Roll No. of Candidate . _____

PHYSICS **Intermediate Part-I , Class 11th (1stA 324- IV)** **Paper: I** **Group – I**

Time: 20 Minutes **OBJECTIVE** **Code : 6477** **Marks: 17**

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question.

1. 1 - A 2 Kg mass is placed on the floor of an elevator which is moving downward with 4.9 m/s^2 acceleration, the reaction of floor on the mass is
(A) 9.8 N ● (B) 0 N (C) 4.9 N (D) 14.7 N

2 - Which pair of angles gives same range of projectile thrown with velocity v_i
(A) $(20^\circ, 60^\circ)$ (B) $(20^\circ, 40^\circ)$ (C) $(30^\circ, 60^\circ)$ ● (D) $(30^\circ, 70^\circ)$

3 - For circular motion with constant speed v, ω and r are at
(A) 90° with each other ● (B) 120° with each other
(C) 60° with each other (D) 30° with each other

4 - Which of the following is correct
(A) in irreversible process entropy remains constant
(B) in reversible process entropy increases
(C) in reversible process entropy remains constant ●
(D) in irreversible process entropy decreases

5 - To observe one hundred fringes in Michelson's interferometer, the distance travelled by moveable mirror will be minimum in case of _____ light.
(A) Red ● (B) Green (C) Blue (D) Yellow

6 - A body in SHM with amplitude x_0 goes from mean position to $\frac{x_0}{2}$. Its phase is
(A) 30° ● (B) 45° (C) 60° (D) 90°

7 - $\hat{i} \cdot (\hat{j} \times \hat{k}) =$ _____
(A) 0 (B) 1 ● (C) $\hat{i}$ (D) $\hat{j}$

8 - Two masses 2 Kg and 3 Kg are moving towards each other with velocity 3 m/s and 2 m/s. The total momentum of the system is
(A) 12 Ns (B) 0 Ns ● (C) 13 Ns (D) –12 Ns

9 - Mass is a highly concentrated form of _____.
(A) Momentum (B) Inertia ● (C) Energy (D) Acceleration

10 - A spectrometer is not used to
(A) study spectrum of light (B) measure refractive index of material of prism ●
(C) study polarization of light (D) measure wavelength of light

11 - If frequency of stationary waves are increased to higher harmonic which of the following decreases
(A) speed (B) wavelength ● (C) tension in the string (D) density of string

12 - Which is renewable source of energy
(A) Biomass ● (B) Coal (C) Oil (D) Uranium

13 - Heat is transferred slowly to a gas in a cylinder, the piston is pushed up through 4.0 cm at constant pressure of 8000 Nm^{-2}. If cross-sectional area of the piston is 0.10 m^2 , work done by the gas is
(A) 32 j (B) 64 j (C) 16 j ● (D) 96 j

14 - The complete requirement for a body to be in equilibrium are
(A) $\sum \vec{F} = 0$ (B) $\sum \vec{F}_x = 0$ (C) $\sum \tau = 0$ (D) $\sum \vec{F} = 0$ and $\sum \tau = 0$ ●

15 - If the percentage uncertainty in the radius of a sphere is 3%, then percentage uncertainty in its area is
(A) 3% (B) 6% ● (C) 9% (D) 4%

16 - Two points in a wave $\frac{\lambda}{4}$ distance apart have phase difference
(A) π (B) π/2 (C) π/3 (D) 2π ●

17 - Bernoulli's equation relates to
(A) pressure, speed and height ● (B) pressure, force and height
(C) force, speed and pressure (D) force, height and speed

PHYSICS **Intermediate Part-I , Class 11th (1stA 324)** **Paper : I Group – I**

Time: 2:40 Hours **SUBJECTIVE** **Marks: 68**

Note: Section I is compulsory. Attempt any THREE (3) questions from Section II.

SECTION – I

2. Write short answers to any EIGHT questions. **(2 x 8 = 16)**

i. What are significant figures? What is rule when first digit dropped is less than 5 while rounding off the data?
ii. What is absolute uncertainty? What is its value?
iii. Why do we find it useful to have two units for the amount of substance, the kilogram and the mole?
iv. Give the drawbacks to use the period of a pendulum as a time standard?
v. Can a vector have a component greater than the vector's magnitude? Explain.
vi. If $\vec{A}+\vec{B}=\vec{O}$, what can you say about the components of the two vectors?
vii. What is position vector? Explain briefly.
viii. Discuss and draw the velocity time graph when car moves with constant acceleration?
ix. Explain the circumstances in which velocity $\vec{v}$ and acceleration $\vec{a}$ are
(i) perpendicular to each other (ii) anti-parallel
x. What will happen when a light body collides with a massive body at rest in an elastic collision?
xi. A 70 kg man runs up a long flight of stairs in 4.0 s. The vertical height of the stairs is 10 m. Calculate his power output in watts.
xii. Calculate the work done in kilo joules in lifting a mass of 10 kg (at a steady velocity) through a vertical height of 10 m.

3. Write short answers to any EIGHT questions. **(2 x 8 = 16)**

i. If a lift is falling freely under gravity, how weightlessness is produced. Use mathematical equations to support your answer.
ii. How do you create a gravity free system?
iii. What is meant by centripetal force and why it must be furnished to an object, if the object is to follow a circular path?
iv. What is meant by moment of inertia with its physical significance? Use equations to support your answer.
v. How Bernoulli's equation is reduced? When
a) height difference is negligible b) velocity is constant.
vi. What do you understand by the term viscosity? Also give its unit.
vii. Define damping process. Use a graph to support your answer.
viii. If a mass spring system is hung vertically and set into oscillations, why does the motion eventually stop?
ix. Explain the relation between total energy, potential energy and kinetic energy of a body oscillating with S.H.M
x. How Doppler Effect is used to monitor blood flow? Use diagrammatic explanation to support your answer.
xi. Explain why sound travels faster in warm air than in cold air?
xii. How are beats useful in tuning musical instrument?

4. Write short answers to any SIX questions. **(2 x 6 = 12)**

i. Under what conditions two or more sources of light behave as coherent sources?
ii. What are the conditions for detectable interference?
iii. 10000 lines per centimeter has been ruled on diffraction grating. Find its grating element.
iv. Why would it be advantageous to use blue light with a compound microscope?
v. Why is meant by " least distance of distinct vision "?

vi. Find magnifying power of convex lens of 25 cm focal length acts as a magnifying glass.
vii. Does entropy of a system increase or decrease due to friction?
viii. Is it possible to construct a heat engine that will not expel heat into the atmosphere?
ix. Derive Charles' law from Kinetic theory of gases

SECTION – II

5. (a) Does the inertia depend on the momentum of a body? Give its reason. Also state and explain the law of conservation of linear momentum. (5)
   (b) Show that the three vectors $\hat{i}+\hat{j}+\hat{k}$, $2\hat{i}-3\hat{j}+\hat{k}$ and $4\hat{i}+\hat{j}-5\hat{k}$ are mutually perpendicular. (3)

6. (a) Stationary waves are also called standing waves, why? Discuss stationary waves in air column of an open organ pipe. (5)
   (b) How large a force is required to accelerate an electron ($m = 9.1 \times 10^{-31}$kg) from rest to a speed of $2 \times 10^{7} ms^{-1}$ through a distance of 5cm? (3)

7. (a) How does a space satellite acquire an artificial gravity? (5)
   (b) A block weighing 4.0 Kg extends a spring by 0.16 m from its unstretched position. If the block is removed and 0.50 kg body is hung from same spring, now what is its period of vibration? (3)

8. (a) Explain four stroke petrol engine in detail. What is the efficiency of a diesel engine? (5)
   (b) Water flows through a hose, whose internal diameter is 1cm at a speed of 1 ms^{-1}. What should be the diameter of the nozzle if the water is to emerge at 21ms^{-1}? (3)

9. (a) What is meant by diffraction of light? Also discuss the diffraction of light through a narrow slit. (5)
   (b) An astronomical telescope having magnifying power of 5 consists of two thin lenses 24 cm apart. Find the focal lengths of the lenses. (3)

Roll No. of Candidate : _____

PHYSICS **Intermediate Part-I , Class 11th (1stA 324- IV)** **Paper : I** **Group – II**

Time: 20 Minutes **OBJECTIVE** **Code : 6478** **Marks: 17**

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question.

1. 1 - In angular motion, the centripetal force is
(A) $mr^2\omega^2$ (B) $m^2r^2\omega$ (C) $mr^2\omega$ (D) $mr\omega^2$ ●

2 - If temperature of sink increases, the efficiency of Carnot Engine
(A) decreases ● (B) increases
(C) remains the same (D) first increases then decreases

3 - The detector in photo-phone is made up of
(A) Germanium (B) Selenium ● (C) Cadmium (D) Silicon

4 - The dimensions of the relation $\sqrt{\frac{F \times \ell}{m}}$ are equal to the dimensions of
(A) Force (B) Impulse (C) Momentum (D) Velocity ●

5 - Dot product of force and velocity is
(A) Work (B) Momentum (C) Power ● (D) Impulse

6 - In reversible process the entropy of system
(A) increases (B) decreases (C) remains constant ● (D) becomes zero

7 - Newton rings are formed due to
(A) diffraction (B) reflection (C) refraction (D) interference ●

8 - The maximum drag force on falling sphere is 9.8 N, its weight is
(A) 9.8 N ● (B) 19.8 N (C) 4.9 N (D) 49 N

9 - Distance covered by a body in one vibration is 20 cm. The amplitude of vibration will be
(A) 5 cm ● (B) 10 cm (C) 15 cm (D) 20 cm

10 - Torque is the rotational analogous of
(A) Momentum (B) Impulse (C) Force ● (D) Power

11 - In which quadrant, vector $3\hat{i} - 5\hat{j}$ lies?
(A) 1st (B) 2nd (C) 3rd (D) 4th ●

12 - A fighter plane is chasing another plane, when it opens fire, its speed
(A) increases (B) decreases ●
(C) remains constant (D) first increases then decreases

13 - 2 revolutions are equal to
(A) $\frac{\pi}{2}$ rad (B) π rad (C) 2π rad (D) 4π rad ●

14 - Speed of sound is independent of
(A) density (B) temperature (C) elasticity (D) pressure ●

15 - The unit of work in base units is
(A) kg ms^2 (B) kg m^2s^{-2} ● (C) kg $m^{-2}s^2$ (D) kg m^2s^2

16 - Star moving towards the earth shows
(A) red shift (B) blue shift ● (C) yellow shift (D) green shift

17 - The distance covered by free falling body in 2 seconds is
(A) 9.8 m (B) 19.6 m ● (C) 4.9 m (D) 49 m

PHYSICS **Intermediate Part-I , Class 11th (1stA 324)** **Paper : I Group – II**

Time: 2:40 Hours **SUBJECTIVE** **Marks: 68**

Note: Section I is compulsory. Attempt any THREE (3) questions from Section II.

SECTION – I

2. Write short answers to any EIGHT questions. **(2 x 8 = 16)**

i. The period of pendulum is measured by a stop watch. What types of errors are possible in the time standard?
ii. Does a dimensional analysis give any information on constant of proportionality that may appear in algebraic expressions? Explain.
iii. Differentiate between precision and accuracy.
iv. How many seconds are there in one year? Explain.
v. Can a vector have a component greater than the vector's magnitude?
vi. A force of 10 N makes an angle of 60° with x-axis. Find its x and y components.
vii. Give two factors on which turning effect depends.
viii. Explain the circumstances in which velocity $\vec{v}$ and acceleration $\vec{a}$ are perpendicular to one another.
ix. A rubber ball and a lead ball of same size are moving with same velocity. Which ball has greater momentum and why?
x. How will you differentiate between uniform and variable velocity?
xi. An object has 1 J of potential energy. Explain.
xii. What is escape velocity? Write the formula of escape velocity.

3. Write short answers to any EIGHT questions. **(2 x 8 = 16)**

i. A disc and a hoop start moving down from the top of an inclined plane at the same time. Which one will be moving faster on reaching the bottom?
ii. Why centripetal force is required to keep a body moving on a circular track?
iii. State the direction of the following vectors in simple situations: angular momentum and angular velocity
iv. What does (INTELSAT) stand for?
v. Explain the term viscosity.
vi. What is difference between laminar flow and turbulent flow?
vii. Does frequency depend on amplitude for harmonic oscillator?
viii. Differentiate between undamped and damped oscillations with the help of a graph between amplitude and time.
ix. Name two characteristics of simple harmonic oscillator.
x. As a result of a distant explosion, an observer senses a ground tremor and then hears the explosion. Explain the time difference.
xi. How are beats useful in tuning musical instruments?
xii. How bats navigate their food?

4. Write short answers to any SIX questions. **(2 x 6 = 12)**

i. An oil film spreading over a wet footpath shows colours. Explain.
ii. How will you differentiate between interference and diffraction of light waves?
iii. 20000 lines per centimeter has been ruled on a diffraction grating. Find its grating element.
iv. How the power is lost in optical fibre through dispersion? Explain.
v. Why would it be advantageous to use blue light with a compound microscope?
vi. Find magnifying power of convex lens of 15 cm focal length acts as a magnifying glass.
vii. Specific heat of a gas at constant pressure is greater than specific heat at constant volume. Why?
viii. Why is the average velocity of the molecules in a gas zero but the average of the square of velocities is not zero?
ix. State Second Law of Thermodynamics in terms of entropy.

(Turn Over)

SECTION – II

5. (a) What is an isolated system? State and explain law of conservation of linear momentum. (5)
   (b) Given that $\vec{A} = \hat{i} - 2\hat{j} + 3\hat{k}$ and $\vec{B} = 3\hat{i} - 4\hat{k}$, find the projection of $\vec{A}$ and $\vec{B}$ (3)

6. (a) Discuss the interconversion of potential and kinetic energy when frictional force is not considered. (5)
   (b) The wavelength of the signals from a radio transmitter is 1500 m and the frequency is 200 KHz. What is wavelength for a transmitter operating at 1000 KHz and with what speed the radio waves travel? (3)

7. (a) What is meant by real and apparent weight? Develop a relation between real and apparent weight (in case of an elevator). (5)
   (b) What should be length of a simple pendulum whose period is 1.0 second at a place where $g = 9.8\ ms^{-2}$ (3)

8. (a) Derive Bernoulli's Equation for an ideal fluid. (5)
   (b) 336 J of energy is required to melt 1 g of ice at 0°C. What is the change in entropy of 30 g of water at 0°C as it is changed to ice at 0°C by a refrigerator? (3)

9. (a) What is Michelson's interferometer? Explain its working and derive its equation. (5)
   (b) A glass light pipe in air will totally internally reflect a light ray if its angle of incidence is at least 39°. What is the minimum angle for total internal reflection if pipe is in water (Refractive index of water = 1.33) (3)

Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2020 – 2022 to 2023 – 2025)**

PHYSICS 224-1st Annual-(INTER PART – I) Time Allowed : 20 Minutes

Q.PAPER – I (Objective Type) GROUP – I Maximum Marks : 17

PAPER CODE = 6475

Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1-1	Two S.H.M having displacements are $x_1 = a\sin\omega t$ and $x_2 = b\cos\omega t$. The path difference between them will be : (A) Zero (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{2}$ (D) π
2	A particle of 1 Kg moving with initial velocity $5\,ms^{-1}$ is acting upon by a constant force 10N. After 5 seconds its velocity becomes : (A) $50\,ms^{-1}$ (B) $55\,ms^{-1}$ (C) $5\,ms^{-1}$ (D) $10\,ms^{-1}$
3	Dolphins detect small differences in the shape, size and thickness of objects through : (A) Beats (B) Radio waves (C) Echolocation (D) Both A and B
4	The ratio of dimensions of torque to angular momentum is : (A) I : T (B) M : T (C) T : I (D) L : T
5	Potential energy associated to the molecules of an ideal gas is considered to be : (A) 100 J (B) Low (C) Zero (D) High
6	A particle moves in a circle of radius r. In half the period of revolution, its displacement and distance covered are : (A) $2r, \pi r$ (B) $2r, 2\pi r$ (C) $\sqrt{2}r, \pi r$ (D) $r, \pi r$
7	The magnitude of $-\hat{i}.(\hat{k}\times\hat{j})$ is equal to (A) 0 (B) $-2\hat{i}$ (C) 1 (D) $2\hat{i}$
8	The percentage uncertainty in mass and radius of earth is 2% and 5% respectively. The total percentage uncertainty in the volume of earth is : (A) 7% (B) 15% (C) 9% (D) 2%
9	The frequency of heart of normal human being is : (A) 1.2 Hz (B) 0.83 Hz (C) 72 Hz (D) 2 Hz
10	The magnifying power of a magnifying glass is 3. Its focal length will be : (A) 15 cm (B) 20 cm (C) 8.3 cm (D) 12.5 cm
11	A flywheel gains an angular speed of 540 rev / min in 9 second. Its angular acceleration is : (A) $9\,\pi$ rad s^{-2} (B) $6\,\pi$ rad s^{-2} (C) $12\,\pi$ rad s^{-2} (D) $2\,\pi$ rad s^{-2}
12	The horizontal range of a projectile is : (A) Equal to height at 30° (B) Double of height at 45° (C) One fourth of the height at 90° (D) Four times of height at 45°
13	The efficiency of diesel engine is : (A) 25% to 35% (B) 35% to 40 % (C) 45% to 50% (D) 20% to 25%
14	A mass is lifted to a height in 10 seconds. Now if the same mass is lifted to the same height in 20 seconds then work done in two cases are in the ratio : (A) 1 : 2 (B) 2 : 1 (C) 1 : 1 (D) 4 : 1
15	Which of the vector can not be represented on graph : (A) Unit vector (B) Position vector (C) Negative vector (D) Null vector
16	Energy cannot flow away in the : (A) Transverse waves (B) Stationary waves (C) Longitudinal waves (D) Sound waves
17	The direction in which light energy is carried called a : (A) Ray (B) Wave front (C) Locus (D) Spherical wave

No _____ (To be filled in by the candidate) **(Academic Sessions 2020 – 2022 to 2023 – 2025)**

PHYSICS 224-1st Annual-(INTER PART – I) Time Allowed : 2.40 hours

PAPER – I (Essay Type) GROUP – I Maximum Marks : 68

SECTION – I

2. Write short answers to any EIGHT (8) questions : 16

(i) Write down dimensions of : (a) Pressure. (b) Density.

