☆☆☆ | Roll No ___ to be filled in by the candidate | HSSC-(P-I)-A/2023 | Paper Code | 6 | 4 | 7 | 6

Physics (Objective) **(For All Sessions)** (Group-II) **Time: 20 Minutes** **Marks : 17**

Note: Write Answers to the Questions on the objective answer sheet provided. Four possible answers A, B, C and D to each question are given. Which answer you consider correct, fill the corresponding circle A, B, C or D given in front of each question with Marker or Pen ink on the answer sheet provided.

1.1. The example of mechanical waves is: Rwp-11-2-23

(A) Water waves (B) Radio waves (C) Infrared waves (D) Ultraviolet waves

2. Sound waves cannot travel through:

(A) Water (B) Air (C) Material medium (D) Vacuum

3. Light is polarized by using:

(A) Sodium chloride (B) Optical fiber (C) Dichroic substance (D) Plane glass

4. It becomes possible to send light to inaccessible place due to:

(A) Coaxial cable (B) Optical fiber (C) Copper wire (D) Glass wire

5. When hot and cold water are mixed, the entropy:

(A) Decreases (B) Increases (C) Remains constant (D) Is zero

6. Force acting on the piston to move outward is:

(A) Intake stroke (B) Compressive stroke (C) Power stroke (D) Exhaust stroke

7. The number of significant figures in 0.00232 is :

(A) 3 (B) 4 (C) 5 (D) 6

8. Number of colours used in process of colour printing to produce the entire range of colours are:

(A) 7 (B) 6 (C) 5 (D) 4

9. If $Ax = Ay$, then the angle between $\vec{A}$ and $x - axis$ is:

(A) $30°$ (B) $45°$ (C) $60°$ (D) $90°$

10. If $\vec{A}$ has components Ax and Ay, the magnitude of Ax is given by:

(A) $A - Ay$ (B) $(A - Ay)^{-\frac{1}{2}}$ (C) $(A - Ay)^{\frac{1}{2}}$ (D) $(A^2 - Ay^2)^{\frac{1}{2}}$

11. When average velocity becomes equal to instantaneous velocity then body is said to be called moving with:

(A) Instantaneous acceleration (B) Variable acceleration (C) Uniform velocity (D) Variable velocity

12. The velocity time graph is parallel to the time axis, the acceleration of the moving body is:

(A) Positive (B) Negative (C) Maximum (D) Zero

13. A body of mass 2kg moving with velocity $4ms^{-1}$ has K.E equal to:

(A) 16 J (B) 8 J (C) 2 J (D) 32 J

14. Apparent weight of an object in a lift moving down with acceleration $a = g$ is:

(A) $W + ma$ (B) Zero (C) W (D) Infinity

15. If radius of earth is increased four times of the present, critical velocity V_o becomes:

(A) $V_o/\sqrt{2}$ (B) $\sqrt{2}\,V_o$ (C) $2V_o$ (D) $V_o/2$

16. Venturimeter is a device used to measure:

(A) Density of fluid (B) Speed of fluid (C) Pressure of fluid (D) Viscosity of fluid

17. By increasing the mass of the object four times attached to a spring. Time period will become:

(A) Same (B) Twice (C) Three times (D) Four times

Roll No _____ to be filled in by the candidate

NSSC-(I-II)-A/2023

Marks : 68

(For All Sessions)

GROUP-II

Time: 2:40 hours

Physics (Subjective)

RWP-11-2-23

SECTION-I

2. **Write short answers of any eight parts from the following:** (8x2=16)

i. What are the dimensions and units of gravitational constant 'G' in the formula $F = G\frac{m_1 m_2}{r^2}$

ii. How many years are in 1 second? iii. Define light year. What are units and dimensions of light year?

iv. Show that $S = V_i t + \frac{1}{2}at^2$ is dimensionally correct.

v. Write down the steps for addition of vectors by rectangular component method.

vi. Is it possible to add a vector quantity to a scalar quantity? Explain.

vii. Can a body rotate about its center of gravity under the action of its weight?

viii. An object is thrown vertically upward. Discuss the sign of acceleration due to gravity, relative to velocity, while the object is in air.

ix. At what point or points in its path does a projectile has its minimum speed, its maximum speed?

x. A rubber ball and lead ball of same size are moving with same velocity. Which ball has great momentum and why?

xi. Show that $\vec{I} = \Delta\vec{P}$ xii. Why fog droplets appear to be suspended in air?

3. **Write short answers of any eight parts from the following:** (8x2=16)

i. Calculate the work done in kilo joules in lifting a mass of 10 kg (at a steady velocity) through a vertical height of 10m.

ii. A girl drops a cup from a certain height, which breaks into pieces. What energy changes are involved?

iii. Describe the negative work with an example? iv. What is meant by moment of inertia? Explain its significance.

v. When mud flies off the tyre of a moving bicycle, in what direction does it fly?

vi. If a person is falling in an elevator freely. What will be his weight? Measured by himself.

vii. Does frequency depend on amplitude for harmonic oscillators?

viii. Describe two common phenomena in which resonance plays an important role.

ix. How long must a simple pendulum be in order to have a period of one second?

x. How are beats useful in tuning musical instruments? xi. Explain the term trough and node.

xii. What happens when a pebble is dropped into a quiet pond?

4. **Write short answers of any six parts from the following:** (6x2=12)

i. An oil film spreading over a wet footpath shows colour. Explain how does it happen?

ii. How would you manage to get more orders of spectra using a diffraction grating?

iii. How coherent light beams can be produced? Explain.

iv. Why would it be advantageous to use blue light with a compound microscope?

v. What do you mean by length of telescope?

vi. Explain the average velocity of the molecules in a gas is zero but the average of the square of velocities is not zero?

vii. Give an example of a process in which no heat is transferred to or from the system but the temperature of the system changes.

viii. Does entropy of a system increases or decreases due to heat engine? ix. Define the 2nd law of thermodynamics.

SECTION-II

Note **Attempt any three questions. Each question carries equal marks:** (8x3=24)

5. (a) Discuss the inter-conversion of potential energy and kinetic energy for falling object when friction force is not considered.

(b) Find the angle between two forces of equal magnitude when the magnitude of their resultant is also equal to the magnitude of either of these forces.

6. (a) What is meant by artificial gravity? Prove that $f = \frac{1}{2\pi}\sqrt{\frac{g}{R}}$

(b) A ball is thrown with a speed of $30ms^{-1}$ in a direction 30° above the horizon. Determine the height to which it rises and time of flight.

7. (a) Show that the product of cross sectional area of the pipe and fluid speed at any point along the pipe is constant.

(b) 336J of energy is required to melt 1g of ice at 0°C. What is change in entropy of 30g of water as it is changed to ice at 0°C by a refrigerator?

8. (a) Why simple pendulum is called simple? Also derive the relation for time period and discuss how the time period depends upon length and gravity.

(b) Find the temperature at which the velocity of sound in air is two times its velocity at 10°C.

9. (a) What is simple microscope? Calculate its magnifying power.

(b) Sodium light ($\lambda = 589nm$) is incident normally on a grating having 3000 lines per centimeter. What is the highest order of the spectrum obtained with this grating?