

O. P. JINDAL SCHOOL, SAVITRI NAGAR
Half Yearly Examination (2019 – 2020)

Class: XI
Subject: Physics

MM: 70
Time: 3 Hrs.

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

General Instructions:

- i. All questions are compulsory
- ii. The question paper consists of 37 questions divided into 4 sections A, B, C and D. Section A comprises of 20 questions of 1 mark each, Section B comprises of 7 questions of 2 marks each, Section C comprises of 7 questions of 3 marks each, Section D comprises of 3 questions of 5 marks each.
- iii. There is no overall choice. However, internal choice has been provided.

SECTION A

1. Pascal is the unit of
 a) Force b) Pressure c) Work d) Energy
2. The number of significant figures in 0.06900 is
 a) 5 b) 4 c) 2 d) 3
3. The slope of acceleration versus time will give
 a) Displacement b) velocity c) Distance d) None of these

OR

The displacement of a car is given as -240 m, Here -ve sign indicates

- a) direction of displacement b) negative path length c) initial position of the car b) no significance of -ve s
4. A 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) $8\pi\text{ms}^{-1}$
5. The sum of two vector is maximum if the angle between the vector is
 a) 90° b) 0° c) 45° d) 180°

OR

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
6. In a projectile motion the range is maximum if it is projected at an angle of
 a) 90° b) 0° c) 30° d) 45°
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).
8. Factor on which frictional force does not depend is
 a) Nature of surface b) normal reaction force c) Area of contact d) None of these
9. A body is moving along a circular path. How much work is done by the centripetal force
 a) -1J b) 2J c) 3J d) Zero
10. Two masses of 1g and 4g are moving with equal kinetic energy .The ratio of the magnitude of their momentum is
 a) 4:1 b) $\sqrt{2} : 1$ c) 1:2 d) 1:16

OR

If the force and displacement of particle in the direction of force are doubled, then work done would be

- a) double b) 4 times c) half d) one fourth
11. Which physical terms remain conserved in an inelastic collision?

12. Friction is a non-conservative force why?

OR

Can acceleration be produced without doing work ? Give example

13. A box is lying on the floor of a lift , which is in free fall, what is the value of normal reaction ?

14. State any two advantage of frictional force in daily life.

15. Action and reaction are equal and opposite . Why cannot they cancel each other ?

16. A boat is moving with a velocity $(3\hat{i} + 4\hat{j})$ with respect to the ground. The water in the river is moving with a velocity of $(-3\hat{i} - 4\hat{j})$ with respect to the ground. What is the relative velocity of boat with respect to water?

OR

A body is projected at an angle of 30° from the horizontal . By what another angle it should be projected again with the same velocity to attain the same range as before?

17. If $\vec{A} = (-\hat{i} + 3\hat{j} - 2\hat{k})$ and $\vec{B} = (2\hat{i} - \hat{j} + 2\hat{k})$ then find $\vec{A} \cdot \vec{B}$.

18. Find the acceleration and velocity of the body at the instant it reaches its highest point if it was thrown up with velocity v .

19. What is the range of angle between force and displacement for work done to be negative ?

OR

For what condition average velocity of a body is equal to its instantaneous velocity?

20. Calculate the length of the arc of the circle of radius 30 cm which subtends an angle of $\frac{\pi}{6}$ at the centre .

SECTION B

21. The resistance R is the ratio of potential difference V and current I . What is the percentage error in R if V is $(100 \pm 5)V$ and I is $(10 \pm 2)A$?

22. 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} ?

23. An aircraft execute a horizontal loop of radius 1000m with a steady speed of $250ms^{-1}$. Find the centripetal acceleration of the plane .

24. A cricket ball is thrown at a speed of $28ms^{-1}$ in a direction 30° above the horizontal. Calculate the time of flight .

OR

If $\vec{A} = (-\hat{i} + \hat{j} - \hat{k})$ and $\vec{B} = (2\hat{i} + \hat{j} - \hat{k})$ then find $\vec{A} \times \vec{B}$.

25. Why we feel a sudden jerk in the forward direction in the moving bus when the brakes are applied ?

26. Draw the free body diagram of an object of mass m placed in a rough inclined plane having the angle of inclination α .

27. Deduce the relation between kinetic energy and momentum of the body .

OR

Define potential energy. How many types of potential energy are there ?

SECTION C

28. Check the correctness of the relation $v^2 - u^2 = 2as$ by method of dimensions . The symbols have their usual meaning .

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

30. Show that If $\vec{A} = (2\hat{i} - 3\hat{j} - \hat{k})$ and $\vec{B} = (-6\hat{i} + 9\hat{j} + 3\hat{k})$ are parallel.

31. Define angular displacement , time period and frequency and write the relation between frequency and time period .

OR

A man can swim with a speed of 4km/h in still water. How long does he take to cross the river 1 km wide, if the river flows steadily 3km/h and he makes his strokes normal to the river current ? How far down the river does he go when he reaches the other bank ?

32. Explain Newton's second law of motion and hence prove that $F = ma$.
33. How Newton's second law advocates the existence of first law?
34. The mass and velocity of a body become twice . how much times the kinetic energy of the body will increase

OR

Explain work energy theorem and prove it .

SECTION D

35. a) Justify that a uniform circular motion is an accelerated motion.
b) While firing, one has to aim a little above the target and not exactly on the target. Explain .

OR

Derive an expression for centripetal acceleration of an object in uniform circular motion in a plane. What will be the direction of velocity and acceleration at any instant ?

36. 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) State and prove the law of conservation of momentum .
b) A bullet of mass 20 g fired from a gun of mass 2 kg with the velocity of 200ms^{-1} . Find the recoil velocity of the gun .
37.a) Prove that during freefall the mechanical energy of the body will remain conserve .
b) A coolie is holding a bag by applying a force of 15 N . He moves forward and covers the horizontal distance of 8 m and then he climbs up and covers the vertical distance of 10 m . What will be the work done by him ?

OR

- a) Define the terms elastic and inelastic collision. What is the difference between partially inelastic collision and completely inelastic collision .
b) A body of mass 1 kg moving with the velocity of 20ms^{-1} strikes a stationary object at rest and after collision they coupled and move together as a single mass . Find the velocity of combined mass .