(ii) Does a dimensional analysis give any information on constant of proportionality that may appear in an algebraic expression?

(iii) Name two major types of errors.

(iv) Write down factors of prefixes atto and tera.

(v) Can magnitude of a vector have a negative value?

(vi) If $\overline{A} - \overline{B} = \overline{O}$, what can you say about the components of the two vectors?

(vii) Can you add zero to a null vector?

(viii) Motion with constant velocity is a special case of motion with constant acceleration. Is this statement true? Discuss.

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

(x) How impulse is equal to change in momentum?

(xi) An object has 1J of potential energy. Explain what does it mean?

(xii) Prove that $P = \overline{F} . \overline{v}$ where P , $\overline{F}$ and $\overline{v}$ are power, force and velocity.

3. Write short answers to any EIGHT (8) questions : 16

(i) A wheel covers 200 m distance between two points. If its radius is 0.2 m, find the number of revolution completed by the wheel.

(ii) Describe what should be the minimum velocity for a satellite, to orbit close to the earth around it.

(iii) State the direction of the following vectors in simple situations, angular momentum and angular velocity.

(iv) When mud flies off the tyre of a moving bicycle, in what direction does it fly? Explain.

(v) A person is standing near a fast moving train. Is there any danger that he will fall towards it?

(vi) Explain the working of a carburetor of a motorcar using Bernoulli's principle.

(vii) Time period of a simple pendulum is 2.0 s and amplitude 20 cm, find its maximum speed.

(viii) What are the conditions of constructive and destructive interference of two sound waves from coherent sources?

(ix) Can we realize an ideal simple pendulum?

(x) What is the total distance travelled by an object moving with SHM in a time equal, to its period, if its amplitude is A?

(xi) Explain the terms : (i) crest. (ii) antinode.

(xii) Why does sound travel faster in solids than in gases?

(Turn Over)

4. Write short answers to any SIX (6) questions : **12**

(i) Which principle is helpful to determine the shape and location of new wavefront? Explain briefly.

(ii) Explain whether the Young's experiment is an experiment for studying interference or diffraction effects of light.

(iii) What are different methods to get polarized light?

(iv) What is multimode step index fibre? Explain in short.

(v) Draw the ray diagram of compound microscope.

(vi) Describe in short the construction and working of collimator.

(vii) What will be efficiency of an engine if it performs 100 J of work and rejects 400 J of heat energy to the cold reservoir?

(viii) Why the efficiency of real heat engine is always less than one?

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

SECTION – II

Note : Attempt any THREE questions.

5. (a) Find resultant of $\overline{A}$ and $\overline{B}$ using addition of vectors by rectangular components. 5

(b) A football is thrown upward at an angle of 30° with respect to horizontal. To throw a 40 m pass what must be the initial speed of the ball? 3

6. (a) How would you describe the analytical approach of formula of absolute P.E., also derive the formula with diagrammatic explanation. 5

(b) The frequency of the note emitted by a stretched string is 300 Hz. What will be the frequency of this note when the tension is increased by one third without changing the length of the wire? 3

7. (a) Define angular momentum and explain orbital and spin angular momentum. 5

(b) A block of mass 4.0 kg is dropped from height of 0.80 m on to a spring of spring constant k = 1960 Nm^{-1}. Find the maximum distance through which the spring will be compressed? 3

8. (a) Define pressure of gas. Prove that pressure exerted by the gas is directly proportional to the average translational kinetic energy of the gas molecules. 5

(b) How large must a heating duct be if air moving along it can replenish the air in a room of 300 m^3 volume every 15 min.? Assume the air's density remains constant. 3

9. (a) Explain Young's Double slit experiment to study the phenomenon of interference of light. 5

(b) An astronomical telescope having magnifying power of 5 consist of two thin lenses 24 cm apart. Find the focal lengths of the lenses. 3

Lahore Board-G-2-2024

_____ (To be filled in by the candidate) **(Academic Sessions 2020 – 2022 to 2023 – 2025)**

.SICS 224-1st Annual-(INTER PART – I) Time Allowed : 20 Minutes

Q.PAPER – I (Objective Type) GROUP – II Maximum Marks : 17

PAPER CODE = 6474

Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1-1	A body completes five revolutions in a circular path having radius 5 cm, the displacement of the body is :			
	(A) Zero	(B) 10 cm	(C) 0.157 rad	(D) 0.314 rad
2	How many satellites can track your Switch ON mobile phone location globally :			
	(A) 3	(B) 24	(C) 14	(D) 5
3	Longitudinal waves do not exhibit :			
	(A) Refraction	(B) Reflection	(C) Polarization	(D) Diffraction
4	The unit of thermodynamic scale is :			
	(A) Centigrade	(B) Fahrenheit	(C) Joule	(D) Kelvin
5	The dimensions of = $(\frac{v}{v-u_s})\frac{1}{\lambda}$ are :			
	(A) $[T]^{-1}$	(B) $[L]^{-1}$	(C) $[MT^{-1}]$	(D) $[T^{-1}L]$
6	The speed of sound in air at 373 K is :			
	(A) $332\,ms^{-1}$	(B) $300\,ms^{-1}$	(C) $291\,ms^{-1}$	(D) $393\,ms^{-1}$
7	The resultant force of two forces 30 N and 50 N acting on a body in opposite direction is :			
	(A) 80 N	(B) $10\sqrt{34}$ N	(C) 50 N	(D) 20 N
8	When the bob of simple pendulum is at its extreme position, it has :			
	(A) K.E	(B) P.E and K.E	(C) P.E	(D) P.E or K.E
9	At constant temperature, the graph between v and $\frac{1}{p}$ is :			
	(A) Hyperbola	(B) Straight line	(C) Parabola	(D) Ellipse
10	All the food we eat in one day has about the same energy as (if one litre petrol energy = 5×10^7 J) :			
	(A) 5×10^7 J	(B) 0.33 J	(C) 10×10^7 J	(D) 1.66×10^7 J
11	The diameter of the milky way is of the order of :			
	(A) $10^{20}m$	(B) $10^{10}m$	(C) 10^3m	(D) $10^{40}m$
12	The angular speed of hour's hand of mechanical watch at 2 o'clock is :			
	(A) $\frac{\pi}{3}$ rad /hour	(B) 2π rad /hour	(C) $\frac{\pi}{6}$ rad /hour	(D) 4π rad /hour
13	The time of flight of projectile is maximum when it is projected at an angle of :			
	(A) 45°	(B) 90°	(C) 76°	(D) 0°
14	A two meter high tank is full of water. A hole appears at its middle. What is the speed of efflux of water (If g = 10 ms^{-2}) :			
	(A) $4.47\,ms^{-1}$	(B) $4.32\,ms^{-1}$	(C) $10.0\,ms^{-1}$	(D) $20.0\,ms^{-1}$
15	Name the quantity which is vector :			
	(A) Density	(B) Power	(C) Impulse	(D) Charge
16	Twenty waves passes through the medium in one second with speed $20\,ms^{-1}$, the frequency of wave is :			
	(A) 400 Hz	(B) 20 Hz	(C) 50 Hz	(D) 2 Hz
17	The magnification of a simple microscope when the final image is formed at infinity :			
	(A) $\frac{d}{f}$	(B) $1+\frac{d}{f}$	(C) $f_o + f_e$	(D) $\frac{f_o}{f_e}$

Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2020 – 2022 to 2023 – 2025)**

PHYSICS 224-1st Annual-(INTER PART – I) Time Allowed : 2.40 hours

PAPER – I (Essay Type) GROUP – II Maximum Marks : 68

SECTION – I

2. Write short answers to any EIGHT (8) questions : **16**

(i) What are two major types of errors, explain them with examples?

(ii) Give any two rules for significant figures.

(iii) Find the dimensions of gravitational constant G in the formula $F = G\frac{m_1 m_2}{r^2}$

(iv) Find the uncertainty in a timing experiment of 30 vibrations completed in 54.6 sec. and the timing device has the least count 0.1 sec.

(v) Under what circumstances would a vector have components that are equal in magnitude?

(vi) How would you prove equilibrium of coplanar forces?

(vii) Analyse the net increase in the value of vector product when angle between two vectors are changed from 0^o to 60^o.

(viii) Why do we wear seat belts? Use an equation to support your answer.

(ix) Mention the points in the path of a projectile for minimum and maximum speed.

(x) An object is thrown vertically upward, discuss the sign of acceleration due to gravity, relative to velocity, while the object is in air.

(xi) How pollution can be reduced? Use mass transportation and energy methods to support your answer.

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

3. Write short answers to any EIGHT (8) questions : **16**

(i) Why mud flies off the tyre of a moving bicycle, in what direction does it fly?

(ii) What are the artificial satellites?

(iii) Show that orbital angular momentum $L_o = mvr$

(iv) Differentiate between tangential and angular velocity, how both are related to each other?

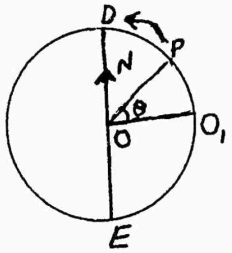
(v) What do you understand about the term viscosity?

(vi) How do you describe the behaviour of an ideal fluid flow?

(vii) On what factors does frequency of a simple pendulum depends?

(viii) If a mass-spring system vibrates, during vibration if potential energy increases what do you conclude about total energy?

(ix) Locate the position of pointer 'P' along with vibrating point 'N' at different instant of time period.



(x) Why does sound travel faster in solids than in gases?

(xi) Describe the phenomenon of sound speed regardless of temperature in air.

(xii) If stationary waves are set up in an organ pipe with both open ends, how does frequency varies with length of pipe?

(Turn Over)

4. Write short answers to any SIX (6) questions : 12

(i) Give two applications of Bragg's equation.

(ii) Under what conditions two or more sources of light behave as coherent sources?

(iii) Can visible light produce interference fringes? Explain.

(iv) Use Snell's law to calculate critical angle for glass air boundary. Make a diagram to support your answer.

(v) Make the ray diagrams of compound microscope and astronomical telescope.

(vi) Define resolving power and give its at least two formulae.

(vii) Give the interpretation of temperature by using pressure of gas equation.

(viii) How do you describe the all processes of strokes for petrol engine?

(ix) Give an example of a natural process that involves an increase in entropy.

SECTION – II

Note : Attempt any THREE questions.

5. (a) Define projectile motion. Derive relation for :
(i) Time of flight (ii) Range (iii) Maximum height 5

(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. 3

6. (a) Discuss stationary waves in an air column. Also discuss different modes of vibrations in an open organ pipe. 5

(b) How large a force is required to accelerate an electron ($m = 9.11 \times 10^{-31} kg$) from rest to speed of $2 \times 10^{7} ms^{-1}$ through a distance of 5 cm? 3

7. (a) What is artificial gravity? Derive an expression for frequency of space-ship to provide the artificial gravity. 5

(b) A simple pendulum is 50.0 cm long. What will be its frequency of vibration at a place where $g = 9.8 ms^{-2}$? 3

8. (a) How does the efficiency of a carnot engine is calculated? 5

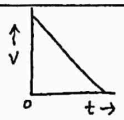
(b) What gauge pressure is required in the city mains for a stream from a fire hose connected to the mains to reach a vertical height of 15.0 m? 3

9. (a) What is meant by diffraction of light? Also discuss the diffraction of light through a narrow slit? 5

(b) A simple astronomical telescope in normal adjustment has an objective of focal length 100 cm and an eye piece of focal length 5.0 cm. 3
(i) Where is the final image formed? (ii) Calculate the angular magnification.

Paper Code Number: 2477	2024 (1st-A) INTERMEDIATE PART-I (11th Class)	Roll No:
PHYSICS PAPER-I GROUP-I		
TIME ALLOWED: 20 Minutes	OBJECTIVE	MAXIMUM MARKS: 17

Q.No.1 You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question.

S.#	QUESTIONS	A	B	C	D
1	The resultant of two forces $\vec{F}_1$ and $\vec{F}_2$ making an angle of 90^o with each other is:	$(F_1 - F_2)^2$	$F_1 + F_2$	$(F_1 + F_2)^2$	$\sqrt{F_1^2 + F_2^2}$ ●
2	The magnitude of $\hat{j} \cdot (\hat{k} \times \hat{i})$ is equal to:	1 ●	$2\hat{j}$	0	$-2\hat{j}$
3	The velocity of a body changes with constant rate. The acceleration is:	Zero	Negative	Constant ●	Increases
4	The velocity time graph of a body is shown. It implies that: 	Force is positive	Force is negative ●	Force is zero	Force is constant
5	Gravity performs zero work when body accelerates:	Vertically upward	Vertically downward	Inclined plane	In a vertical loop ●
6	The acceleration of an object falling freely is:	$9.8ms^{-2}$ ●	$0ms^{-2}$	$-9.8ms^{-2}$	$5ms^{-2}$
7	The rotational K.E of any ring of radius 'r' is given by:	$\frac{1}{2}mr\omega^2$	$\frac{1}{2}mr^2\omega^2$ ●	$\frac{1}{2}mr^2$	$\frac{1}{4}mr^2\omega^2$
8	The viscosity of water at 30^oC is:	$0.019Nm^{-2}s$	$1000Nm^{-2}s$	$1Nm^{-2}s$	$0.801Nm^{-2}s$ ●
9	The time period of a simple pendulum, whose length is 980m is:	2π sec	$2\pi\sqrt{0.1}$ sec	20π sec ●	$\frac{2}{\pi}$ sec
10	The speed of sound wave is independent of:	Pressure ●	Medium	Source of sound	Temperature
11	A longitudinal sinusoidal wave has wavelength of 1cm with a time period of 2sec, its wave velocity is:	$50ms^{-1}$	$0.005ms^{-1}$ ●	$0.5ms^{-1}$	$2ms^{-1}$
12	Which one of the given cannot be polarized?	Light waves	Radio waves	Microwaves	Sound waves ●
13	The minimum number of rays required by a lens to form an image are:	2 ●	3	4	5
14	When heat is removed from the system, entropy is:	Remain same	Positive	Negative ●	Zero
15	For mono atomic gas $C_V = \frac{3}{2}R$, therefore gamma "γ" for gas is:	$\frac{3}{5}$	$\frac{2}{5}$	2	$\frac{5}{3}$ ●
16	How many colours are used by colour printing to produce the entire range of colours?	3	4 ●	5	6
17	The dimensions of the relation mc^2 are equal to the dimensions of:	Force	Momentum	Heat ●	Velocity

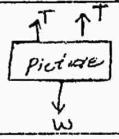
PHYSICS PAPER-I GROUP-I

TIME ALLOWED: 2.40 Hours	SUBJECTIVE	MAXIMUM MARKS: 68

NOTE: Write same question number and its parts number on answer book, as given in the question paper.

SECTION-I

2. Attempt any eight parts. **8 × 2 = 16**

(i)	How do you check the correctness of an equation?
(ii)	How would a numerical data should be rounded off up to last significant figure?
(iii)	What do you understand about precise and accurate measurement?
(iv)	An old saying is that "A chain is only as strong as its weakest link" what analogous statement can you make regarding experimental data used in computation?
(v)	Two vectors have unequal magnitude. Can their sum be zero? Explain.
(vi)	What is the minimum value of tension in the string? 
(vii)	How do you subtract two vectors?
(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)	How a rocket is propelled in space?
(x)	When a moving car stops quickly, in what direction passengers fall and why?
(xi)	What is the method of fermentation?
(xii)	What sort of energy is in (a) compressed spring (b) moving car (c) water in a high dam?

