

**BLUE PRINT- Physics**  
**XI- CLASS (W.T)**

**General Instructions :**

- 1. All questions are compulsory.**
- 2. Question No. 1-5 are very short answer questions and carry 1 mark each.**
- 3. Question No. 6-10 are short answer questions and carry 2 marks each.**
- 4. Question No. 11-15 are also short answer questions and carry 3 marks each.**
- 5. Question No. 16-19 are long answer questions and carry 5 marks each.**
- 6. Use log tables if necessary, use of calculators is not allowed.**

S. NO	Types of Ques	No. Of Ques	Marks for each ques	Total Marks
1	V. short ans type ques	5	1	5
2	Short ans type ques	5	2	10
3	Long ans type ques	5	3	15
5	V. Long ans type Ques	4	5	20

**DELHI PUBLIC SCHOOL, BAHADURGARH**  
**SUMMATIVE ASSESSMENT I Sample Paper**  
**CLASS XI**  
**PHYSICS**

**TIME:3 HRS**

**DATE:**

**MAX MARKS:70**

**NO.OF PAGES:3**

*General Instructions:*

- All questions are compulsory. There are 26 questions in total.*
- This question paper has five sections: Section A, Section B, Section C, Section D and Section E.*
- Section A : Questions 1 to 5 carry one mark each, Section B : questions 6 to 10 carry two marks each, Section C : questions 11 to 22 carry three marks each, Section D : question 23 is a value based question carrying four marks and Section E :questions 24 to 26 carry five marks each.*

*-There is no overall choice. However, an internal choice has been provided in one of the two mark questions one question of three marks and all the three questions of five marks. You have to attempt only one of the given choices in such questions.*

*-Use of calculators is not permitted.*

### **SECTION-A**

1. Name the mediating particle in gravitational force.
2. A new unit of length is chosen such that the speed of light in vacuum is unity. What is the distance between the sun and the earth in terms of the new unit if light takes 8min and 20 s to cover this distance?
3. Which is the most accurate atomic clock?
4. Name two commonly used units to express wavelength of light?
5. A particle revolves uniformly along a circle (on a smooth horizontal table) by means of a string connected to it. Does angular momentum of the particle change from its initial value if the string is cut suddenly? If yes or no, give reason.

### **SECTION-B**

6. Define limiting friction. Why are rockets given conical shape?(give 3 points)
7. State the law of conservation of linear momentum.
8. What is the need of banking of roads?
9. Two masses A and B of 10kg and 5kg respectively are connected with a string passing over a frictionless pulley fixed at the corner of a table as shown in the figure. The coefficient of friction of A with the table is 0.2. find the minimum mass of C that may be placed on A to prevent it from moving.

10. A machine gun has a mass of 10kg. It fires 30g bullets at a rate of 6 bullets per sec with a speed of 400m/s. What force in newton must be applied to the gun to keep it in position?

**Or**

Define torque and give its vector relationship with force.

### **SECTION-C**

11. What is inertia? Discuss its types giving one example each.
12. State Newton's second law of motion. Derive the law of conservation of linear momentum from it.
13. Describe any three methods of reducing friction.
14. Derive the relation between linear displacement and angular displacement.
15. (a)Find the scalar &vector product of two vectors  $A=3i-4j+5k$  &  $B=-2i+j+3k$ .

- (b) Find the work done in moving a particle along a vector  $s=4i-j+7k$  if the applied force is  $F=i+2j-k$  where  $s$  is in metres &  $F$  in Newton.
16. (a) Rain is falling vertically with a speed of 35m/s. Wind starts blowing after sometime with a speed of 12m/s in east to west direction. In which direction should a boy waiting at the bus stand hold his umbrella?
- (b) a motorboat is racing towards north at 25km/hr and the water current in that region is 10km/hr in the direction of  $60^\circ$  east of south. Find the magnitude of resultant velocity of the boat.
17. Discuss the motion of the centre of mass of  $n$ -particles.
18. Derive the rotational kinematic equations.
19. State the principle of homogeneity of dimensions. Test the dimensional homogeneity of the equations (a)  $h = h_0 + ut + \frac{1}{2}gt^2$  (b)  $v = u + at$ .
20. An aircraft executes a horizontal loop of radius 1km with a steady speed of 900km/hr. Compare its centripetal acceleration with the acceleration due to gravity.
21. Define work, power and energy. Derive an expression for kinetic energy of a mass  $m$ , moving with a velocity  $v$ .
22. State the parallelogram law of vectors. Determine the magnitude and direction of the resultant vector analytically.

