

O. P. JINDAL SCHOOL, SAVITRI NAGAR
Half Yearly Examination (2023 – 2024)

Class: XI
Subject: Physics

MM: 70
Time: 3 Hrs.

(Fifteen Minutes Extra will be given for reading the Question Paper) General Instructions:

- (1) There are 33 questions in all. All questions are compulsory.
- (2) This question paper has five sections: Section A, Section B, Section C, Section D and Section E.
- (3) All the sections are compulsory.
- (4) Section A contains sixteen questions, twelve MCQ and four Assertion and Reasoning based of 1 mark each, Section B contains five questions of two marks each, Section C contains seven questions of three marks each, Section D contains two case study based questions of four marks each and Section E contains three long answer questions of five marks each.
- (5) There is no overall choice. However, an internal choice has been provided in one question in Section B, one question in Section C, one question in Section D.
 You have to attempt only one of the choices in such questions.

SECTION A

- Q.1.** The relationship between \vec{A} and $-2\vec{A}$ is that
 a) both have same magnitude b) both have same direction c) both have opposite direction d) none
- Q.2.** The number of significant figures in 0.06900 is
 a) 5 b) 4 c) 2 d) 3
- Q.3** The slope of acceleration versus time will give
 a) Displacement b) velocity c) Distance d) None of these
- Q.4.** cyclist moving on a circular track of radius 40m completes half a revolution in 40s. Its average velocity is
 a) zero b) 2ms^{-1} c) $4\pi\text{ms}^{-1}$ d) $8\pi\text{ms}^{-1}$
- Q.5.** The sum of two vector is maximum if the angle between the vector
 a) 90° b) 0° c) 45° d) 180°
- Q.6.** In a projectile motion the range is maximum if it is projected at an angle
 a) 90° b) 0° c) 30° d) 45°
- Q.7.** In equilibrium of particle when net external force of the particle is zero . Then the particle is
 a) at rest b) moving with uniform velocity
 c) moving with uniform acceleration d) Both (a) and (b).
- Q.8.** A force of 6N acts on a body of mass 1kg at rest. During the time the body attains a velocity of 30m/s. The time for which the force acts on the body is:
 a) 10 sec b) 8 sec c) 7 sec d) 5 sec
- Q.9.** The area under acceleration versus time will give
 a) Displacement b) velocity c) Distance d) None of these
- Q.10.** The angle between $\vec{A} = (\hat{i} + \hat{j})$ and $\vec{B} = (\hat{i} - \hat{j})$ is
 a) 45° b) 90° c) -45° d) 180°
- Q.11.** The magnitude of resultant of 5N i and -10N j is that
 a) $5\sqrt{5}\text{N}$ b) -5N
 c) 5N d) none
- Q.12.** The displacement of a car is given as -240 m, Here -ve sign indicates
 a) direction of displacement c) negative path length

Q25. i) State and prove the law of conservation of momentum.

ii) Find the magnitude of sum of \vec{A} and \vec{B} having magnitude 5 and 4 unit respectively and angle between them is 60° .

Q26. i) The position of a moving particle is given by $S = 6 + 18t + 9t^2$. What is the velocity at $t = 2s$?

ii) Two vectors of magnitude 3 units and 4 units are at an angle 60° between them. Find the magnitude of their sum.

Q.27. The rain is falling vertically downward at speed of 60km/hr and a man is travelling horizontal on a road at speed of 80km/hr. By what angle he should open the umbrella from vertical so that he will be protected from rain.

Q.28. i) State the parallelogram law of two vectors.

ii) Two vectors A and B in x-y plane are given by $\vec{A} = A_x\hat{i} + A_y\hat{j}$ and $\vec{B} = B_x\hat{i} + B_y\hat{j}$.

(a) Write in the vector form representing the sum of the two vectors.

(b) Show by a diagram representing \vec{A} , \vec{B} and their sum

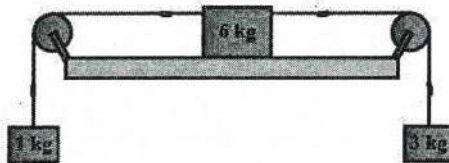
(c) Write the magnitude of its sum.

SECTION -D

Q.29. Three masses of 1kg, 6kg and 3 kg are connected to each other with threads and are placed on table as shown in

figure. (i) What is the acceleration with which the system is moving?

ii) Find tension force in the string.



Q.30 A monkey of mass 40kg climbs on a rope which can stand a maximum tension of 600 N. In which of the following cases will the rope break? The monkey

i) Climbs up with an acceleration of 6ms^{-2} .

ii) Climbs down with an acceleration of 4 m/s^2 .

iii) Climbs up with a uniform speed of 5 m/s.

OR

A cricket ball of mass 150 g is moving with a velocity of 12 m/s and is hit by a bat so that the ball is turned back with a velocity of 20m/s.

(i) If duration on contact between the ball and bat is 0.01 s the impulse of force is

(a) 7.4 Ns (b) 4.8 Ns (c) 1.2 Ns (d) 4.7 Ns

(ii) Average force exerted by the bat is

(a) 480 N (b) 120 N (c) 1200 N (d) 840 N

(iii) The retardation of ball is

(a) 1600 m/s^2 (b) 320 m/s^2 (c) 3200 m/s^2 (d) 160 m/s^2

(iv) The force acting on the whose linear momentum changes by 20 kg m/s in 10 s is

(a) 2N (b) 20 N (c) 200N (d) 0.2N

SECTION-E

Q.31(i) A man of mass 70 kg stands on a weighing scale in a lift which is moving

(a) moving up with a uniform acceleration of 5m/s^2

(b) moving down with a uniform acceleration of 5m/s^2

(c) moving up with uniform speed of 10 m/s

what would be the reading of the scale in each case?

(ii) The odometer of a car reads 1700 km at the start of a trip and 2500 km at the end of the trip. The trip took 16 h. What is the average speed of car in ms^{-1} ?

Q.32 (i) A ball moving along +x axis with velocity 5m/s and strikes a wall and turns back at $x=1\text{m}$, then find the change in momentum of the ball and the direction of force exerted by ball and wall on each other?

(ii) A man can swim at a speed of 3km/h in still water. He want to cross a 500m wide river at 2km/h. He keeps himself at an angle of 120° with river flow while swimming.

(a) Find the time he takes to cross the river.

(b) At what point on the opposite bank will he arrive

Q.33. The acceleration of an object is said to be uniform acceleration if its velocity changes by equal amount in equal interval of time, however small these time intervals may be. A particle is moving with uniform acceleration in x-direction, the displacement x of particle varies with time t as, $x = 4t^2 - 15t + 25$. m

(i) The position of particle at $t = 0$,

(a) 14 m. (b) 18 m (c) 20 m (d) 25 m

(ii) Velocity of particle at $t = 2$ s

(a) -15 m/s (b) 1 m/s (c) 3 m/s (d) 31 m/s

(iii) Acceleration of particle at $t = 2$ s

(a) 0 ms^{-2} (b) 8 ms^{-2} (c) 10 ms^{-2} (d) 20 ms^{-2}

(iv) The velocity of particle will become zero at time t equal to

(a) 2.975 s. (b) 1.875 s. (c) 2 s. (d) 1 s.

(v) The particle has a uniform acceleration 'a' when

(a) acceleration does not depend on time t (b) acceleration depends on time t

(c) velocity changes by unequal amount in equal interval of time, (d) None of these