3. Attempt any eight parts. **8 × 2 = 16**

(i)	If a body of mass 10kg is allowed to fall freely what will be its weight?
(ii)	Show that orbital angular momentum, $L_o = mvr$.
(iii)	What is meant by moment of inertia? Explain its significance.
(iv)	Why does a diver change his body position before and after diving in the pool?
(v)	Explain the term viscosity.
(vi)	Why fog droplets appear to be suspended in air?
(vii)	What is second pendulum also write its length, time period and frequency?
(viii)	Can we realize an ideal simple pendulum?
(ix)	Describe some common phenomena in which resonance plays an important role?
(x)	A wave has speed 400 m/sec. Find wavelength of a wave if frequency is 2 kHz.
(xi)	Explain why sound travels faster in warm air than in cold air?
(xii)	What features do longitudinal waves have in common with transverse waves?

4. Attempt any six parts. **6 × 2 = 12**

(i)	How is the distance between interference fringes affected by the separation between the slits of Young's experiment? Can fringes disappear?
(ii)	How interference produced in their film?
(iii)	Could you obtain Newton's rings with transmitted light? If yes, would be pattern be different from that obtained with reflected light?
(iv)	What is Optical fibre? Write its types.
(v)	What is the function of turn table in the spectrometer?
(vi)	If a person was looking through a telescope at the full moon, how would the appearance of the moon be changed by covering half of the objective lens?
(vii)	State second law of thermodynamics in terms of entropy.
(viii)	Can the mechanical energy be converted into heat energy? If so give an example.
(ix)	A thermos flask containing milk as a system is shaken rapidly. Does the temperature of the milk rise?

SECTION-II

NOTE: Attempt any three questions. **3 × 8 = 24**

5.(a)	Explain what is meant by projectile motion? Describe the expression for (i) Height of the projectile (ii) Time of flight	5
(b)	Find the projection of vector $\vec{A} = 2\hat{i} - 8\hat{j} + \hat{k}$ in the direction of vector $\vec{B} = 3\hat{i} - 4\hat{j} - 12\hat{k}$	3
6.(a)	How would you portray step by step guide for interconversion of PE and KE?	5
(b)	Find the temperature at which the velocity of sound in air is two times its velocity at $10^{\circ}C$.	3
7.(a)	Define real and apparent weight and discuss when apparent weight increases, decreases and becomes zero during vertical motion.	5
(b)	An 8.0kg body executes S.H.M with amplitude 30cm. The restoring force is 60N. When the displacement is 30cm. Find (i) period (ii) speed when the displacement is 12cm	3
8.(a)	Bernoulli's equation represents the conservation of energy in fluid dynamics. Discuss it.	5
(b)	Show that the ratio of the root mean square speeds of molecules of two different gases at a certain temperature is equal to the square root of the inverse ratio of their masses.	3
9.(a)	Describe the experiment performed by Michelson to find the speed of light. Also discuss the speed of light reduced in other materials than vacuum.	5
(b)	Light of wavelength 450nm is incident on a diffraction grating, on which 5000 lines per centimeter have been ruled. How many orders of spectra can be observed on either side of the direct beam?	3

Paper Code Number: 2478	2024 (1^{st}-A) INTERMEDIATE PART-I (11^{th} Class)	Roll No: .....
PHYSICS PAPER-I GROUP-II	Multan Board-G-2-2024	
TIME ALLOWED: 20 Minutes	OBJECTIVE	MAXIMUM MARKS: 17

Q.No.1 You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question.

S.#	QUESTIONS	A	B	C	D
1	A fixed mass of an ideal gas in a cylinder is compressed isothermally. Which is true statement?	Heat is dissipated from the system ●	K.E. of the gas increases	P.E of the gas increases	No work is done on the gas
2	Number of significant zeroes in 3.50070 are:	1	2	3 ●	No significant zero
3	If we add the numbers 2.7543, 4.10, 1.273, the rounded off answer will be:	8.1273	8.127	8.2	8.13 ●
4	If vector $\vec{A}$ makes an angle θ with Y–axis, then its Y–component will be:	$A\sin\theta$	$A\cos\theta$ ●	$A\tan\theta$	A
5	The magnitude of $\vec{A} = \cos\theta\,\hat{i} + \sin\theta\,\hat{j}$ is:	$\sqrt{\cos\theta + \sin\theta}$	2	1 ●	$\sqrt{1+\cos^2\theta}$
6	A body moves in a circle of radius r. The displacement covered in one rotation is:	$2\pi r$	πr	$\frac{\pi}{2}r$	Zero ●
7	A stone is dropped from the top of a tower. It takes 2s to reach the ground. The height of the tower is:	19.6 m ●	9.8 m	40 m	19 m
8	Two masses M and $4M$ are moving with same K.E. The ratio of their linear momenta is:	1 : 16	1 : 2 ●	$\sqrt{2}:1$	4 : 1
9	Which is a correct relation?	$\vec{v} = \vec{r} \times \vec{w}$	$\vec{w} = \vec{v} \times \vec{r}$	$\vec{v} = \vec{w} \cdot \vec{r}$	$\vec{v} = \vec{w} \times \vec{r}$ ●
10	A body of mass m is moving in a vertical circle of radius r, tied with a string. The tension at the lowest point is:	$T = m\left(\frac{v^2}{r} - g\right)$	$T = m\left(\frac{v^2}{r} + g\right)$ ●	$T = m(v^2 - gr)$	$T = m(v^2 + gr)$
11	1 torr = _____ N/m^2	133.33 ●	123.33	122.22	143.33
12	What will be the displacement of a particle in SHM when its velocity is half the maximum velocity (amplitude = x_o):	$\frac{3}{\sqrt{2}}x_o$	$\sqrt{2}x_o$	$\frac{3}{4}x_o$	$\frac{\sqrt{3}}{2}x_o$ ●
13	A physical system under going forced vibrations in known as:	Simple harmonic oscillator	Driven harmonic oscillator ●	Damped harmonic oscillator	Torsional oscillator
14	The frequency of sound emitted from a source in water is 600 Hz. If speed of sound in water and air is 1500 m/s and 300 m/s respectively, then frequency of sound heard above the water surface is:	300 Hz	750 Hz	600 Hz ●	120 Hz
15	Which monochromatic light will produce maximum orders of spectra using a diffraction grating?	Blue ●	Red	Green	Yellow
16	Multimode step index fibre is useful for short distance to carry white light due to:	Polarization effects	Diffraction effects	Interference effects	Dispersion effects ●
17	In PV graph of isothermal and adiabatic process, the adiabatic curve has _____ work under the curve, than isothermal curve,:	Greater	Smaller ●	Equal	Negative work

TIME ALLOWED: 2.40 Hours	SUBJECTIVE	MAXIMUM MARKS: 68

NOTE: Write same question number and its parts number on answer book, as given in the question paper.

SECTION-I

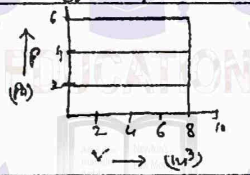
2. Attempt any eight parts. **8 × 2 = 16**

(i)	Differentiate between random error and systematic error.
(ii)	What is principle of homogeneity?
(iii)	Name several repetitive phenomenon occurring in nature which could serve as reasonable time standards?
(iv)	Give the drawbacks to use the period of a pendulum as a time standard?
(v)	Why the cross product is not commutative? Explain briefly.
(vi)	The vector sum of three vectors gives a zero resultant. What can be the orientation of the vectors?
(vii)	If one of the rectangular components of a vector is not zero, can its magnitude be zero? Explain.
(viii)	Can the velocity of an object reverse direction when acceleration is constant? If so give an example.
(ix)	Calculate the force due to water when it flows out from a pipe at $3kgs^{-1}$ and its velocity changes from $5ms^{-1}$ to zero on striking the wall?
(x)	An object is thrown vertically upward. Discuss the sign of acceleration due to gravity, relative to velocity, while the object is in air?
(xi)	Derive a relation between power and velocity.
(xii)	A person holds a bag of groceries while standing still, talking to a friend. A car is standing still while its engine is running. From stand point of work, how are these two situations similar?

3. Attempt any eight parts. **8 × 2 = 16**

(i)	Show that orbital angular momentum $L_o = mvr$.
(ii)	What is meant by moment of inertia? Explain its significance.
(iii)	Prove that 1 radian $= 57.3^o$.
(iv)	Write down applications of communication satellites.
(v)	What are the factors upon which drag force acting upon a small sphere of radius "r" moving through a liquid, depend?
(vi)	A chimney works best when it is tall. Why?
(vii)	Does frequency depends on amplitude for harmonic oscillators?
(viii)	The equation for SHM of an object is given by $X = 0.25\cos\left(\frac{\pi}{8}\right)t$. What will be displacement after 2 seconds?
(ix)	What is Hook's law? Write its mathematical form.
(x)	Explain why sound travels faster in warm air than in cold air.
(xi)	How will you differentiate between longitudinal and transverse wave?
(xii)	What is period of 300 cycles per second of sound waves?

4. Attempt any six parts. **6 × 2 = 12**

(i)	Why interference is necessary to produce diffraction pattern? Answer this question with the analytical approach.
(ii)	Explain the term "Optical rotation".
(iii)	Could you obtain Newton's rings with transmitted light? If yes, would the pattern be different from that obtained with reflected light?
(iv)	Explain how a convex lens is used as a magnifier?
(v)	Explain scattering and absorption as a loss of power?
(vi)	If a person was looking through a telescope at the full moon, how would the appearance of the moon be changed by covering half of the object lens?
(vii)	What happens to the temperature of room, when an air conditioner is left running on a table in the middle of the room?
(viii)	Is it possible to convert internal energy into mechanical energy? Explain with an example.
(ix)	Calculate the work done in the given diagram: 

SECTION-II

NOTE: Attempt any three questions. **3 × 8 = 24**

5.(a)	What do you know about collision? How would two balls collides elastically in different cases?	5
(b)	The magnitude of dot and cross product of two vectors are $6\sqrt{3}$ and "6" respectively. Find the angle between vectors.	3
6.(a)	Define absolute potential energy. Derive its mathematical expression $U = \frac{-GMm}{r}$	5
(b)	An organ pipe has a length of 50cm. Find the frequency of its fundamental note when it is closed at one end. (Speed of sound = $350\,ms^{-1}$).	3
7.(a)	How orbital radius of Geostationary orbits are calculated mathematically. Also calculate its value and its height from the earth surface.	5
(b)	A spring, whose spring constant is $80.0\,Nm^{-1}$ vertically supports a mass of 1.0 kg in the rest position. Find the distance by which the mass must be pulled down, so that on being released, it may pass the mean position with a velocity of $1.0\,ms^{-1}$.	3
8.(a)	State and prove the Bernoulli's equation in dynamic fluid; that relates pressure to fluid speed and height.	5
(b)	$336J$ of energy is required to melt 1g of ice at 0^oC. What is the change in entropy of 30g of water at 0^oC as it is changed to ice at 0^oC by a refrigerator.	3
9.(a)	What is compound microscope? Describe its construction and working. Also calculate its magnifying power.	5
(b)	A light is incident normally on a grating which has 2500 lines per centimeter. Compute the wavelength of a spectral line for which the deviation in second order is 15.0^o.	3

☆☆☆	Roll No _____	HSSC-(P-I)-A/2024 (For All Sessions)	Paper Code	6	4	7	5

Physics (Objective)

(Group-I)

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 When temperature of air increases then the speed of sound will:

(A) Decrease (B) ● Increase (C) Remain same (D) Be Zero

2. The distance between first and third crest in transverse wave is:

(A) ● 2λ (B) 3λ (C) 4λ (D) 8λ

3. Wave front and light rays are always:

(A) Parallel (B) ● Perpendicular (C) Antiparallel (D) $At\ 120°$

4. The advantage of graded index fibre over the step index fibre is due to no :

(A) Refraction (B) ● Dispersion (C) Multiple reflection (D) Scattering

5. In the gas equation $Pv = RT$, where v represents volume of:

(A) 1 g of gas (B) ● 1 mole of gas (C) 1 liter of gas (D) Any mass of gas

6. If $T_1 > T_2$ then $\frac{Q}{T_2} - \frac{Q}{T_1}$ is always:

(A) Zero (B) Infinity (C) Negative (D) ● Positive

7. The dimension of $\sqrt{\frac{f \times l}{m}}$ is

(A) $[LT^{-3}]$ (B) $[LT^{-2}]$ (C) $[MLT^{-1}]$ (D) ● $[LT^{-1}]$

8. The least count of a balance A is10kg, of B is 1 kg, of C is 0.1 kg and of D is 0.01kg, which is most precise:

(A) A (B) B (C) C (D) ● D

9. $\hat{i} \times (\hat{j} + \hat{k})$ is equal to:

(A) 1 (B) $\vec{0}$ (C) $\hat{j} - \hat{k}$ (D) ● $\hat{k} - \hat{j}$

10. $\vec{A} = 5\hat{i} + 7\hat{j} - 3\hat{k}$ and $\vec{B} = 2\hat{i} + 2\hat{j} - a\hat{k}$ are perpendicular vectors, the value of 'a' is:

(A) -2 (B) 8 (C) ● -7 (D) -8

11. A body is moving with uniform velocity its acceleration will be:

(A) Variable (B) ● Zero (C) Uniform (D) Positive

12. Which of the following can be determined by finding the slope of the tangent of the velocity time graph at a point is:

(A) ● Acceleration (B) Momentum (C) Displacement (D) Average velocity

13. The work done in taking a body from the floor to the table top depends on:

(A) The path taken (B) ● Height of the table (C) Speed of the particle (D) Time taken for work

14. "$mr\omega^2$" is an expression for:

(A) Gravitational force (B) ● Centripetal force (C) Newton's force (D) Apparent force

15. The rate of change of angular momentum is:

(A) Force (B) ● Torque (C) Pressure (D) Density

16. The terminal velocity of an object in a fluid of greater viscosity is:

(A) Large (B) ● Small (C) Maximum (D) Zero

17. A body performing SHM, the distance covered by body in complete vibration is 20 cm. its amplitude will be:

(A) ● 5 cm (B) 10 cm (C) 20 cm (D) 40 cm

Roll No _____

HSSC-(P-I)-A-2024
(For All Sessions)

Marks : 68

Time: 2:40 hours

Physics (Subjective)

Group-I

SECTION-I

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

i. Does all physical measurements are accurate or precise, yes or not, explain.
ii. How do you calculate final uncertainty in a timing experiment?
iii. Find the dimension of coefficient of viscosity η in the relation $F = 6\pi\eta rv$.
iv. Name several repetitive phenomenon occurring in nature which could serve as reasonable time standards.
v. How do you multiply a vector by a scalar number? vi. Can the magnitude of a vector have a negative value?
vii. Can a body rotate about its center of gravity under the action of its weight?
viii. Explain the circumstances in which the velocity and acceleration of a car are (i) Parallel (ii) Anti-parallel.
ix. Define impulse and how it is related to linear momentum? x. What is meant by a ballistic missile, how it works?
xi. An object has 1J of potential energy. Explain what does it mean? How much power does it have?
xii. A girl drops a cup from certain height, which breaks into pieces. Why it happens & what energy changes are involved?

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

i. What is meant by angular momentum? Explain the law of conservation of angular momentum.
ii. When mud flies off the tyre of a moving bicycle, in what direction does it fly? Explain.
iii. Differentiate between tangential velocity and angular velocity. iv. Prove that $2\ radian = 114.6^{\circ}$
v. A person is standing near a fast moving train. Is there any danger that he will fall towards it?
vi. What are systolic and diastolic pressures? vii. Does frequency depend on amplitude for harmonic oscillators?
viii. What is meant by phase angle? Does it define angle between maximum displacement and the driving force?
ix. Show that when a pendulum moves from mean position to half of amplitude, time taken by it is, $t = T/12$.
x. A wave is produced along a stretched string but some of its particles permanently show zero displacement .What type of wave is it?
xi. Why does sound travels faster in solids than in gases?
xii. Find the temperature of air, if the velocity of sound is $340\ ms^{-1}$ at the temperature.

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

i. Under what conditions two or more sources of light behave as coherent sources?
ii. How would you manage to get more orders of spectra using a diffraction grating?
iii. What is graphical representation of diffraction pattern of monochromatic light produced due to to a single slit?
iv. What do you understand by linear magnification and angular magnifications?
v. How power is lost in optical fiber through dispersion? Explain. vi. Name the parts of a spectrometer?
vii. Does entropy of a system increases or decreases due to friction?
viii. Is it possible to construct a heat engine that will not expel heat into the atmosphere?
ix. Draw a PV-diagram in case of isothermal process and adiabatic process.