**Or**

At what angle the two forces  $(P+Q)$  and  $(P-Q)$  act so that the resultant is  $\sqrt{3P^2 + Q^2}$ .

#### **SECTION-D**

- 23. Suresh noticed a big Granite rock in his locality. He thought that if they worked upon it they could earn money. He took permission from the government, completed all the formalities. He broke the rock using a bomb. The rock was made into slices. They established a Granite industry. Many of the people in the surroundings started to earn and live comfortably.**

**Answer the following question based on the above information:**

- (a) What values of Suresh impress you?**
- (b) A bomb is thrown in a horizontal direction with a velocity of 50m/s. It explodes into two parts of masses 6kg and 3kg. The heavier fragment continues to move in the horizontal direction with a velocity of 80m/s. Calculate the velocity of lighter fragment.**

**(2+2)**

#### **SECTION-E**

24. What are conservation laws? State each conservation law.

**Or**

State Newton's laws of motion. Illustrate each one with example. Also the consequences of second law.

25. A planet moves around the sun in nearly circular orbit. Its period of revolution  $T$  depends on radius  $r$  of the orbit, mass  $M$  of the sun & gravitational constant  $G$ . Show that  $T^2 \propto r^3$ .

**Or**

What do you understand by gravitational potential energy? Obtain an expression for it. Also deduce an expression for potential energy stored in a spring.

26. What is a projectile? Derive the expression for the trajectory, time of flight, maximum height & horizontal range for a projectile thrown upwards, making angle  $\theta$  with the horizontal direction.

**Or**

Differentiate elastic and inelastic collisions. Obtain the expressions for final velocities for perfectly elastic collision in one dimension.

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**DELHI PUBLIC SCHOOL, BAHADURGARH**  
**SUMMATIVE ASSESSMENT I**  
**CLASS XI (SET II)**  
**PHYSICS**

**TIME:3 HRS**

**MAX MARKS:70**

**DATE:**

**NO.OF PAGES:3**

*General Instructions:*

- All questions are compulsory. There are 26 questions in total.*
- This question paper has five sections: Section A, Section B, Section C, Section D and Section E.*
- Section A : Questions 1 to 5 carry one mark each, Section B : questions 6 to 10 carry two marks each, Section C : questions 11 to 22 carry three marks each, Section D : question 23 is a value based question carrying four marks and Section E :questions 24 to 26 carry five marks each.*
- There is no overall choice. However, an internal choice has been provided in one of the two mark questions one question of three marks and all the three questions of five marks. You have to attempt only one of the given choices in such questions.*
- Use of calculators is not permitted.*

**SECTION-A**

- 27. Name the mediating particle in electromagnetic force.
- 28. Name two physical quantities with same dimensional formula.
- 29. Which fundamental force is the strongest?
- 30. Give the dimensions of time period and planck's constant.
- 31. The cap of a pen can be easily opened with the help of two fingers than with one finger. Why?

**SECTION-B**

- 32. Define centre of mass. Obtain an expression for it.
- 33. State the law of conservation of angular momentum.
- 34. Give any two limitations of dimensional analysis.

35. Three equal weights A,B and C of mass  $m$  each are hanging on a string over a fixed pulley as shown in the figure. What are the tensions in the string connecting weights A to B and B to C?

36. One of the rectangular components of velocity of 80km/hr is 40km/hr. Find the other component.

**Or**

Define moment of inertia. Derive a relation connecting torque and angular momentum.

### **SECTION-C**

37. Define impulse. Derive a relation connecting impulse and change in linear momentum.

38. What are conservative and non-conservative forces? Give 2 examples each.

39. Describe any three methods of increasing friction.

40. Derive the relation between linear velocity and angular velocity.

41. (a) Find the scalar & vector product of two vectors  $A=i-6j+2k$  &  $B=-3i+2j+3k$ .

(b) Find the work done in moving a particle along a vector  $s=4i-3j+7k$  if the applied force is  $F=5i+2j-2k$  where  $s$  is in metres &  $F$  in Newton.

42. We measure the period of oscillation of a simple pendulum. In successive measurements, the readings turn out to be 2.63s, 2.56s, 2.42s, 2.71s, and 2.80s. calculate the absolute errors, relative error and percentage error.

