Paper I	(Objective Type)	**Inter (Ist – A – Exam – 2024)**	
Time :	20 Minutes	**Inter (Part – I)**	**(Group Ist)**
Marks :	17 BWP-1-24	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)	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
(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)	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
(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)	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) $\frac{2}{3}mr^2$
(7)	Tidal Energy is due to Gravitational Pull of : (A) Moon (B) Sun (C) Earth (D) Mars
(8)	Motion of Projectile is : (A) One Dimensional (B) Two Dimensional (C) Three Dimensional (D) Four Dimensional
(9)	The Unit of Rotational K.E is : (A) rad s^{-1} (B) Js (C) J (D) Kgm^2
(10)	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
(11)	Time Period of Simple Pendulum only depends on : (A) Mass (B) Length (C) Amplitude (D) Displacement
(12)	Stoke 's Law hold for bodies when they have : (A) Spherical Shape (B) Curved Shape (C) Rectangular Shape (D) Triangle Shape
(13)	The maximum value of beat frequency is : (A) 10 Hz (B) 100 Hz (C) 20 Hz (D) 30 Hz
(14)	When Ice melts , entropy : (A) Increases (B) Decreases (C) Constant (D) Zero
(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)	The effective path difference between two x-ray beams reflected from a crystal plane is : (A) $d \sin\theta$ (B) $\frac{d}{2}\sin\theta$ (C) $2d \sin\theta$ (D) $\frac{2\sin\theta}{d}$
(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) $Q = W$

B

(Subjective)

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** | BWP-24 | 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 $\theta = 0 . 25^\circ$. The Wavelength is 650nm . Determine the slit separation.	(3)

Physics	(B)	L.K.No.1530	Paper Code No. 6474
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 (1)	The Entropy of sand in a desert at night time will be : (A) Increases (B) Zero (C) Constant (D) Decreases
(2)	When the temperature difference between source and sink is Constant , then the efficiency will be : (A) Smaller (B) Remain Same (C) Greater (D) Zero
(3)	The infrared light emitted from LED has a Wavelength : (A) 1 . 3 μm (B) 1 . 23 μm (C) 1 . 38 μm (D) 1 μm
(4)	The spacing between two adjacent dark fringes is : (A) $\frac{\lambda L}{2d}$ (B) $\frac{\lambda L}{d}$ (C) $\frac{n\lambda}{d}$ (D) $\frac{2L}{d}$
(5)	The Wavelength of the fundamental mode of vibration of a closed end pipe is : (A) 2ℓ (B) ℓ (C) $\ell/2$ (D) 4ℓ
(6)	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
(7)	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
(8)	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
(9)	100^{o} is equal to : (A) 1.7 rad (B) 16.5 rad (C) 1.82 rad (D) 1.75 rad
(10)	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
(11)	Tidal Energy is due to Gravitational Pull of : (A) Moon (B) Sun (C) Earth (D) Mars
(12)	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 $Hour^{-2}$
(13)	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
(14)	The angle between two vectors $2\hat{i} - 3\hat{j}$ and $3\hat{k}$ is : (A) 30^{o} (B) 90^{o} (C) 60^{o} (D) 0^{o}
(15)	A Paratrooper having : (A) Dynamic Equilibrium (B) Static Equilibrium (C) Acceleration (D) Zero Velocity
(16)	$Kgm^{2}s^{-2}$ is the unit of : (A) Work (B) Force (C) Moment of Force (D) Both A and C
(17)	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

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)** | BWP-2-24 | 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 $\mathbf{v}_i$ 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)

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