SECTION-II

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

5. (a) Drive the expression for the final velocities of two hard smooth balls after their elastic collision in one dimension. (5)
(b) Find the angle between the two vectors. $\vec{A} = 5\hat{i} + \hat{j}$ and $\vec{B} = 2\hat{i} + 4\hat{j}$ (3)

6. (a) Which field is produced by the earth? Prove that the work done in this field is independent of the path followed and work done in a closed path be zero. (5)
(b) A stationary wave is established in a string which is 120cm long and fixed at both ends. The string vibrates in four segments, at a frequency of 120 Hz. Determine its wavelength and fundamental frequency. (3)

7. (a) What is resonance phenomenon ? Explain it with examples. (5)
(b) A gramophone record turntable accelerates from rest to an angular velocity of 45.0 rev / min in 1.60 seconds. What is the average angular acceleration. (3)

8. (a) How does the pressure of a gas in a container is directly proportional to average translational kinetic energy. (5)
(b) An airplane wing is designed so that when the speed of the air across the top of the wing is $450ms^{-1}$, the speed of air below the wing is $410ms^{-1}$. What is the pressure difference between the top & bottom of the wings? (Density of air =$1.29kgm^{-3}$) (3)

9. (a) Discuss Michelson's interferometer in detail. (5)
(b) An astronomical telescope having magnifying power of 5 consist of two thin lenses 24cm apart. Find focal lengths of lenses. (3)

☆☆☆	Roll No _____	HSSC-(P-I)-A/2024	Paper Code	6	4	7	6

(For All Sessions)

Physics (Objective)

(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 location of submarines can be detected by:

(A) ● Doppler effect (B) Compton's effect (C) Photoelectric effect (D) Temperature effect

2. The speed of sound is greater in:

(A) Oxygen (B) Air (C) Water (D) ● Copper

3. The property of bending of light around obstacles is:

(A) Reflection (B) Refraction (C) ● Diffraction (D) Polarization

4. Magnifying power of telescope is:

(A) $\frac{fe}{fo}$ (B) ● $\frac{fo}{fe}$ (C) $fefo$ (D) $\frac{1}{fefo}$

5. $W = -\Delta U$ equation holds for:

(A) Isothermal (B) ● Adiabatic (C) Isochoric (D) Isobaric

6. The efficiency of carnot engine depends on:

(A) Working substance (B) T_1 (C) T_2 (D) ● T_1 & T_2

7. The number of significant figures in 0.00232 are:

(A) 6 (B) 5 (C) 4 (D) ● 3

8. Light year is the unit of:

(A) Light (B) ● Distance (C) Time (D) Velocity

9 The relation $\bar{A} + (-\bar{A})$ results the:

(A) ● Null vector (B) Parallel vector (C) Unit vector (D) Position vector

10 Unit vector for a vector $\vec{A} = 4\hat{i} + 3\hat{j}$ is:

(A) $\frac{4\hat{i}+3\hat{j}}{25}$ (B) $\frac{25}{4\hat{i}+3\hat{j}}$ (C) ● $\frac{4\hat{i}+3\hat{j}}{5}$ (D) $\sqrt{\frac{5}{4\hat{i}+3\hat{j}}}$

11 The horizontal range of projectile at 30°C with horizontal is same as that at an angle of:

(A) 45° (B) ● 60° (C) 90° (D) 120°

12. The mass of fuel consumed by a typical rocket to overcome earth's gravity is:

(A) $10\ Kgs^{-1}$ (B) $100\ Kgs^{-1}$ (C) ● $10000\ Kgs^{-1}$ (D) $1000\ Kgs^{-1}$

13. The work is said to be negative if:

(A) $\theta = 0^\circ$ (B) $\theta = 90^\circ$ (C) ● $\theta > 90^\circ$ (D) $\theta < 90^\circ$

14. The relation for moment of inertia of sphere is:

(A) ● $\frac{2}{5}mr^2$ (B) $\frac{5}{2}mr^2$ (C) $\frac{1}{2}mr^2$ (D) $2mr^2$

15. If $1\ rad = 57.3^\circ$ then $\frac{1}{2}\ rad$ is:

(A) 57.3° (B) ● 28.65° (C) 180° (D) 360°

16. The pressure will be low when the speed of fluid is:

(A) ● High (B) Low (C) Zero (D) Constant

17. The acceleration of a body executing SHM depends upon its:

(A) Time period (B) Amplitude (C) Frequency (D) ● Displacement

Roll No _____

HSSC-(P-I)-A-2024
(For All Sessions)

Marks : 68

Physics (Subjective)

Group-II

Time: 2:40 hours

Section-I

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

i. Write the dimension of (i) Pressure (ii) Density.

ii. What are the dimension and unit of $\sqrt{\frac{F \times l}{m}}$?

iii. What are supplementary units? Define only one unit.

iv. Give the drawbacks to use the period of a pendulum as a time standard.

v. Two vectors have unequal magnitudes. Can their sum be zero? Explain.

vi. Under what circumstances would a vector have components that are equal in magnitude?

vii. If $\vec{A} = 3\hat{i} - 5\hat{j}$, $\vec{B} = 7\hat{k}$ find $(\vec{A} \times \vec{B})$

viii. What is ballistic missile? Define its trajectory.

ix. Show that the area between the velocity time graph is numerically equal to the distance covered by the object.

x. Explain what is meant by projectile motion. Derive expression for the time of flight

xi. What is the solar constant and what is its value?

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

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

i. Show that orbital angular momentum, $L_0 = mvr$.

ii. How can you describe angular equations of motion analogous with linear equations of motion?

iii. Prove that, $\theta = \frac{s}{r}$ radian.

iv. Can centripetal force perform any work? Explain.

v. Fog droplet appears to be suspended in air. Why?

vi. How an airplane is lifted up in the air?

vii. Does the acceleration of a simple harmonic oscillator remains constant during its motion? Is the acceleration ever zero? Explain.

viii. Why in S.H.M the acceleration is zero when the velocity is greatest?

ix. Prove the relation $U = f\lambda$

x. Calculate the formula of the time period of a mass attached to a spring.

xi. As a result of a distant explosion an observer senses a ground tremor & then hears the explosion. Explain the time difference.

xii. What will be effect on speed of sound if the temperature of the gas through which it passes increases to three times keeping the pressure of the gas constant?

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

i. Can visible light produce interference fringes? Explain.

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

iii. When mirror M_1 of Michelson interferometer is moved a distance 0.5 mm, 200 fringes are observed, then calculate the wavelength of light used.

iv. Explain the difference between angular magnification and resolving power of an optical instrument.

v. How the power is lost in optical fibre through dispersion? Explain

vi. What is meant by length of the telescope? Explain.

vii. Why does the pressure of a gas in a car type increase when it is driven through some distance?

viii. A thermos flask containing milk as a system is shaken rapidly. Does the temperature of milk rise?

ix. Does the efficiency of Carnot engine depends on the nature of working substance? Explain it.

SECTION-II

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

5. (a) Define vector product and also discuss torque as an example of vector product in detail. (5)

(b) Two blocks of masses 2.0 kg and 0.50 kg are attached at the two ends of a compressed spring. The elastic potential energy is stored in the spring is 10J. Find the velocities of the block if the spring delivers its energy to blocks when released. (3)

6. (a) How would you derive a relation for the effect of temperature on the speed of sound in a gas? (5)

(b) A 70 kg man runs up a long flight of stairs in 4.0 sec. The vertical height of the stairs is 4.5 m. calculate his power output in watts. (3)

7. (a) Prove that energy is conserved in simple harmonic motion. (5)

(b) A 1000 kg car travelling with a speed of $144\ kmh^{-1}$ round a curve of radius 100m. Find the necessary centripetal force. (3)

8. (a) State first law of thermodynamics and explain (i) Isothermal process (ii) Adiabatic process. (5)

(b) Water flows through a hose, whose internal diameter is 1 cm at a speed of 1m/s . What should be the diameter of the nozzle if the water is to emerge at 21 m/s? (3)

9. (a) Explain the construction and working of an astronomical telescope. Also derive a relation for its magnifying power. (5)

(b) A light is incident normally on a grating which has 2500 lines per centimeter. Compute the wavelength of the spectral line for which the deviation in second order is 15.0° (3)

1124 Warning:- Please write your Roll No. in the space provided and sign. Roll No .....

(Inter Part – I) (Session 2020-22 to 2023-25) Sig. of Student .....

Physics (Objective) (Group I) Paper (I)

Time Allowed:- 20 minutes **PAPER CODE 2471** Maximum Marks:- 17

Note:- You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write **PAPER CODE**, which is printed on this question paper, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

1) The percentage of uncertainty for V and I is 2% and 6% respectively. Hence, total uncertainty in the value of $R = V/I$ is

(A) 8% ● (B) $\frac{1}{3}$% (C) 3% (D) 4%

2) How many years are there in 1 Second?
(A) $3.15 \times 10^{+7}$ years (B) 3.1×10^{-8} years (C) 3.15×10^{16} years (D) 3.1×10^{-6} years ●

3) A vector of 10N making an angle of 60° with y-axis. Its x-component is equal to
(A) 7 N (B) 5 N (C) 8.66 N ● (D) 10 N

4) When a massive body collides with a body of negligible mass. What is the final velocity of massive body if its initial velocity is 5 m/s
(A) 10 m/s ● (B) 15 m/s (C) 20 m/s (D) Information is not enough

5) Which of the following can be possessed by a moving object
(A) Force (B) Momentum ● (C) Impulse (D) Power

6) The formula $W = \vec{F}.\vec{d}$ have two restrictions. Pick the correct one
(A) $\vec{F}$ can vary but $\vec{d}$ must be in circle ● (B) $\vec{F}$ can vary but $\vec{d}$ must be in straight line (C) $\vec{F}$ is constant and average but $\vec{d}$ is in straight line (D) $\vec{F}$ is constant and average but $\vec{d}$ can be curved

7) θ , ω , α , τ , L all these five parameters can have the same direction only if
(A) Torque should be applied externally (B) Angular momentum 'L' is not fixed (C) Angular velocity 'ω' is decreased ● (D) Angular velocity 'ω' is increased

8) Centripetal force is acted along
(A) Straight line (B) Curved line (C) Circular path ● (D) Elliptical path

9) Bernoulli's theorem can be reduced to
(A) Torricelli's theorem but not to venturi's relation (B) Both Torricelli's theorem and venturi's relation (C) Venturi's relation but not to Torricelli's theorem ● (D) This equation can not be reduced

10) What is the equation of the phase for a vibrating body in a circle, when intial phase is 270°
(A) $x_o \sin \omega t$ (B) $x_o \cos \omega t$ (C) $-x_o \sin \omega t$ ● (D) $-x_o \cos \omega t$

11) How speed of sound varies with temperature.
(A) $v \propto \frac{1}{T}$ (B) $v \propto 1/\sqrt{T}$ (C) $v \propto T$ ● (D) $v \propto \sqrt{T}$

12) At which angle, we get more orders of spectra in diffraction
(A) 45° (B) 90° ● (C) 60° (D) 30°

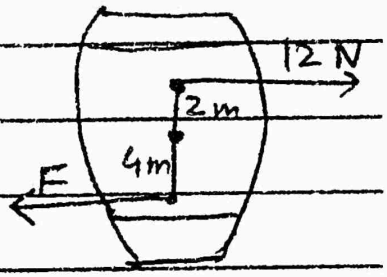
13) If a gas is maintained at 8000 N/m^2 in a container with piston having area 0.10 m^2. If the gas expands and piston is pushed up through a distance of 10 cm then the work done by the gas is
(A) 8000 J (B) 400 J (C) 40 J ● (D) 80 J

14) For diatomic gas $C_v = \frac{5R}{2}$, therefore "γ" for this gas is
(A) $7/5$ (B) $5/7$ (C) 7.5 ● (D) 5.7

15- For rotational equilibrium, the value of force in the following figure is

a) 12 N b) 4 N

c) 2 N d) 6 N ●



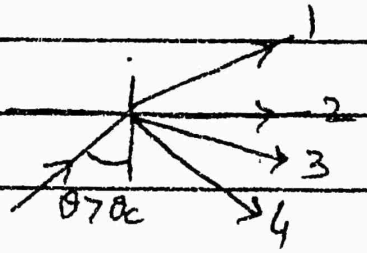
16- In the organ pipe shown in the figure then the frequency

a) $f_5 = 5f_1$ b) $f_9 = 9f_1$

c) $f_3 = 3f_1$ ● d) $f_{7} = 7f_1$

17- If a light ray is incident with an angle higher than critical angle, then the predicted ray of light after incidence

a) light ray follows path 1
b) light ray follows path 2
c) light ray follows path 3
d) light ray follows path 4 ●



Time Allowed: 2.40 hours Section ---------- I Maximum Marks: 68

2. Answer briefly any Eight parts from the followings:- 8 × 2 = 16

(i) Why do we find it useful to have two units for the amount of substance kilogram and the mole?
(ii) Write the dimensions of pressure and density (iii) What are supplementary units? Define only one unit.
(iv) Add the following masses given in kg upto appropriate precision. 2.189 , 0.089 , 11.8 and 5.32?
(v) Under what circumstances would a vector have components that are equal in magnitude?
(vi) What is the unit vector in the direction of the vector $\vec{A} = 4\hat{i} + 3\hat{j}$?
(vii) Is it possible to add a vector quantity to a scalar quantity? Explain.
(viii) What is ballistic missile? Define its trajectory.
(ix) Show that the area between the velocity time graph is numerically equal to the distance covered by the object.
(x) Motion with constant velocity is a special case of motion with constant acceleration. Is this statement true? Discuss.
(xi) Calculate the work done in kilo joules in lifting a mass of 10 kg through a vertical height of 10 m.
(xii) Differentiate between geyser and aquifer.

3. Answer briefly any Eight parts from the followings:- 8 × 2 = 16

(i) Why does a diver change his body positions before and after diving in the pool?
(ii) Show that orbital angular momentum, $L_o = mvr$
(iii) State the direction of the following vectors in simple situations; angular momentum and angular velocity.
(iv) Prove that $a_T = r\alpha$ where, a_T = tangential acceleration, r = radius of circle, α = angular acceleration.
(v) Why does droplets appear to be suspended in air? (vi) What is meant by drag force?
(vii) Name two characteristics of simple harmonic motion.
(viii) Describe some common phenomena in which resonance plays an important role.
(ix) Define the phenomenon of resonance. (x) Prove that $v = f\lambda$
(xi) Explain why sound travels faster in warm air than in cold air? (xii) Explain the terms (a) trough (b) Antinode

4. Answer briefly any Six parts from the followings:- 6 × 2 = 12

(i) How is the distance between interference fringes affected by the separation between the slits of Young's experiment? Can fringes disappear?
(ii) Write two steps of Huygen's principle. What is its importance.
(iii) How would you distinguish between un-polarized and plane-polarized lights?
(iv) How you can increase the resolving power of a telescope?
(v) How the power is lost in optical fibre through dispersion? Explain.
(vi) A telescope is made of an objective of focal length 30 cm and an eye piece of 5 cm, both convex lenses. Find the angular magnification.
(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) How "Human Metabolism" provides an example of energy conservation and satiesfy the first law of thermodynamics.
(ix) What is Boltzman Constant. Calculate its numerical value.

Note: Attempt any three questions. Section ---------- II (8 × 3 = 24)

5. (a) Define and explain the term torque. Derive expression for torque due to force acting on a rigid body.
(b) Prove that for angles of projection, which exceed or fall short of 45° by equal amounts, the ranges are equal.

6. (a) Discuss interconversion of Potential energy and Kinetic energy.
(b) A stationary wave is established in a string which is 120 cm long and fixed at both ends. The string vibrates in four segments, at a frequency of 120 Hz. Determine its wavelength and the fundamental frequency.

7. (a) What is the simple pendulum. Show that the motion of a simple pendulum is simple harmonic. Also derive expression for its time period and frequency.
(b) A gramophone record turntable accelerates from rest to an angular velocity of 45.0 rev min^{-1} in 1.60 s. What is its average angular acceleration.

8. (a) Define molar specific heat of gas. Also prove $C_p - C_v = R$
(b) Water flows through a hose, whose internal diameter is 1cm at a speed of $1ms^{-1}$. What should be the diameter of the nozzle if the water is to emerge at $21ms^{-1}$.

9. (a) Describe the working of compound microscope, derive an expression for magnifying power and write the formula of length of compound microscope.
(b) X – rays of wavelength 0.150 nm are observed to undergo a first order reflection at a Bragg angle of 13.3° from a quartz (SiO_2) crystal. What is the interplanar spacing of the reflecting planes in the crystal?

