

# UNIT TEST

STD : 11 ( SCIENCE STREAM )

TIME : 1 : 00 HOUR

SUB : PHYSICS (054)

MARKS : 25

## Section A

Do as directed. (Each carries 1 mark)

[05]

1. What will be the stopping distance if the initial velocity is doubled ?
2. Ratio of distances covered by object falling freely under gravity in 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> second is .....  
(A) 1 : 3 : 5                      (B) 1 : 2 : 5                      (C) 1 : 4 : 9                      (D) 1 : 5 : 9
3. What does the area of  $v \rightarrow t$  graph of moving object represent ?
4. Pick out the only vector quantity in the following list :  
Temperature, pressure, impulse, time, power, total path length, energy, gravitational potential, coefficient of friction, charge.
5. Which one of the following statements is incorrect ?  
(A) Coefficient of sliding friction has dimensions of length.  
(B) Rolling friction is smaller than sliding friction.  
(C) Frictional force oppose the relative motion.  
(D) Limiting value of static friction is directly proportional to normal reactions.

## Section B

Answer in short for the following questions. (Each carries 2 marks)

[06]

6. A jet airplane travelling at the speed of  $400 \text{ km h}^{-1}$  ejects its products of combustion at the speed of  $1200 \text{ km h}^{-1}$  relative to the jet plane. What is the speed of the latter with respect to an observer on the ground ?
7. "Explain Triangle method of vector addition."  
OR  
Rain is falling vertically with a speed of  $30 \text{ ms}^{-1}$ . A woman rides a bicycle with a speed of  $10 \text{ ms}^{-1}$  in the north to south direction. What is the direction in which she should hold her umbrella ?
8. Determine the maximum acceleration of the train in which a box lying on its floor will remain stationary, given that the co-efficient of static friction between the box and the train's floor is 0.15.

## Section C

Answer the following questions. (Each carries 3 marks)

[09]

9. Derive the equations of uniformly accelerated motion by graphical method.  
OR  
Two trains A and B of length  $400 \text{ m}$  each are moving on two parallel tracks with a uniform speed of  $72 \text{ km h}^{-1}$  in the same direction, with A ahead of B. The driver of B decides to overtake A and accelerates by  $1 \text{ m s}^{-2}$ . If after  $50 \text{ s}$ , the guard of B just brushes past the driver of A, what was the original distance between them ?
10. A stone tied to the end of a string  $90 \text{ cm}$  long is whirled in a horizontal circle with a constant speed. If the stone makes 15 revolutions in  $30 \text{ s}$ , what is the magnitude and direction of acceleration of the stone ?
11. Obtain the formula for the maximum safe speed of a vehicle on a level curved road.

## Section D

Answer the following question.

[05]

12. (a) Derive the formula for maximum height attained by a projectile.  
(b) What is Horizontal range of the projectile ? Derive it's formula.

OR

A particle starts from origin at  $t = 0$  with a velocity  $5.0 \hat{i} \text{ ms}^{-1}$  and moves in  $x$ - $y$  plane under action of a force which produces a constant acceleration of  $(3.0 \hat{i} + 2.0 \hat{j}) \text{ ms}^{-2}$  (a) What is the  $y$  - coordinate of the particle at the instant its  $x$  - coordinate is 84 m ? (b) What is the speed of the particle at this time ?

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