



SARALA BIRLA  
PUBLIC SCHOOL

(SARALA BIRLA GROUP OF SCHOOLS)

# SARALA BIRLA PUBLIC SCHOOL

## Mahilong, Ranchi.

### Revision Test (Physics) [21.1.2020]

#### Class - XI

1. A mass  $M$  is split into two parts  $m$  and  $(M-m)$  which are then separated by a certain distance. What ratio of  $m/M$  maximize the gravitational force between the parts? (1)  
(a)  $2/3$  (b)  $3/4$  (c)  $1/3$  (d)  $1/2$
2. The distance travelled by a particle in a straight line is directly proportional to  $t^{1/2}$  where 't' is time elapsed. What is the nature of motion? (1)  
(a) increasing acceleration (b) decreasing acceleration (c) increasing retardation  
(d) decreasing retardation
3. An object covers 10 m in first 2 seconds of its motion, 20 m in next 3 seconds and 30 m in subsequent 10 seconds. What of the following statement (s) is/are true for this motion? (1)  
(a) the object is uniformly accelerated (b) the average speed of the object is 4 m/s  
(c) the object has decelerating forces acting on it during the motion  
(d) the average acceleration of the object is  $3.5 \text{ m/s}^2$ .
4. Cross-product of two vectors are (1)  
(a) commutative (b) anti-commutative (c) both (a) and (b) (d) neither (a) nor (d)
5. If  $A + B = A - B$ , then the angle between A and B is (1)  
(a)  $0^\circ$  (b)  $30^\circ$  (c)  $60^\circ$  (d)  $90^\circ$   
Fill in the blanks:
6. The number of significant figures in the following: (1)  
(a)  $0.2370 \text{ g/cm}^3$  (b)  $10.008 \text{ km}$
7. The displacement of a progressive wave is represented by  $y = A \sin (\omega t - kx)$  where  $x$  is distance and  $t$  is time. The dimensional formula of  $\omega$  is ..... and  $k$  is ..... (1)
8. A body of mass  $\frac{1}{2} \text{ kg}$  travels in a straight line with velocity  $v = ax^{3/2}$  where  $a = 5 \text{ m}^{-1/2}\text{s}^{-1}$ . What is the work done by the net force during its displacement from  $x = 0$  to  $x = 2 \text{ m}$ ? (1)
9. What will be the ratio of time of flight for complimentary angles where their initial speed is the same? (1)
10. Two springs A and B having spring constants  $k_A$  and  $k_B$  ( $k_A = 2k_B$ ) are stretched by applying a force of equal magnitude. If energy stored in spring A is  $E_A$ , then find the energy stored in B. (1)
11. Derive the relation between angle of friction and angle of repose. (2)
12. Prove law of conservation of angular momentum. (2)

or

Deduce the expression of centre of mass of two particle system using a labeled diagram.

13. A man weighing 50 kg supports a body of 15 kg on his head. Calculate the work done by him if he moves a distance of 20 m. (take  $g = 10 \text{ m/s}^2$ ) (2)
- (i) on a horizontal road (ii) upon an inclined plane of 1 in 5.
14. A particle moving in a straight line covers half the distance with a speed of 3 m/s. The other half of the distance is covered in two equal interval of time with speeds of 4.5 m/s and 7.5 m/s respectively. Find the average speed of the particle during this motion. (3)
15. Prove that the path of a projectile at some angle with the horizontal is a parabolic path. (3)
16. Deduce the expression for variation of acceleration due to gravity with altitude. (3)

or

Derive the expression for variation of acceleration due to gravity with depth.

- 17.(a) Derive the expression for kinetic energy of rotation of a body. Hence define moment of inertia of the body.
- (b) A uniform solid cylinder of mass 1.50 kg and diameter 0.60 m rotates about its own axis at a constant angular speed of 160 rad/s. Calculate
- (i) the moment of inertia
- (ii) the rotational kinetic energy
- (iii) the angular momentum of the cylinder about the given axis

or

- (a) State and prove parallel axes theorem
- (b) Find the moment of inertia of a uniform circular disc about a tangent in its own plane.
- 18.(a) Derive an expression for centripetal acceleration of an object in uniform circular motion in a plane. What will be its direction at any instant?
- (b) A flywheel is speeded up uniformly to 300 rpm in 100 second from rest. Calculate the angular acceleration and the linear acceleration of a point 10 cm from the axis.