Warning:- Please write your Roll No. in the space provided and sign. Roll No----------

ater Part – I) **(Session 2020-22 to 2023-25)** **Sig. of Student ----------**

Physics (Objective) **(Group II)** **Paper (I)**

Time Allowed:- 20 minutes **PAPER CODE 2478** **Maximum Marks:- 17**

Note:- You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write **PAPER CODE**, which is printed on this question paper, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

1) In multimode step index fibre, the diameter of the core is
(A) $20\mu m$ (B) $30\mu m$ (C) $40\mu m$ (D) $50\mu m$ ●

2) What remains constant in adiabatic process
(A) Pressure (B) Volume (C) Temperature (D) Entropy ●

3) Triple point of water is
(A) 273.16 °C (B) 273.16 °F (C) 273.16 K ● (D) 373.16 K

4) Significant figures in 0.00567 are
(A) 2 (B) 3 ● (C) 4 (D) 5

5) One light year is equal to
(A) 9×10^{12} m (B) 9×10^{13} m (C) 9×10^{14} m (D) 9×10^{15} m ●

6) If the magnitude of $\vec{A} \cdot \vec{B} = \frac{1}{2} AB$ then the angle between $\vec{A}$ and $\vec{B}$ is
(A) 30^o (B) 45^o (C) 60^o ● (D) 90^o

7) The dimensions of torque are
(A) $[M^{-1}LT]$ (B) $[ML^{-1}T]$ (C) $[M^2LT^{-2}]$ (D) $[ML^2T^{-2}]$ ●

8) When a body moves with constant acceleration, The velocity time graph is
(A) Hyperbola (B) Parabola (C) Curve (D) Straight line ●

9) Which hurt you maximum when the time of collision is
(A) 1 Sec (B) $\frac{1}{10}$ Sec (C) $\frac{1}{100}$ Sec (D) $\frac{1}{1000}$ Sec ●

10) The value of escape velocity is maximum for
(A) Earth (B) Moon (C) Jupiter ● (D) Mercury

11) A body of 1kg moving up with a = g then its apparent weight is
(A) 9.8 N (B) 98 N (C) 19.6 N ● (D) 0.98 N

12) The moment of inertia of a ring is equal to
(A) $\frac{1}{2}mr^2$ ● (B) mr^2 (C) $\frac{2}{5}mr^2$ (D) $\frac{1}{4}mr^2$

13) One Torr is equal to
(A) 1.333 Nm^2 (B) 13.33 Nm^2 (C) 133.3 Nm^2 ● (D) 1333 Nm^2

14) By increasing mass of the object four times attatched to a spring time period will become
(A) Twice ● (B) Thrice (C) Four times (D) Six times

15) The speed of sound in air at 30 °C is approximately equal to
(A) 332 m/s (B) 335 m/s (C) 340 m/s (D) 350 m/s ●

16) The distance covered by wave in 1 second is
(A) Wavelength (B) Wave number (C) Wave speed ● (D) Frequency

17) Longitudinal waves do not exhibit
(A) Polarization ● (B) Diffraction (C) Reflection (D) Refraction

1131 - 1124 - 15000 (4)

1124 **Warning:- Please, do not write anything on this question paper except your Roll No.**

Physics (Subjective) Group (II) (Session 2020-22 to2023-25) Paper (I)

Time Allowed: 2.40 hours Section ---------- I (Inter Part - I) Maximum Marks: 68

2. Answer briefly any Eight parts from the followings:- 8 × 2 = 16

(i) What are the three main frontiers of Physics.
(ii) Write two steps which are involved in the measurement of a base quantity.
(iii) Show that the famous "Einstein equation" $E = mc^2$ is dimensionally consistent.
(iv) Give the drawbacks to use the period of a pendulum as a time standard.
(v) How would you explain "arbitrary direction" for a null vector obtained from east and west directed two equal in magnitude vectors.
(vi) The vector sum of three equal in magnitudes vectors gives a zero resultant. What can be the orientation of the vectors.
(vii) If one of the rectangular components of a vector is not zero, can its magnitude be zero? Explain
(viii) How do you find out the height of a tower by using one of the equation of motion. Write all steps you take for measurement.
(ix) Derive a formula for range of the projectile.
(x) Why two projectiles fired with different initial horizontal velocities take same time to reach ground?
(xi) What do you understand by the term "escape velocity". Give the value of escape velocity for Earth.
(xii) Calculate the work done in kilo joules in lifting a mass of 10 kg through a vertical height of 10 m.

3. Answer briefly any Eight parts from the followings:- 8 × 2 = 16

(i) A person is standing near a fast moving train. Is there any danger that he will fall towards it.
(ii) Differentiate between systolic and diastolic pressure. Are these values varies with age.
(iii) What do you mean by term weightlessness in satellite.
(iv) What is moment of inertia? Explain its significance.
(v) A disc and a hoop starts moving down from top of an inclined plane at the same time which will have great speed on reaching bottom.
(vi) Why an object, orbiting the earth, is said to be freely falling, use your explanation to describe why objects appear weightless under certain circumstances.
(vii) What are the values of velocity of a vibrating mass-spring system at its mean and extreme point.
(viii) What should be the length of a simple pendulum whose time period is 1.0 sec. What does effect on length if time period is doubled.
(ix) Describe phenomenon of tunning a radio. (x) How beats are useful in tuning musical instrument.
(xi) Is it possible for two identical waves travelling in same direction, will give rise to stationary waves
(xii) In an organ pipe, closed at one end, how does harmonic varies with length of air coulomn.

4. Answer briefly any Six parts from the followings:- 6 × 2 = 12

(i) Differentiate between spherical and plane wave front. (ii) Can visible light produce interference fringes?
(iii) How would you manage to get more orders of spectra using a diffraction grating?
(iv) How a piece of paper is used to see a print clearly?
(v) Why would it be advantageous to use blue light with a compound microscope?
(vi) How light signal is transmitted through the optical fibre?
(vii) Why does the pressure of a gas in a car tyre increase when it is driven through some distance?
(viii) Why specific heat at constant pressure is greater than specific heat at constant volume?
(ix) How can efficiency of Carnot Engine be increased?

Note: Attempt any three questions. Section ---------- II (8 × 3 = 24)

5. (a) Define elastic collision. Show that for elastic collision, relative speed of approach is equal to relative speed of separation.
(b) Find the projection of vector $\vec{A} = 2\hat{i} - 8\hat{j} + \hat{k}$ in the direction of the vector $\vec{B} = 3\hat{i} - 4\hat{j} - 12\hat{k}$

6. (a) Define escape velocity. Prove that $v_{esc} = \sqrt{2gR}$ and also find out its value.
(b) Find the temperature at which the velocity of sound in air is two times its velocity at 10 °C.

7. (a) What is meant by geostationary orbit? Derive formula for its radius.
(b) A simple pendulum is 50.0 cm long. What will be its frequency of vibration at a place where, g = 9.8 ms^{-2}.

8. (a) What is Carnot engine. Explain its working and calculate its efficiency.
(b) Certain globular protein particle has a density of 1246 kgm^{-3}. It falls through pure water ($\eta = 8.0 \times 10^{-4} kgm^{-1}s^{-1}$) with a terminal speed of 3.0 cmh^{-1}. Find the radius of the particle.

9. (a) Explain the diffraction of X-rays by crystals.
(b) A glass light pipe in air will totally internally reflect a light ray if its angle of incidence is at least 39°. What is the minimum angle for total internal reflection if pipe is in water? (Refractive Index of water = 1.33)

1132 -- 1124 -- 15000

Roll No. : _____

Objective
Paper Code
6471

Intermediate Part First

PHYSICS (Objective) GROUP - I

Time: 20 Minutes Marks: 17

Q.No.1 **You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill the relevant circle in front of that question number on computerized answer sheet. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero marks in that question. Attempt as many questions as given in objective type question paper and leave other circles blank.**

S.#	Questions	A	B	C	D
1	Which is not a base unit in SI units?	Ampere	Joule ●	Kilogram	Kelvin
2	If error in measurement of radius of circle is 2%, then permissible error in its area will be:	1%	2%	3%	4% ●
3	If $A_x = A_y$, then angle between $\vec{A}$ and x-axis is:	30°	45° ●	60°	90°
4	In which quadrant vector $-2\hat{i} - 3\hat{j}$ lies?	1st	2nd	3rd ●	4th
5	Impulse has same unit as that of:	Mass	Energy	Force	Linear momentum ●
6	The range of projectile is same for:	10°, 70°	20°, 50°	25°, 65° ●	30°, 70°
7	Which one is non-renewable source of energy?	Tides	Biomass	Waves	Oil ●
8	Rotational K.E. of disc is given by:	$\frac{1}{2}mv^2$	$\frac{1}{4}mv^2$ ●	$\sqrt{gh}$	$\sqrt{\frac{4}{3}gh}$
9	If a body of mass 10kg is falling freely, its apparent weight will be:	Zero ●	10N	98N	980N
10	The dimension of ρgh is similar as that of:	Power	Torque	Pressure ●	Force
11	The wavelength of wave produced by microwave oven is:	6cm	12cm ●	24cm	50cm
12	Speed of sound in air at S.T.P. is:	280 m/s	330 m/s	332 m/s	350 m/s ●
13	Half wavelength corresponds to:	0°	90°	180° ●	360°
14	Which cannot be polarized?	Sound waves ●	X-rays	Light waves	Radio waves
15	The first person who attempted to measure the speed of light was:	Newton	Galileo ●	Huygen	Michelson
16	Boltzman constant "K" has the same unit as:	Pressure	Energy	Temperature	Entropy ●
17	If temperature of the sink decreases, then efficiency of Carnot engine:	Increases ●	Decreases	Remains the same	First increases then decreases

Intermediate Part First Roll No. _____

PHYSICS (Subjective) GROUP - I

Time: 02:40 Hours Marks: 68

SECTION – I

Write short answers to any EIGHT parts. 16

(i) Why do we find it useful to have two units for the amount of substance, the kilogram and the mole?
(ii) Does a dimensional analysis give any information on constant of proportionality that may appear in an algebraic expression? Explain.
(iii) Write the dimensions of (a) pressure (b) density.
(iv) If percentage uncertainty in radius of sphere is 0.4%, then what will be total uncertainty in its volume?
(v) Can a body rotate about its center of gravity under the action of its weight?
(vi) Name three conditions that could make, $\vec{A_1} \times \vec{A_2} = \vec{0}$
(vii) Draw the diagram of two cases in which components of a vector are equal in magnitude.
(viii) Explain the circumstances in which the velocity $\vec{v}$ and acceleration $\vec{a}$ of a car are (a) $\vec{v}$ is zero but $\vec{a}$ is not zero. (b) $\vec{a}$ is zero but $\vec{v}$ is not zero.
(ix) At what point or points in its path does a projectile have its minimum speed, its maximum speed?
(x) Which quantities are assumed to be constant in projectile motion?
(xi) What sort of energy is in (a) compressed spring (b) water in a high dam?
(xii) A girl drops a cup from a certain height, which breaks into pieces. What energy changes are involved?

3. **Write short answers to any EIGHT parts.** 16

(i) Explain how many minimum number of geostationary satellites are required for global coverage of TV transmission.
(ii) Satellites orbiting at different altitudes have different time periods. Explain why?
(iii) Why is it difficult for a car to turn round a corner at high speed than at lower speed?
(iv) A 1000kg car moves with a speed of $40ms^{-1}$ round a curve of radius 100m. Find the necessary centripetal force.
(v) Explain how the swing is produced in a fast moving cricket ball?
(vi) What are systolic and diastolic pressures? Also give values.
(vii) Under what conditions, does the addition of two simple harmonic motions produce a resultant, which is also simple harmonic?
(viii) What will be the frequency of a simple pendulum if its length is 1m at place where $g = 9.8ms^{-2}$?
(ix) Explain briefly the example of electrical resonance.
(x) How beats are useful in tuning musical instruments?
(xi) Differentiate between red shift and blue shift.
(xii) How the frequency of a string of a musical instrument can be changed?

4. **Write short answers to any SIX parts.** 12

(i) Can visible light produce interference fringes? Explain.
(ii) Why the polaroid sunglasses are better than ordinary sunglasses?
(iii) Differentiate between a ray and a wave front.
(iv) Why would it be advantageous to use blue light with a compound microscope?
(v) If a person was looking through a telescope at the full moon, how would the appearance of the moon be changed by covering half of the objective lens?
(vi) What are the necessary conditions for total internal reflection?
(vii) Why specific heat at constant pressure is greater than specific heat at constant volume?
(viii) Why does pressure of a gas in a car tyre increase when it is driven through some distance?
(ix) Explain adiabatic process with two examples.

SECTION – II Attempt any THREE questions. Each question carries 08 marks.

5. (a) Define cross product of two vectors. Give examples. Also write the characteristics of cross product. 05
(b) A football is thrown upward with an angle of 30° with respect to horizontal. To throw a 40m pass, what must be initial speed of the ball? 03

6. (a) What is gravitational field? Show that work done in the earth gravitational filed is independent of the path followed. 05
(b) An organ pipe has a length of 50cm. Find the frequency of its fundamental note and the next harmonic when it is open at both ends. 03

7. (a) What is resonance phenomenon? Explain it with examples. 05
(b) A gramophone records turntable accelerates from rest to an angular velocity of 45.0 rev min^{-1} in 1.60s. What is its average angular acceleration? 03

8. (a) What is Carnot cycle? Calculate the efficiency of a Carnot engine during one Carnot cycle. 05
(b) A water hose with an internal diameter of 20mm at the outlet discharges 30kg of water in 60 sec. Calculate the water speed at the outlet. Assume the density of water is $1000kgm^{-3}$ and its flow is steady. 03

9. (a) What do you know about diffraction grating? Also derive a relation which involves that image of each wavelength for a certain value of n is diffracted in a different direction. 01,03,01
(b) An astronomical telescope having magnifying power of 5 consists of two thin lenses 24cm apart. Find the focal lengths of the lenses. 03

Roll No. : _____

Objective
Paper Code
6472

Intermediate Part First

PHYSICS (Objective) GROUP – II

Time: 20 Minutes Marks: 17

Q.No.1 **You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill the relevant circle in front of that question number on computerized answer sheet. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero marks in that question. Attempt as many questions as given in objective type question paper and leave other circles blank.**

S.#	Questions	A	B	C	D
1	A light year is the distance light travels in one year. How many meters are there in one light year?	9.5×10^{-15} m	9.5×10^{15} km ●	9.5×10^{15} cm	9.5×10^{15} m
2	Significant figures in 8.70×10^{4} kg are:	5	4 ●	3	2
3	First condition of equilibrium implies that:	$\Sigma F = 0$ ●	$\Sigma F_x = 0$	$\Sigma F_y = 0$	$\Sigma F_x = \Sigma F_y$
4	Magnitudes of cross product and dot product of two vectors are equal. The angle between the vectors is:	0°	45° ●	180°	60°
5	Which formula is true?	$m = \frac{a}{F}$	$F = \frac{m}{a}$	$a = \frac{F}{m}$ ●	$a = \frac{m}{F}$
6	SI unit of impulse is equivalent to that of:	Force	Velocity	Momentum ●	Acceleration
7	Which is non-conservative force?	Electrical force	Gravitational force	Frictional force ●	Magnetic force
8	Which quantity is dimension less?	Centripetal force	Angular velocity	Angular displacement ●	Angular acceleration
9	Centripetal force performs:	Minimum work	Maximum work	No work ●	Negative work
10	SI units of viscosity are:	$kg^{-1}ms^{-1}$	$kg^{-1}m^{-1}s$	$kgm^{-1}s^{-1}$ ●	$kgms^{-1}$
11	The wave form of SHM is:	A square wave	Sine wave ●	Cosine wave	Tangent wave
12	Half wave length corresponds to:	0°	90°	180° ●	360°
13	With increase of temperature sound speed:	Remains constant	Increases ●	Becomes zero	Decreases
14	Fringe spacing increases if we use:	Green light	Red light ●	Yellow light	Blue light
15	Least distance of distinct vision for normal eye is:	15 cm	125 cm	25 cm ●	25 m
16	Which remains constant in an adiabatic process:	Volume	Entropy ●	Pressure	Temperature
17	$C_p - C_v = :$	Plank's constant	Molar gas constant	General gas constant ●	Boltzmann constant

Intermediate Part First

Roll No. _____

PHYSICS (Subjective) GROUP - II

Time: 02:40 Hours Marks: 68

SECTION – I

rite short answers to any EIGHT parts. 16

) Write the dimensions of pressure and density.

ii) Name several repetitive phenomenon occurring in nature which could serve as reasonable time standard.

(iii) How many meters are there in one light year? Explain.

(iv) What are the characteristics of ideal standard?

(v) The vector sum of three vectors gives a zero resultant. What can be orientation of the vectors?

(vi) Can a body rotate about its center of gravity under the action of its weight?

