

CLASS XI - PHYSICS❖ General instructions:

- (i) All questions are compulsory.
- (ii) There is no overall choice. However, an internal choice has been provided.
- (iii) Question number 1 to 5 are very short answer questions carrying 1 mark
- (iv) Question number 6 to 12 are short answer questions, carrying 2 marks
- (v) Question number 13 to 24 are short answer questions, carrying 3 marks
- (vi) Question number 25 to 27 are long answer questions, carrying 5 marks
- (vii) Use of calculators is not permitted.

❖ SECTION A

1. How many fermi are there in one metre?
2. Can a body have a constant speed and still have a varying velocity?
3. Which physical quantities are expressed by the following:
  - (i) the rate of change of angular momentum, and
  - (ii) moment of linear momentum?
4. Define one newton force.
5. Two solid spheres of same mass are made of metals of different densities. Which of them has larger amount of moment of inertia about its diameter?
6. The angular diameter of the sun is  $1920''$ . if the distance of the sun from the earth is  $1.5 \times 10^{11}$  m, what is the linear diameter of the Sun?
7. Define power. Prove that  $P = F \cdot v$  where the symbols have their usual meanings.
8. Two vectors, both equal in magnitude have their resultant equal in magnitude of the either. Find the angle between the two vectors.
9. Find the dimensions of a x b in the relation:
$$P = (b - x^2) / at$$
where P is power, x is distance and t is time.
10. A constant force acting on a body of mass 3 kg changes its speed from 2 m/s to 3.5 m/s in 25 seconds. The direction of motion of the body remains unchanged. What is the magnitude and the direction of the force?

OR

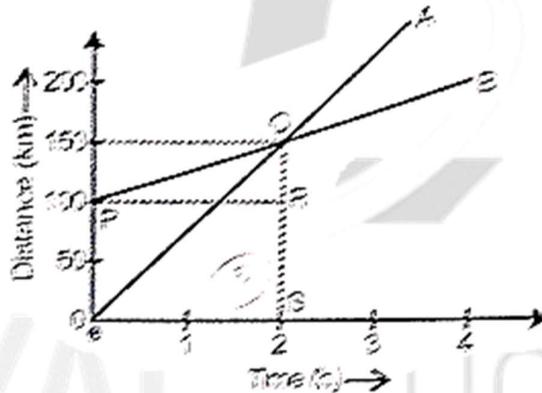
A player throws a ball upwards with an initial speed of 29.4 m/s. What are the velocity and acceleration of the ball at the highest point

of its motion?

11. State parallelogram law of vector addition. Show that resultant of two vectors A and B Inclined at an angle is

$$R = (A^2 + B^2 + AB \cos \theta)^{1/2}$$

12. State the principle of conservation of linear momentum. Explain why the gun recoils when a bullet is fired from it.
13. The escape velocity  $V$  of a body depends upon  
 (i) the acceleration due to gravity of the planet and  
 (ii) the radius of the planet  $R$ . Establish dimensionally the relationship between  $V$ ,  $g$  and  $R$ .
14. Figure shows the distance-time graphs of two trains, which start moving simultaneously in the same direction. From the graphs find:



- (i) How much ahead of A is B when the motion starts?  
 (ii) When and where will A catch B?  
 (iii) What is the difference between the speeds of A and B?
15. The displacement (in meters) of a particle moving along x-axis is given by  $x = 4t^2 - 20t$ , Calculate  
 (i) the instantaneous velocity at  $t=1s$   
 (ii) average velocity between  $t=1s$  and  $t=2s$   
 (iii) instantaneous acceleration
16. A parachutist falls out from an aeroplane and after dropping through a distance of 40m, he opens the parachute and decelerates at  $2m/s^2$  if he reaches the ground with the speed of  $2m/s$ , how long is he in the air? At what height did he fall out from the plane?
17. State and prove work - energy theorem for constant force.
18. Explain why  
 (i) A horse cannot pull a cart and run in empty space.  
 (ii) It is easier to pull a lawn mower than to push it.

19. Two bodies A and B of masses 10 kg and 20 kg respectively kept on a smooth, horizontal surface are tied to the ends of a light string. A horizontal force  $f = 600 \text{ N}$  is applied to (i) B (ii) A, along the direction of string. What is the tension in the string in each case?

**OR**

A man weighs 70 kg. He stands on a weighing machine in a lift, which is moving

(i) Upwards with a uniform speed of 10 m/s.

(ii) Downwards with a uniform acceleration of  $5 \text{ m/s}^2$ .

(iii) Upwards with a uniform acceleration of  $5 \text{ m/s}^2$

What would be the reading on the scale in each case? What would be the reading, if the lift mechanism failed and it come down freely under gravity?

20. A body of mass 2 kg. Initially at rest moves under the action of an applied horizontal force of 7 N on a table with coefficient of kinetic friction equal to 0.1. Compute the
- (i) Work done by the applied force in 10 seconds
  - (ii) Work done by the friction in 10 seconds
  - (iii) Work done by the net force on the body in 10 seconds.
21. A particle performing uniform circular motion has angular momentum L. What will be the new angular momentum, if its angular frequency is doubled and its kinetic energy halved?

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