , and *time*  $t$ : (5 marks)

$$x = ut + \frac{1}{2}at^2$$

- (a) If  $x = 15$  m,  $u = 2$  ms<sup>-1</sup>, and  $a = 7.5$  ms<sup>-2</sup>. Rewrite the expression in **quadratic form**.
- (b) Solve for the time  $t$  using the **quadratic formula**.
- (c) What is the **distance covered** of an object travelling with an initial velocity of 10 ms<sup>-1</sup> and accelerating at a rate of 4 ms<sup>-2</sup> at time  $t = 10$  seconds? Hence, solve for the value of  $x$  using the original equation (not the derived one).
2. Pressure is defined as force per unit area. A nail with a surface area of 0.1 mm by 0.1 mm at the tip of the nail is driven into a piece of wood with a hammer which exerts a force of 10 Newton on the other end of the nail. Determine the pressure at the tip of the nail. (2 marks)
3. A block of metal of mass  $m = 50$  g has a dimension of 1 cm  $\times$  2 cm  $\times$  3 cm. Determine the orientation of the block on the surface of the table for which the pressure of the contact area of block and table is maximized. (1 mark)
4. A mass of 1 kg moves with a velocity of 4 m/s. What is the correct value of the kinetic energy  $E_{kin}$ ? (2 marks)
5. What is the result in adding the lengths of 2 cm, 25 mm and 1.5 m? (1 mark)
6. A solid of dimension 1 cm by 15 mm by 0.03 m has a weight of 13.5 g. Determine the density. (2 marks)
7. Power  $P$  is defined as work  $W$  over time taken  $\Delta t$ , i.e  $P = \frac{W}{\Delta t}$ . A mass of 2 kg is accelerated by a machine with 1 m/s<sup>2</sup> and is moved a distance of 3 meters in 2 seconds. Determine the value and the unit of the power  $P$  supplied by the machine. (3 marks)
8. A car is moving along a road at 8.0 ms<sup>-1</sup>. It then speeds up to 20 ms<sup>-1</sup> in 4.0 s. (6 marks)
- (a) Draw the movement of the car in the v-t graph taking 8.0 ms<sup>-1</sup> as the initial velocity ( $t=0$ ).
- (b) What is the acceleration of the car?
- (c) If the car moves at a constant acceleration for 5.0 seconds more, what is its new velocity? Hence, compute for the velocity of the car when  $t = 9.0$  seconds.
- (d) Describe the relationship between the velocity of the car and the time within the interval (0 to 9 seconds).

9. A man throws a stone over the edge of a cliff with a horizontal velocity of  $20 \text{ ms}^{-1}$ . The cliff is approximately 180 m high. The man is about 1.90 m tall. Ignoring air resistance and taking  $g = 10.0 \text{ ms}^{-2}$ , calculate: (4 marks)
- (a) The time the stone reach the ground,
  - (b) the distance it lands from the foot of the cliff.
10. A man weighing 600 N runs up the hill. It takes him 20 s to reach the top which is 15 m from the ground. Calculate: (4 marks)
- (a) the work he has done
  - (b) the power output of his legs.