(vii) If $\vec{A} = 3\hat{i} - 5\hat{j}$, $\vec{B} = 7\hat{k}$, find $(\vec{A} \times \vec{B})$

(viii) Define impulse and show that how it is related to linear momentum?

(ix) Explain the circumstances in which the velocity $\vec{v}$ and acceleration $\vec{a}$ of a car are perpendicular to one another.

(x) What is the effect on the speed of a fighter plane chasing another when it opens the fire?

(xi) When a rocket re-enters the atmosphere, its nose cone becomes very hot. Where does this heat energy come from?

(xii) Prove that $P = \vec{F} \cdot \vec{v}$

3. **Write short answers to any EIGHT parts.** 16

(i) What is the venturi relation? Which quantity is measured using this relation?

(ii) How does swing is produced in a tennis ball?

(iii) Two cylinders of equal mass but with different diameters, which has greater rotational inertia?

(iv) What do you know about GPS and its use?

(v) What is an orbital velocity? What does effect of mass of satellite on value of orbital velocity?

(vi) How do you find direction of angular momentum and angular velocity in simple situation?

(vii) Why does the oscillation of a vibrating body eventually stop?

(viii) If a pendulum vibrates with frequency ' f '. What does effect on its angular frequency, if its time period is doubled?

(ix) What does information is determined by phase of a vibrating body?

(x) Describe the term crest, trough, node and antinode.

(xi) How does the speed of distant stars and galaxies are calculated?

(xii) In the phenomenon of stationary waves, if string vibrates in more and more loops, what would you conclude about its frequency and wavelength?

4. **Write short answers to any SIX parts.** 12

(i) What conditions must be met to observe the interference of light?

(ii) Why the polaroid sunglasses are better than ordinary sunglasses?

(iii) Justify that a path difference $\frac{\lambda}{4}$ is neither associated with constructive interference nor destructive interference of light.

(iv) How the power is lost in optical fiber through dispersion? Explain.

(v) How the light propagates with in a flexible glass fiber?

(vi) Describe briefly how light is refracted in continuous refraction?

(vii) Can the mechanical energy be converted completely into heat energy? If so, give an example.

(viii) Calculate the change in internal energy when 42J heat energy is transferred to the system during the expansion and 32J work is done on the piston.

(ix) Does entropy of a system increase or decrease due to friction? Explain.

SECTION – II Attempt any THREE questions. Each question carries 08 marks.

5. (a) What is meant by cross product and explain its four characteristics? 05

(b) A 100g golf ball is moving to the right with a velocity of $20ms^{-1}$. It makes a head on collision with an 8 kg steel ball, initially at rest. Compute velocities of the balls after collision. 03

6. (a) Show that frequencies of stationary waves in a stretched string are quantized. 05

(b) A car of mass 800kg travelling at $54kmh^{-1}$ is brought to rest in 60 meters. Find the average retarding force on the car. 03

7. (a) Define centripetal acceleration and derive its relation. 05

(b) A 100g body hung on a spring elongates the spring by 4.0cm. When a certain object is hung on the spring and set vibrating, its period is 0.568s. What is the mass of the object pulling the spring? 03

8. (a) Derive the relations for pressure and temperature in term of average K.E. of the molecules. 05

(b) What gauge pressure is required in the city mains for a stream from a fire house connected to the mains to reach a vertical height of 15.0m? 03

9. (a) What is meant by diffraction of light? Also discuss the diffraction of light through a narrow slit. 05

(b) Calculate the critical angle and angle of entry for an optical fiber having core of refractive index 1.50 and cladding of refractive index 1.48. 03

Physics	(A)	L.K.No. 1529	Paper Code No. 6471
Paper I	(Objective Type)	Inter (Ist – A – Exam – 2024)	
Time :	20 Minutes	Inter (Part – I)	(Group Ist)
Marks :	17	Session (2022 – 24) & (2023 – 25)	

Note : Four choices A , B , C ,D to each question are given. Which choice is correct fill that circle in front of that Question No. on the Objective Bubble Sheet. Use Marker or Pen to fill the circles. Cutting or filling two or more circles will result in Zero Mark in that Question.

Q.No.1 (1)	The main frontiers of fundamental Science are : (A) 1 (B) 2 (C) 3 (D) 4
(2)	The sum of three numbers 2 . 7543 , 4 . 10 and 1 . 273 upto correct decimal place is : (A) 8 . 12 (B) 8 . 13 (C) 8 . 127 (D) 8 . 1273
(3)	The vector $\overline{A} = \frac{1}{\sqrt{2}}\hat{i} + \frac{1}{\sqrt{2}}\hat{j}$ is a : (A) Null Vector (B) Unit Vector (C) Vector of magnitude $\sqrt{2}$ (D) Vector of magnitude $\frac{1}{\sqrt{2}}$
(4)	If $\lvert\overline{A} \cdot \overline{B}\rvert = \lvert\overline{A} \times \overline{B}\rvert$ then angle between vectors $\overline{A}$ and $\overline{B}$ is : (A) 0 (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{2}$ (D) π
(5)	The Momentum and Kinetic Energy of a body having the same value at the speed of : (A) 8 ms^{-1} (B) 1 ms^{-1} (C) 4 ms^{-1} (D) 2 ms^{-1}
(6)	Motion of Projectile is : (A) One Dimensional (B) Two Dimensional (C) Three Dimensional (D) Four Dimensional
(7)	Tidal Energy is due to Gravitational Pull of : (A) Moon (B) Sun (C) Earth (D) Mars
(8)	The relation for Moment of Inertia of the thin ring is : (A) mr^2 (B) $\frac{1}{2}mr^2$ (C) $\frac{2}{5}mr^2$ (D) $\frac{2}{3}mr^2$
(9)	The Unit of Rotational K.E is : (A) rad s^{-1} (B) Js (C) J (D) Kgm^2
(10)	Stoke 's Law hold for bodies when they have : (A) Spherical Shape (B) Curved Shape (C) Rectangular Shape (D) Triangle Shape
(11)	Time Period of Simple Pendulum only depends on : (A) Mass (B) Length (C) Amplitude (D) Displacement
(12)	If the path difference between two waves is $\frac{\lambda}{2}$ then interference will be : (A) Constructive (B) Destructive (C) Beats (D) Both A and B
(13)	The maximum value of beat frequency is : (A) 10 Hz (B) 100 Hz (C) 20 Hz (D) 30 Hz
(14)	The effective path difference between two x-ray beams reflected from a crystal plane is : (A) d sin θ (B) $\frac{d}{2}\sin\theta$ (C) 2d sin θ (D) $\frac{2\sin\theta}{d}$
(15)	Using the relation for Magnification Power $M = 1 + \frac{d}{f}$ if f = 5 cm and d = 25 cm then M will be : (A) 4 (B) 5 (C) 6 (D) 7
(16)	When Ice melts , entropy : (A) Increases (B) Decreases (C) Constant (D) Zero
(17)	For the Isothermal Process , the first Law of Thermodynamics can be written as : (A) $Q = \Delta U + w$ (B) $Q = \Delta U$ (C) $Q = -\Delta U$ (D) $Q = W$

Roll No.	1529 -	Inter (Part – I)	Session (2022 –24) & (2023 – 25)
Physics (Subjective)	Inter (Ist – A– Exam – 2024)	Group Ist	Time 2 : 40 Hours Marks : 68

Note : It is compulsory to attempt any (8 – 8) Parts each from Q.No. 2, Q.No.3 and attempt any (6) Parts from Q.No.4. Attempt any (3) Questions from Part – II .Write the Same Question Number and its Part Number as given in the Question Paper

Make Diagram where necessary.

Part - I

22 x 2 = 44

Q.No.2	(i)	The length and width of a rectangular plate are 15.3cm and 12.80cm respectively. Find the area of the plate upto correct significant figures.
	(ii)	Give the drawbacks to use the period of a pendulum as a time standard.
	(iii)	Name several repetitive phenomenon occurring in nature which could serve as reasonable time standards.
	(iv)	Why do we find it useful to have two units for the amount of substance , the Kilogram and the Mole?
	(v)	If Force of magnitude 20N makes an angle of 30° with x – axis then find its y – component?
	(vi)	Can you add zero to a Null vector?
	(vii)	Two vectors have unequal magnitudes . Can their sum be zero? Explain.
	(viii)	Define Impulse and show how it is related to Linear Momentum?
	(ix)	At what point or points in its path does a projectile have its minimum speed , its maximum speed?
	(x)	Does the man can jump high on the surface of moon as compare to earth ? Explain.
	(xi)	An object has 1 J of Potential Energy . Explain what does it mean?
	(xii)	What is meant by work done by a constant force?
Q.No.3	(i)	Show that Orbital Angular Momentum $L_o = mvr$
	(ii)	When mud flies off the tyre of a moving bicycle , in what direction does it fly? Explain.
	(iii)	What is meant by Moment of Inertia? Explain its significance.
	(iv)	What are directions of Angular Momentum and Angular Velocity?
	(v)	Explain the term Viscosity.
	(vi)	Explain how swing is produced in a fast moving Cricket Ball?
	(vii)	Can we realize an Ideal Simple Pendulum?
	(viii)	Explain Damping with an example.
	(ix)	For SHM , explain the equations : (a) $y = A \sin(\omega t + \varphi)$ (b) $a = -\omega^2 x$
	(x)	Explain how sound travel faster in warm air than in cold air ?
	(xi)	Explain the terms Crest , Trough , Node and Antinode.
	(xii)	Which Phenomenon is used to detect the motion of an aeroplane in a radar?
Q.No.4	(i)	Why the Polaroid sun glasses are better than ordinary sun glasses?
	(ii)	Why x-rays cannot be diffracted by diffraction grating ?
	(iii)	It is impossible to get phase Coherent beam of light from two separate sources of light . Why?
	(iv)	A magnifying glass gives a five times enlarged image at a distance of 25 cm from the lens . Find the Focal Length of the Lens .
	(v)	Why multimode graded index fiber is better for long distances than multimode step index Fiber?
	(vi)	What are the conditions necessary for the total internal reflection to take place?
	(vii)	Under what condition the efficiency of a Carnot Engine will be 100% ?
	(viii)	Is it possible to Construct a Heat Engine that will not expel heat into the atmosphere ? Explain.
	(ix)	When 50 J of heat enter into a system and 20 J of work is done by the system. What will be the change in internal energy of the system?

(Part – II)

3 x 8 = 24

Q.No.5	(a)	What is Elastic Collision ? In case of Elastic Collision of two bodies in one dimension , write their velocities after Collision.	(5)
	(b)	Find the Projection of vector $\vec{A} = 2\hat{i} - 8\hat{j} + \hat{k}$ in the direction of the vector $\vec{B} = 3\hat{i} - 4\hat{j} - 12\hat{k}$.	(3)
Q.No.6	(a)	What assumptions are made by Laplace to calculate speed of sound in air?	(5)
	(b)	A man pushes a lawn mower with a 40 N Force directed at an angle of 20° downward from the horizontal. Find the work done by the man as he cuts a strip of grass 20 m long .	(3)
Q.No.7	(a)	How would you analyse Moment of Inertia with mass distribution and orientation ? Also derive its formula for a rigid body.	(5)
	(b)	What should be the length of a simple pendulum whose period is 1 . 0 second at a place where $g = 9 . 8\ ms^{-2}$? What is the Frequency of such a Pendulum?	(3)
Q.No.8	(a)	What is Carnot Engine ? Explain its working and calculate its efficiency.	(5)
	(b)	Water flows through a hose, whose internal diameter is 1 cm at a speed of $1\ ms^{-1}$. What should be the diameter of the nozzle if the water is to emerge at $21\ ms^{-1}$.	(3)
Q.No.9	(a)	What is Simple Microscope ? Derive relation for its Magnifying Power.	(5)
	(b)	In a double slit experiment , the second order maximum occurs at $\theta = 0 . 25°$. The Wavelength is 650nm . Determine the slit separation.	(3)

Physics	(C)	L.K.No.1530	Paper Code No. 6476
Paper I	(Objective Type)	Inter (Ist – A – Exam – 2024)	
Time :	20 Minutes	Inter (Part – I)	Group 2nd
Marks :	17	Session (2022 – 24) & (2023 – 25)	

Note : Four choices A , B , C ,D to each question are given. Which choice is correct fill that circle in front of that Question No. on the Objective Bubble Sheet. Use Marker or Pen to fill the circles. Cutting or filling two or more circles will result in Zero Mark in that Question.

Q.No.1	A Paratrooper having :
(1)	(A) Dynamic Equilibrium (B) Static Equilibrium (C) Acceleration (D) Zero Velocity
(2)	Kgm^2s^{-2} is the unit of : (A) Work (B) Force (C) Moment of Force (D) Both A and C
(3)	The sum of 2 . 7342 , 2 . 3 , 1 . 432 and 5 . 32 upto the correct decimal place is : (A) 11 . 78 (B) 11 . 8 (C) 11 . 786 (D) 11 . 7862
(4)	The angle between two vectors $2\hat{i} - 3\hat{j}$ and $3\hat{k}$ is : (A) 30° (B) 90° (C) 60° (D) 0°
(5)	Tidal Energy is due to Gravitational Pull of : (A) Moon (B) Sun (C) Earth (D) Mars
(6)	Acceleration of $1.5\ ms^{-2}$ expressed in Km $Hour^{-2}$ is : (A) 324 Km $Hour^{-2}$ (B) 19440 Km $Hour^{-2}$ (C) 5400 Km $Hour^{-2}$ (D) 4 Km $Hour^{-2}$
(7)	Distance covered by a freely falling body in 2 sec will be : (A) 4 . 9m (B) 29 . 2 m (C) 19 . 6m (D) 44 . 1m
(8)	A man in an elevator descending with deacceleration will conclude that his apparent weight has : (A) Increased (B) Decreased (C) Remain Constant (D) Reduced to Zero
(9)	When the bob of Simple Pendulum is at its dynamic equilibrium position , it has : (A) K.E (B) P.E and K.E (C) P.E (D) Both A and B
(10)	A two meter high tank containing water is hit by two bullets of same caliber at 1 . 5 m and 1 m above the ground , the speed of efflux is maximum for : (A) 1 m (B) 1 . 5 m (C) 0 . 5 m (D) 0 . 3 m
(11)	100° is equal to : (A) 1.7 rad (B) 16.5 rad (C) 1.82 rad (D) 1.75 rad
(12)	The distance from first antinode to 7th node is equal to : (A) $\frac{10\lambda}{2}$ (B) 3λ (C) $\frac{11\lambda}{4}$ (D) 7λ
(13)	The infrared light emitted from LED has a Wavelength : (A) 1 . 3 µm (B) 1 . 23 µm (C) 1 . 38 µm (D) 1 µm
(14)	The spacing between two adjacent dark fringes is : (A) $\frac{\lambda L}{2d}$ (B) $\frac{\lambda L}{d}$ (C) $\frac{n\lambda}{d}$ (D) $\frac{2L}{d}$
(15)	The Wavelength of the fundamental mode of vibration of a closed end pipe is : (A) 2ℓ (B) ℓ (C) $\ell/2$ (D) 4ℓ
(16)	When the temperature difference between source and sink is Constant , then the efficiency will be : (A) Smaller (B) Remain Same (C) Greater (D) Zero
(17)	The Entropy of sand in a desert at night time will be : (A) Increases (B) Zero (C) Constant (D) Decreases

Roll No.	1530 - 22000	Inter (Part – I)	Group 2nd
Physics (Subjective)	Inter (Ist – A – Exam – 2024)	Time 2 : 40 Hours Marks : 68	Session (2022 –24) & (2023 – 25)

Note : It is compulsory to attempt any (8 – 8) Parts each from Q.No. 2, Q.No.3 and attempt any (6) Parts from Q.No.4. Attempt any (3) Questions from Part – II .Write the Same Question Number and its Part Number as given in the Question Paper .

Make Diagram where necessary.