43. What do you understand by a rigid body? Prove the two conditions for a rigid body.

44. Derive the expression for kinetic energy of rotation.

45. A truck starts from rest and accelerates uniformly at  $2m/s^2$ . At  $t=10s$ , a stone is dropped by a person standing on the top of the truck (6m high from the ground). What are the (a) velocity (b) acceleration of the stone at  $t=11s$ . (neglect air resistance)

46. A cyclist goes round a circular track of 440m length in 20s. Find the angle that his cycle makes with the vertical.

47. State and prove work-energy theorem.

48. State the triangle law of vectors. Determine the magnitude and direction of the resultant vector analytically.

**Or**

Show that the given vectors are parallel to each other.

$A=2i-3j+4k$  and  $B=-6i+9j-12k$

### **SECTION-D**

49. Suraj went to Big Bazaar to purchase certain goods. There he noticed an old lady struggling with her shopping. Immediately he showed her the lift and explained her how it carries the load from one floor to the next. Even then the lady was not convinced. Then Suraj took her in the lift and showed her how to operate it. The old lady was ver happy.

Answer the following question based on the above information:

(a) What values does suraj possess?

(b) An elevator can carry a maximum load of 1800kg is moving up with constant speed of 2m/s. The frictional force opposing the motion is 4000N. Determine the minimum power delivered by the motor to the elevator in watts.

(2+2)

### SECTION-E

50. Compare gravitational and electromagnetic forces in detail.

**Or**

State law of conservation of mechanical energy. Prove it for a freely falling body.

51. State the laws of limiting friction. Also define kinetic friction, static friction and rolling friction.

**Or**

What do understand by banking of roads? Obtain an expression for the velocity with which a vehicle negotiates.

52. Derive the equations of motion for linear motion by the method of calculus.

**Or**

State law of conservation of angular momentum and prove it. Prove that the centre of mass moves with a uniform velocity.

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**DELHI PUBLIC SCHOOL, BAHADURGARH**  
**S A II EXAMINATION    Sample Paper**  
**PHYSICS**  
**CLASS-XI**

**Date-**

**Duration:3hours**

**SET: 1**

*General Instructions:-*

- *All questions are compulsory.*
- *There are 30 questions in total. Questions 1 to 8 carry one mark each, Questions 9 to 18 carry 2 marks each, Questions 19 to 27 carry 3 marks each and questions 28 to 30 carry 5 marks each.*

- *Use of calculators are not permitted.*
- *There is no overall choice. However, an internal choice has been provided in all three questions of five marks each. You have to attempt only one of the given choices in such questions.*

1. What is oscillatory motion?
2. What is the nature of light waves?
3. Give the expression for work done in an isothermal process.
4. Draw the position-time graph of a stationary object.
5. Give the dimensional formulae of kinetic energy and strain.
6. Define torque.
7. An impulsive force of 100N acts on a body for 1s. What is the change in its linear momentum?
8. Define universal gravitational constant.
9. State the laws of limiting friction.
10. What are conservative forces? Give two examples.
11. Differentiate between uniform and non-uniform motion with examples.
12. What do you understand by an irreversible process?
13. What do you understand by the concept of relative velocity?
14. State the law of conservation of angular momentum.
15. What are geo-stationary satellites? Give any two uses.
16. Show that the angle between  $\vec{A} = \hat{i} - 5\hat{j}$  and  $\vec{B} = 2\hat{i} - 10\hat{j}$  is zero.
17. How are we able to break a wire by repeated bendings?
18. State first law of thermodynamics and express its mathematical statement.
19. Derive the expression for centre of mass of a two particle system.
20. Explain the principle and working of hydraulic lift.
21. Derive the expression for work done in an adiabatic process.
22. A particle executes SHM in a straight line path. The amplitude of the particle is 3cm. when the displacement from the mean position is 1cm, the magnitude of acceleration is equal to that of its velocity. Find the time period.
23. Calculate the efficiency of a heat engine working with source and sink at temperatures 127°C and 27°C respectively.
24. State and prove work-energy theorem.
25. Derive the expression for time period of a simple pendulum.
26. State and prove Kepler's second law of planetary motion.
27. Distinguish between transverse and longitudinal waves. Give two examples each.
28. What is projectile motion? Derive the expressions for maximum height, horizontal range and time of flight.

OR

What is a carnot engine? Explain carnot's cycle with help of suitable P-V diagram and deduce the expression for its efficiency.

29. Show that the total energy of a particle executing SHM remains constant. Give the graphical representation of energy vs displacement.

OR

State and prove Bernoulli's theorem. Give any two applications.

30. What do you mean by streamline flow? Derive the equation of continuity for steady flow of an incompressible fluid.

OR

State Hooke's law. Define the terms stress and strain. Draw and describe the stress vs strain graph for a metallic wire, when stretched upto a breaking point.

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