(Part – I)

22 x 2 = 44

Q.No.2	(i)	Two sides of a rectangle are 15 . 3 cm and 12 . 80 cm . Find the area of the plate.
	(ii)	What is a Light Year?
	(iii)	Write the dimensions of : (i) Pressure (ii) Density .
	(iv)	Time Period of a Simple Pendulum is measured by a Stop Watch. What type of errors are possible in the Time Period?
	(v)	If $\vec{A} - \vec{B} = \vec{0}$, what can you say about the components of the two vectors?
	(vi)	Can you add zero to a Null Vector?
	(vii)	Name three different conditions that could make $\vec{A}_1 \cdot \vec{A}_2 = 0$
	(viii)	What is the difference between Uniform and Variable Velocity? Define Acceleration.
	(ix)	How Force and Momentum are related to each other?
	(x)	Calculate Time of Flight in case of a Projectile.
	(xi)	How Power and Velocity are related to each other?
	(xii)	What energy changes are involved when a cup breaks into pieces?
Q.No.3	(i)	What is meant by Angular Momentum? Explain the Law of Conservation of Angular Momentum.
	(ii)	Explain how many minimum number of Geo-Stationary Satellite are required for Global Coverage of T.V. Transmission.
	(iii)	Differentiate between Tangential Velocity and Angular Velocity.
	(iv)	Prove that $v = r\omega$
	(v)	Explain the difference between Laminar Flow and Turbulent Flow.
	(vi)	Define Viscosity and Drag Force.
	(vii)	What is meant by Phase Angle? Does it define angle between maximum displacement and the driving Force?
	(viii)	Find the Time Period of Simple Pendulum , if the value of 'g' increases by 2 times.
	(ix)	What do you mean by Damping ?
	(x)	How are Beats Useful in Tuning musical instruments ?
	(xi)	Explain the terms Crest , Trough , Node and Antinode.
	(xii)	What is the effect of temperature on Speed of Sound ? Explain .
Q.No.4	(i)	How would you manage to get more orders of Spectra using a diffraction grating?
	(ii)	Write two uses of Michelson's Interferometer.
	(iii)	10,000 lines Per Centimeter has been ruled on a diffraction grating. Find its Grating Element.
	(iv)	How the light signal is transmitted through the Optical Fibre?
	(v)	What are the uses of Spectrometer?
	(vi)	Find Magnifying Power of Convex Lens of 25cm Focal Length acts as a magnifying glass.
	(vii)	Why does the pressure of a gas in a car tyre increases when it is driven through same distance?
	(viii)	Give an example of natural process that involves an increase in Entropy.
	(ix)	Derive Boyle's Law from Kinetic Theory of Gases.

(Part – II)

3 x 8 = 24

Q.No.5	(a)	When a ball is thrown with some initial velocity V_i making an angle θ with the horizon . Discuss its Motion . Also derive relation for Height , Time of Flight and Range.	(5)
	(b)	What is the Unit Vector in the direction of Vector $\vec{A} = 4\hat{i} + 3\hat{j}$?	(3)
Q.No.6	(a)	Define Conservative Field and prove that work done is independent of the path followed by the body in Gravitational Field.	(5)
	(b)	The frequency of the note emitted by a stretched string is 300 Hz. What will be the frequency of this note when the length of the wave is reduced by one-third without changing the tension?	(3)
Q.No.7	(a)	What is Simple Pendulum ? Show that the motion of Pendulum is S.H.M . Also find relation for its Time Period and Frequency.	(5)
	(b)	What is the least speed at which an Aeroplane can execute a vertical loop of 1 . 0 Km radius so that there will be no tendency for the pilot to fall down at the highest point?	(3)
Q.No.8	(a)	State and Prove equation of Continuity $A_1v_1 = A_2v_2$.	(5)
	(b)	A Heat Engine performs 100 J of work and at the same time rejects 400 J of heat energy to the cold reservoirs . What is the efficiency of the Engine?	(3)
Q.No.9	(a)	Describe in detail the construction and working of Michelson's Interferometer.	(5)
	(b)	A glass light pipe in air will totally internally reflect a light ray if its angle of incidence is at least 39°. What is the minimum angle for total internal reflection if pipe is in water. (Refractive Index of water = 1 . 33) .	(3)

05-05-2024

PHYSICS	PAPER CODE – 6475	TIME : 20 MINUTES
GROUP : FIRST	11th CLASS – 1st Annual 2024	MARKS :17
	OBJECTIVE	

NOTE: You have four choices for each objective type question as A , B , C and D . The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero marks in that question.

QUESTION NO. 1

1 The minimum velocity necessary to put a satellite into orbit is :
(A) 7.1 Kms^{-1} (B) 7.9 Kms^{-1} (C) 7.4 Kms^{-1} (D) 8.7 Kms^{-1}

2 Stoke's law holds for bodies having :
(A) Oblong shape (B) Rectangular shape (C) Spherical shape (D) All shapes

3 Product of time period and frequency is :
(A) Zero (B) π (C) 1 (D) 2

4 The value of 'r' for monoatomic gas is :
(A) 1.67 (B) 1.40 (C) 1.29 (D) 1.45

5 Laplace 's formula for speed of sound is :
(A) $\sqrt{\gamma P/p}$ (B) $\sqrt{E/p}$ (C) $\sqrt{P/p}$ (D) $\gamma P/p$

6 The blue colour of sky is due to :
(A) Reflection (B) Diffraction (C) Scattering (D) Polarization

7 Magnifying power of astronomical Telescope is :
(A) f_e/f_o (B) f_o/f_e (C) $f_e f_o$ (D) $\frac{1}{f_e f_o}$

8 Heat is form of :
(A) Power (B) Momentum (C) Torque (D) Energy

9 Pascal is the unit of :
(A) Force (B) Pressure (C) Tension (D) Weight

10 SI unit of intensity of light is :
(A) Watt (B) Joule (C) Mole (D) Candela

11 1 giga is equal to :
(A) 10^3 (B) 10^{12} (C) 10^9 (D) 10^{18}

12 The magnitude of $\hat{i} . (\hat{j} \times \hat{k})$ is :
(A) -1 (B) 0 (C) 1 (D) $\hat{j}$

13 If A_x and A_y are both negative, the resultant vector will lie in --------- quadrant.
(A) First (B) Second (C) Third (D) Fourth

14 A body having uniform acceleration of 10 ms^{-2} has a velocity of 100 ms^{-1}. In what time its velocity will be doubled ?
(A) 7 S (B) 14 S (C) 10 S (D) 16 S

15 The mass of an object is quantitative measure of its :
(A) Momentum (B) Inertia (C) Energy (D) Velocity

16 Work is negative when angle between $\bar{F}$ and $\bar{d}$ is :
(A) 0^o (B) 90^o (C) 180^o (D) 45^o

17 One revolution is equal to :
(A) $\frac{\pi}{2}$ rad (B) π rad (C) 2π rad (D) $\frac{\pi}{4}$ rad

11th CLASS -- 1st Annual 2024

PHYSICS	SUBJECTIVE PART	TIME: 2 HRS 40 MINUTES
GROUP : FIRST		MARKS: 68

SECTION–I

QUESTION NO. 2 Write short answers to any Eight (8) of the following 16

i	Does a dimensional analysis give any information on constant of proportionality that may apear in an algebraic expression ? Explain.
ii	Give the drawbacks to use the period of a pendulum as a time standard.
iii	Find the uncertainty in the average value of these measurements 1.20 , 1.22 , 1.23 , 1.19
iv	Find the distance between Moon and Earth where the travel time of light from Moon to Earth is 1 min 20 sec.
v	If one of the rectangular components of a vector is not zero. Can its magnitude be zero ? Explain.
vi	Can a body rotate about its center of gravity under the action of its weight ?
vii	If $F_1 = 3$ cm and $F_2 = 6$ cm. Let $\vec{F_1}$ is at angle 30° while $\vec{F_2}$ is lying at an angle of 120° w.r to X-axis respectively, then find their dot Product.
viii	What is the difference between uniform and variable velocity. Give S.I unit of acceleration.
ix	Why does a cricket player retrace his hands backward while catching ?
x	At what point or points in its path does a projectile have its minimum speed, its maximum speed ?
xi	When a rocket re – enters the atmosphere, its nose cone becomes very hot. Where does this heat energy come from ?
xii	Calculate the work done in Kilo joules in lifting a mass of 10 Kg through a vertical height of 10 m.

QUESTION NO. 3 Write short answers to any Eight (8) of the following 16

i	What are natural satellites and artificial satellites ?
ii	Define angular displacement and write its unit.
iii	A disc and a hoop start moving down from the top of an inclined plane at the same time. Which one will be moving faster on reaching the bottom ?
iv	Show that $S = r\theta$
v	Explain the difference between laminar flow and turbulent flow.
vi	Explain what do you understand by the term viscosity ?
vii	Can we realize an ideal simple pendulum ?
viii	What is meant by phase angle ? Does it define angle between maximum displacement and the driving force ?
ix	What is the total distance travelled by an object moving SHM in a time equal to its period, if its amplitude is A ?
x	Explain the terms node and anti-node.
xi	Why does sound travel faster in solid than in gases ?
xii	What are stationary waves ? Explain.

QUESTION NO. 4 Write short answers to any Six (6) of the following 12

i	How would you distinguish between un-polarized and plane-polarized lights ?
ii	Can visible light produce interference fringes ? Explain.
iii	Explain for which colour of light, the fringe spacing in double slit experiment will be maximum.
iv	Why would it be advantageous to use blue light with a compound microscope ?
v	How the power is lost in optical fibre through dispersion ? Explain.
vi	In a compound microscope magnification of objective and eyepiece are 5 and 50 respectively. What is the total magnification of microscope ?
vii	Why does the pressure of a gas in a car tyre increase when it is driven through some distance ?
viii	What happens to the temperature of the room, when an air conditioner is left running on a table in the middle of the room ?
ix	How process of Human metabolism can be explained, by the first law of thermodynamics.

SECTION-II

Note: Attempt any Three questions from this section 8 x 3 = 24

Q.5.(A)	What is vector product of two vectors ? Why it is called cross product ? Give its examples and write down its characteristics.	5
(B)	A truck weighing 2500 Kg and moving with velocity of 21 ms^{-1} collides with a stationary car weighing 1000 Kg. The truck and the car move together after the impact. Calculate their common velocity.	3
Q.6.(A)	What is gravitational field ? Show that gravitational field is a conservative field.	5
(B)	An organ Pipe has a length of 50 cm. Find the frequency of its fundamental note and the next harmonic when it is open at both ends. (Speed of sound = 350 ms^{-1})	3
Q.7.(A)	What is moment of inertia. Discuss the moment of inertia of a rigid body.	5
(B)	A car of mass 1300 Kg is constructed using a frame supported by four springs. Each spring has a spring constant 20,000 Nm^{-1}. If two people riding in the car have a combined mass of 160 Kg. Find the frequency of vibration of the car, when it is driven over a pot hole in the road. Assume the weight is evenly distributed.	3
Q.8.(A)	State and explain Bernoulli's equation.	5
(B)	A mechanical engineer develops an engine. Working between 327 °C and 27 °C and claims to have an efficiency of 52 %. Does he claim correctly ? Explain.	3
Q.9.(A)	How does the magnification of an object is determined by using compound microscope ?	5
(B)	Sodium light λ = 589 nm is incident normally on grating having 3000 lines per centimeter. What is the highest order of the spectrum obtained with this grating ?	3

PHYSICS	PAPER CODE – 6472	TIME : 20 MINUTES
GROUP : SECOND	11th CLASS – 1st Annual 2024	MARKS : 17
	OBJECTIVE	

NOTE: You have four choices for each objective type question as A , B , C and D . The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero marks in that question.

QUESTION NO. 1

1 Unit used for the factor $\sqrt{\frac{l}{g}}$ may be :

(A) Meter (B) Second (C) Kilogram (D) Radian

2 Solid angle is :

(A) One dimensional (B) Two dimensional (C) Three dimensional (D) Four dimensional

3 If the magnitude of $\overline{A} \cdot \overline{B} = \frac{1}{2} AB$ then an angle between $\overline{A}$ and $\overline{B}$ is

(A) 30^o (B) 45^o (C) 60^o (D) 90^o

4 $\hat{i} \cdot (\hat{k} \times \hat{i})$ is equal to :

(A) 0 (B) 1 (C) $\hat{i}$ (D) $\hat{j}$

5 Impulse has the same unit as that of :

(A) Force (B) Energy (C) Mass (D) Momentum

6 When an object moves with constant acceleration, the velocity – time graph is

(A) Parabola (B) Hyperbola (C) Straight line (D) Semi circle

7 1 Kilowatt is the unit of :

(A) Power (B) Work (C) Energy (D) Weight

8 The value of ' g ' at the center of earth is :

(A) infinite (B) 2 g (C) 3 g (D) Zero

9 The expression for the angular momentum is :

(A) $\bar{L} = \bar{p} \cdot \bar{r}$ (B) $\bar{L} = -\bar{p} \cdot \bar{r}$ (C) $\bar{L} = \bar{r} \times \bar{p}$ (D) $\bar{L} = \bar{p} \times \bar{r}$.

10 The diastolic pressure of a normal healthy person in torr is :

(A) 70 - 75 (B) 75 - 80 (C) 90 - 95 (D) 95 - 100

11 If time period of a simple pendulum is double, its length will be

(A) Eight times (B) Four times (C) Three times (D) Two times

12 The value of ' r ' for diatomic gas is :

(A) 1.4 (B) 1.67 (C) 1.29 (D) 1.73

13 Open end of an organ pipe act as :

(A) Node (B) Antinode (C) Crest (D) Trough

14 The wavelength of X – rays is of the order of :

(A) 10^{-10} mm (B) 10^{-10} cm (C) 10^{-10} m (D) 10^{-10} dm

15 Optical fibre is covered for the protection with :

(A) Glass (B) Plastic jacket (C) Copper (D) Aluminum

16 The value of triple point of water is :

(A) 273.16 ^oC (B) 273.16 F (C) 273.16 K (D) 273.16 K^{-1}

17 When hot and cold water are mixed, the entropy :

(A) Decreases (B) Increases (C) Remains constant (D) Zero

PHYSICS	SUBJECTIVE PART	TIME: 2 HRS 40 MINUTES
GROUP : SECOND		MARKS: 68

SECTION–I

QUESTION NO. 2 Write short answers to any Eight (8) of the following 16

i	The length of a floor tile is 0.233 m while its breadth is 0.178 m. Find its area in significant figures.
ii	What is the difference between random error and systematic error ?
iii	Why do we find it useful to have two units for the amount of substance, the Kilogram and the mole ?
iv	Write the dimensions of (i) Pressure (ii) Density
v	If force $\vec{F}$ of magnitude 10 N makes an angle of 30° with y – axis then find its x – component.
vi	What does $\frac{\vec{A} \times \vec{B}}{AB \sin \theta}$ represent ?
vii	Can a vector have a component greater than the vector 's magnitude
viii	If a squash ball comes back to its starting point after bouncing several times, then what would be its average velocity ?
ix	What is velocity time graph ?
x	Define impulse and show how it is related to linear momentum.
xi	A 60 kg man runs up a long flight of stairs in 40 sec. The vertical height of the stairs is 4.5 m. Calculate his power output in watts .
xii	What sort of energy is in the following (a) Compressed spring (b) A moving car

QUESTION NO. 3 Write short answers to any Eight (8) of the following 16

i	Describe what should be the minimum velocity, for a satellite to orbit close to the Earth around it.
ii	Show that orbital angular momentum $L_o = mvr$
iii	Show that how many minimum number of geostationary satellites are required for global coverage of T.V transmission.
iv	Orbital speed of a satellite is 7.9 Kms^{-1}. Calculate its period.
v	What are dimensions of AV , where ' A ' is area and ' V ' is velocity.
vi	A person is standing near a fast moving train. Is there any danger that he will fall towards it ?
vii	Why can we not realize an ideal simple pendulum ?
viii	Explain a relation between total energy, potential energy and kinetic energy of a body oscillating with SHM.
ix	Does frequency depend on amplitude for harmonic oscillator ?
x	Why does sound travel faster in solids than in gases ?
xi	How stationary waves are produced ?
xii	How do bats navigate food ?

QUESTION NO. 4 Write short answers to any Six (6) of the following 12

i	An oil film spreading over a wet footpath shows colours.. Explain how does it happen ?
ii	What is the difference between " Spherical wave front " and " plane wavefront " ?
iii	What are the conditions to observe the interference of light waves ?
iv	If a person was looking through a telescope at the full moon, how would the appearance of the moon be changed by covering half of the objective lens.
v	What will be the speed of light in water ? (refractive index of water is 1.33)
vi	One can buy a cheap microscope for use of children. The images seen in such a microscope have coloured edges. Why is this so ?
vii	Why the entropy of the system increases due to friction ?
viii	Why does the pressure of a gas in a car tyre increase when it is driven through some distance ?
ix	The oceans and our atmosphere contain large amount of heat energy but we cannot convert this energy into useful work. Why ?

SECTION-II

Note: Attempt any Three questions from this section 8 x 3 = 24

Q.5.(A)	Explain the addition of vector by rectangular components. Also write the main steps for addition.	5
(B)	A truck weighing 2500 Kg and moving with a velocity of 21 ms^{-1} collides with a stationary car weighing 1000 Kg. The truck and the car move together after the impact. Calculate their common velocity.	3
Q.6.(A)	What are stationary waves ? How they generate in an air column ?	5
(B)	A car of mass 800 kg at 54 km h^{-1} is brought to rest in 60 m. Find the average retarding force on the car. What has happened to its original kinetic energy ?	3
Q.7.(A)	How would you Differentiate real weight with apparent weight on the basis of frame of reference, also elaborate the reading of the scale as apparent weight in case of movement of lift.	2+1+1+1
(B)	A block of mass 4.0 Kg is dropped from a height of 0.80 m on to a spring of spring constant K = 1960 N/m, find the maximum distance through which the spring will be compressed ?	3
Q.8.(A)	What is terminal velocity ? Show that terminal velocity of fog droplet is directly proportional to the square of its radius.	5
(B)	A heat engine performs 100 J of work and at the same time rejects 400 J of heat energy to the cold reservoirs. What is the efficiency of the engine ?	3
Q.9.(A)	Explain the diffraction of X – rays by crystal and derive Bragg's law. What are the uses of diffraction of X – rays ?	5
(B)	An astronomical telescope having magnifying power of 5 consists of two thin lenses 24 cm apart. Find the focal lengths of these lenses.	3

SAHIWAL BOARD

Physics
Session (2024)

(Inter Part – I, Group – I, Paper Code: 6475)
Objective

Time : 20 Minutes
Marks : 17

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number with marker or pen. Cutting of filling two or more circles will result in zero mark in that question.

1. **The ratio of size of image to the size of object is called:**
   (a) Polarization (b) Magnification (c) Transmission (d) Reflection
2. **Thin oil film on water surface shows colour due to:**
   (a) Diffraction (b) Interference (c) Polarization (d) Reflection
3. **Velocity of sound in free space is:**
   (a) $332ms^{-1}$ (b) $224\ ms^{-1}$ (c) $76\ ms^{-1}$ (d) Zero ms^{-1}
4. **If the pressure of gas is doubled, then speed of sound is:**
   (a) Doubled (b) Not changed (c) Half (d) Increased 4 times
5. **The wave form of SHM is:**
   (a) Square wave (b) Saw tooth wave (c) Sine wave (d) Random wave
6. **The maximum drag force on falling sphere is 9.8 N, its weight is:**
   (a) 1N (b) 9.8N (c) 19.8N (d) 980N
7. **A rev min^{-1} is equal to:**
   (a) $\pi/30\ rad\ s^{-1}$ (b) $\pi/6\ rad\ s^{-1}$ (c) $\frac{\pi}{15}\ rad\ s^{-1}$ (d) $\pi/20\ rad\ s^{-1}$
8. **Which is correct relation?**
   (a) $\bar{v} = \bar{w} \times \bar{r}$ (b) $\bar{v} = \bar{w}\bar{r}$ (c) $\bar{w} = \bar{v} \times \bar{r}$ (d) $\bar{v} = \bar{r} \times \bar{w}$
9. **Earth receives large amount of energy directly from:**
   (a) Wind (b) Sun (c) Moon (d) Water
10. **The slope of velocity-time graph gives:**
    (a) Speed (b) Torque (c) Displacement (d) Acceleration
11. **The distance covered by a body in time 't' starting from rest is:**
    (a) at^2 (b) v^2t (c) $\frac{a^2t}{2}$ (d) $\frac{at^2}{2}$
12. **Which is vector quantity?**
    (a) Length (b) Volume (c) Work (d) Velocity
13. **A single vector having same effect as all the original vectors taken together is:**
    (a) Equal vector (b) Resultant vector (c) Position vector (d) Unit Vector
14. **If percentage uncertainty in radius of a sphere is 2%, then total uncertainty in the volume is:**
    (a) 6% (b) 2% (c) 4% (d) 8%
15. **In 8.70×10^4 kg has number of significant digits:**
    (a) Four (b) Two (c) Three (d) Seven
16. **Entropy of an irreversible process:**
    (a) Increases (b) Decreases (c) Remains same (d) None of these
17. **If 32 Joule work is done by absorbing heat of 42 Joule, change in internal energy is:**
    (a) $\Delta U = 74J$ (b) $\Delta U = 10J$ (c) $\Delta U = \frac{21}{8}J$ (d) $\Delta U = \frac{8}{21}J$

Roll No. _____ (To be filled in by the candidate)

Physics | H.S.S.C (11th) 1st-Annual-2024 | Time: 20 Minutes

Paper: I Group: Ist | Objective - (i) | Marks: 17

Paper Code	6	4	7	1

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number in your answer book. Use marker or pen to fill the circles. Cutting or filling up two or more circles will result no mark.

SECTION – A

Q.1	Questions	A	B	C	D
1.	In 8.70×10^4 kg has number of significant digits:	Four	Two	Three ●	Seven
2.	If percentage uncertainty in radius of a sphere is 2% then total uncertainty in the volume is:	6% ●	2%	4%	8%
3.	A single vector having same effect as all the original vectors taken together is:	Equal vector	Resultant vector ●	Position vector	Unit vector
4.	Which is vector quantity?	Length	Volume	Work	Velocity ●
5.	The distance covered by a body in time 't' starting from rest is:	at^2	v^2t	$\frac{a^2t}{2}$	$\frac{at^2}{2}$ ●
6.	The slope of velocity-time graph gives:	Speed	Torque	Displacement	Acceleration ●
7.	Earth receives large amount of energy directly from:	Wind	Sun ●	Moon	Water
8.	A rev min^{-1} is equal to:	$\pi/30$ *rad* s^{-1} ●	$\pi/6$ *rad* s^{-1}	$\frac{\pi}{15}$ *rad* s^{-1}	$\pi/20$ *rad* s^{-1}
9.	Which is correct relation?	$\vec{v}=\vec{w}\times\vec{r}$ ●	$\vec{v}=\vec{w}.\vec{r}$	$\vec{w}=\vec{v}\times\vec{r}$	$\vec{v}=\vec{r}\times\vec{w}$
10.	The maximum drag force on falling sphere is 9.8 N, its weight is:	1 N	9.8 N ●	19.8 N	980 N
11.	The wave from of SHM is:	Square wave	Saw tooth wave	Sine wave ●	Random wave
12.	If the pressure of gas is doubled, then speed of sond is:	Doubled	Not changed ●	Half	Increased 4 times
13.	Velocity of sound in free space is:	$332ms^{-1}$	$224ms^{-1}$	$76ms^{-1}$	Zero ms^{-1} ●
14.	Thin oil film on water surface shows colour due to:	Diffraction	Interference ●	Polarization	Dispersion
15.	The ratio of size of image to the size of obejct is called:	Polarization	Magnification ●	Transmission	Reflection
16.	Entropy of an irreversible process:	Increases ●	Decreases	Remains same	None of these
17.	If 32 joule work is done by absorbing heat of 42 joule, change in internal energy is:	$\Delta U=74J$	$\Delta U=10J$ ●	$\Delta U=\frac{21}{8}J$	$\Delta U=\frac{8}{21}J$

2. Write short answers to any EIGHT parts.

i. The period of simple pendulum is measured by a stop watch. What type of errors are possible in the time period?

ii. Write down the dimensions of a) pressure b) density

iii. What is the light year and write down its units?

iv. Write down any two rules for rounding off the significant figures.

v. Can you add zero to a null vector?

vi. The vector sum of three vectors gives a zero resultant. What can be the orientation of the vectors?

vii. What is the moment of a force about the point lying on the axis of rotation?

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. What is meant by instantaneous acceleration? Write down its formula.

x. Show that $F = \frac{\Delta P}{\Delta t}$

xi. How energy can be obtained from sea tides? Explain

xii. When a rocket re-enters the atmosphere, its nose cone becomes very hot. Where does this heat energy come from?

3. Write short answer to any EIGHT parts.

i. During circular motion with constant speed, body's velocity is northward. After time Δt its velocity is westward. What will be the direction of centripetal force? Explain with vector diagram.

ii. Explain the difference between tangential velocity and angular velocity.

iii. What is meant by moment of inertia? Explain its significance.

iv. Show that orbital angular momentum $L_o = mvr$

v. Why fog droplets appear to be suspended in air?

vi. What is the difference between laminar flow and turbulent flow?

vii. Find the angular velocity of a point on the earth's equator as a result of earth's rotation.

viii. A simple pendulum has time period 2s with amplitude 0.10m. Find its maximum acceleration.

ix. Name two characteristics of simple harmonic motion.

x. Does frequency depend on amplitude for harmonic oscillators?

xi. State law of reflection for transverse waves.

xii. What features do longitudinal waves have in common with transverse waves?

4. Write short answer to any SIX parts.

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

ii. What do sugar and tartaric acid show when they are in solution and why?

iii. How did Michelson measure the length of a standard metre?

iv. What will be the angular magnification of telescope having an objective of focal length of 20cm and an eye piece of 4.0cm, both convex lenses.

v. Describe the function of repeaters and photodiode in signal transmission?

vi. A magnifying glass gives a five-times enlarged image at a distance of 25 cm from the lens. Find focal length using ray diagram.

vii. Why do we keep pressure or volume constant to study the effect of heating gases?

viii. A thermo flask containing milk as a system is shaken rapidly. Does the temperature of milk rise?

ix. Why the internal energy is similar to gravitational potential energy? Explain

SECTION – II

Attempt any THREE questions. Each question carries 08 Marks.

5. (a) Discuss vector addition of a number of coplanar vectors by rectangular components.

(b) A bomber dropped a bomb at a height of 490m when its velocity along horizontal was 300kmh^{-1}. How long was it in air?

6. (a) Derive an expression of Laplace's correction for speed of sound in air. Is this correction close to experimental value?

(b) A car of mass 800kg travelling at 54kmh^{-1} is brought to rest in 60 metres. Find the average retarding force on the car.

7.(a) Define and explain centripetal force and derive the relation for it.

(b) A block of mass 4.0kg is dropped from a height of 0.80m onto a spring of spring constant K=1960 Nm^{-1}. Find the maximum distance through which the spring will be compressed.

8.(a) Define and explain the velocity at which the water droplets attain the dynamic equilibrium in air.

(b) Calculate the entropy change when 1.0kg ice at 0° C melts into water at 0° C. Latent heat of fusion of ice $L_f = 3.36 \times 10^5$ J kg^{-1}.

9. (a) In fibre optic communication system, explain signal transmission and conversion to sound.

(b) A light is incident normally on a grating which has 2500 lines per centimetre. Compute the wavelength of a spectral line for which the deviation in second order is 15.0°.

Roll No. _____ (To be filled in by the candidate)

Physics
Paper: I Group: II

H.S.S.C (11th)1st-Annual-2024
Objective-(iv)

Time: 20 Minutes
Marks: 17

Paper Code	6	4	7	8

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number in you answer book. Use marker or pen to fill the circles. Cutting or filling up two or more circles will result no mark.

SECTION – A

Q.1	Questions	A	B	C	D
1.	Which one is constant for a satellite in orbit:	Potential energy	Velocity	Angular momentum	Kinetic energy
2.	The ratio of moment of inertia of a solid cylinder and thin ring is:	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{2}{5}$	$\frac{2}{1}$
3.	A fog droplet of radius "r" falls in air with terminal velocity v_t if the radius of the droplet become "2r". Then terminal velocity is:	$\frac{v_t}{1}$	$4v_t$	$2v_t$	v_t
4.	If the suspended mass of pendulum is doubled then its time period:	Becomes double	Becomes half	Remains unchanged	1.414 times increased
5.	The distance between two consecutive nodes or antinodes is:	$\frac{\lambda}{2}$	$\frac{\lambda}{4}$	2λ	4λ
6.	When a wave is travelling in a denser medium incident on a rare medium, the reflected wave undergoes a phase change of:	0	$\frac{\pi}{2}$	π	2π
7.	The transverse nature of light is confirmed by the phenomenon of:	Interference	Polarization	Diffraction	Beats
8.	Final image formed in compund microsope is:	Virtual and erect	Virtual and inverted	Real and inverted	Real and erect
9.	The mean square velocity of the gas molecule is given by:	$\sqrt{\frac{3T}{2K}}$	$\sqrt{\frac{KT}{m}}$	$\sqrt{\frac{2KT}{m}}$	$\frac{3KT}{m}$
10.	If a heat engine has 65% efficiency, then $\frac{T_2}{T_1}$ =	0.5	0.45	0.35	0.25
11.	1 watt hour =	3.6 J	3.6 MJ	3.6×10^{8}J	3.6×10^{3}J
12.	If the mass of the body is increased to four times while the force is kept constant, then acceleration in body will become:	One Half	Doubled	One Fourth	Four Times
13.	The range of projectile at 60° is the same as that angle:	30°	45°	90°	120°
14.	Vectors A and B of magnitudes 4 N and 3 N make an angle of 30° and 60° with x-axis respectively. The scalar product of the two vectors:	12 N	7 N	10 N	6 N
15.	Two forces act together on an obect. The magnitude of their resultant force is minimum when they act at:	180°	90°	450°	0°
16.	Which the given quantity has different dimensisons?	Work	Energy	Pressure	Torque
17.	Time for 20 vibrations of a simple pendulum is 40.25 sec measured by a stop watch of accuracy up to 0.1 sec. The absolute uncertaintry in the time period is:	±2.01	±0.05	±0.003	±0.005

2. **Write short answers to any EIGHT parts.**

i Why do we find it useful to have two units for the amount of substance, the kilogram and the mole?

ii Name several repetitive phenomena occurring in nature which could serve as reasonable time standards

iii. How can you reduce random and systematic error?

iv. Write down dimensions of a) work b) torque

v. If $\bar{A} + \bar{B} = \bar{0}$, what can you say about the components of the two vectors?

vi Can a body rotate about its centre of gravity under the action of its weight?

vii What is the position vector? Explain.

viii Explain the circumstances in which the velocity $\bar{v}$ and acceleration $\bar{a}$ of a car are

a) $\bar{v}$ is zero but $\bar{a}$ is not zero b) $\bar{a}$ is zero but $\bar{v}$ is not zero.

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

x If we draw a graph between velocity and time, how can you find the distance and acceleration from it.

xi. A boy uses a catapult to throw a stone which accidentally smashes a greenhouse window. List the possible energy changes. xii. What is salter's duck? Explain.

3. **Write short answer to any EIGHT parts.**

i. What is meant by moment of inertia? Explain its significance.

ii. Show that orbital angular momentum, $L_o = mvr$ iii. How many radians are there in 2 degree?

iv. What is the difference between real and apparent weights?

v. Explain, how the swing is produced in a fast moving cricket ball?

vi. What are three conditions which fluid must satisfy to study its motion?

vii Can we realize an ideal simple pendulum?

viii. Show that in SHM the acceleration is zero when the velocity is greatest and the velocity is zero when the acceleration is greatest.

ix. If spring is cut into two equal halves, what will be spring constant of each part?

x. What features do longitudinal waves have in common with transverse waves?

xi. As a result of a distant explosion, an observer senses a ground tremor and then hears the explosion? Explain the time difference. xii. What is period of 300 cycles per second of sound waves?

4. **Write short answer to any SIX parts.**

i. Can visible light produce interference fringes? Explain.

ii. Why a fringe is shifted when mirror is shifted through $\lambda / 2$ in Michelson interferometer.

iii. Why longitudinal waves do not show polarization?

iv. Why is it preferred to use the lens of small focal length for high angular magnification?

v. One can buy a cheap microscope for the use of children. The image seen in such a microscope have coloured edges. Why is this so? vi. What do you understand by axial ray? How does it travel?

vii. Can Boyle's law be derived by Kinetic Molecular theory? If so, explain.

viii. Specific heat of a gas at constant pressure is greater than specific heat at constant volume. Why?

ix. Why is it not possible to utilize the heat contents of oceans and atmosphere?

SECTION – II

Attempt **any THREE questions. Each question carries (8) Marks.**

5.(a) What is meant by rectangular components? Explain addition of two vectors by rectangular components.

(b) Prove that for angles of projection, which exceed or fall short of 45° by equal amounts, the ranges are equal.

6. (a) If a body of mass 'm' is dropped from height 'h' as shown, discuss the interconversion of energies during its motion.

(b) An organ pipe has a length of 50 cm. Find the frequency of its fundamental note and the next harmonic when it is closed at one end.

7. (a) What is meant by centripetal force? Derive relations for centripetal force and centripetal acceleration.

(b) A block of mass 4.0 kg is dropped from a height of 0.80 m onto a spring of spring constant K-1960 Nm^{-1}, find the maximum distance through which the spring will be compressed.

8. (a) Define molar heat capacity and prove that $C_p - C_v = R$

(b) How large must a heating duct be if air moving 3.0 ms^{-1} along it can replenish the air in a room of 300 m_3 volume every 15 min? Assume the air's density remains constant.

9. (a) How would you derive the equation of magnification of compound microscope accompanied by ray diagrammatic explanation? Also, give two points to resolve the details of an image.

(b) X-rays of wavelength 0.150 nm are observed to undergo a first order reflection at a Bragg angle of 13.3° from a quartz crystal. What is the interplanar spacing of the reflecting planes in the crystal?