Physics	(B)	L.K.No. 1107	Paper Code No. 6473
Paper I	(Objective Type)	Inter – A – 2022	(Group Ist)
Time :	20 Minutes	Inter (Part I)	
Marks :	17	Session (2020 – 22) to (2021 – 23)	

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

BWP-Gr.-22

Q.No.1 (1)	Average Translational Kinetic Energy of Gas Molecule is related by : (A) $\frac{1}{2}$ KT (B) KT (C) $\frac{2}{3}$ KT (D) $\frac{3}{2}$ KT
(2)	The S.I. unit of product of Pressure and Volume is : (A) $Watt$ (B) Joule (C) $Pascal$ (D) Kelvin
(3)	When a Beam of white light falls perpendicularly on a plane of glass , then angle of refraction will be : (A) 90^{o} (B) 60^{o} (C) 0^{o} (D) 180^{o}
(4)	The phase difference of 180^{o} is equivalent to a path difference of : (A) $\frac{\lambda}{2}$ (B) $\frac{\lambda}{4}$ (C) 2λ (D) λ
(5)	Speed of Sound in Air is independent of : (A) Density (B) Pressure (C) Temperature (D) Elasticity
(6)	Speed of Sound at 10^{o}C is : (A) 332 ms^{-1} (B) 339 ms^{-1} (C) 349 ms^{-1} (D) 360 ms^{-1}
(7)	Total Energy of Particle in SHM is proportional to square of : (A) Acceleration (B) Velocity (C) Time Period (D) Amplitude
(8)	Pressure is low where speed is : (A) High (B) Low (C) Zero (D) Constant
(9)	The range of a projectile becomes half of the maximum range at angle of projection : (A) 15^{o} (B) 25^{o} (C) 45^{o} (D) 72^{o}
(10)	How many Radians are in a Semi Circle : (A) $2\pi\ rad$ (B) $\frac{\pi}{2} rad$ (C) $\pi\ rad$ (D) 10π rad
(11)	Escape Velocity of an object is independent of : (A) Mass of the Object (B) Mass of the Planet (C) Radius of the Planet (D) Type of Planet
(12)	For the impulse to be zero , which of the following must be constant : (A) Force (B) Velocity (C) Acceleration (D) All these
(13)	The time to reach the maximum height by the Projectile is : (A) $\frac{V_i Sin\theta}{g}$ (B) $\frac{2V_i Sin\theta}{g}$ (C) $\frac{V_{i2} Sin^2\theta}{g}$ (D) $\frac{V_{i2} Sin\theta}{g}$
(14)	Minimum Coplanar unequal forces for producing equilibrium are : (A) 2 (B) 3 (C) 4 (D) 5
(15)	$\hat{i} \cdot (\hat{j} \times \hat{k})$ equals : (A) 1 (B) Zero (C) $\hat{i}$ (D) $-\hat{j}$
(16)	The percentage uncertainties in Length and Width of a rectangle are 2 % and 3 % . Its area has percentage uncertainty : (A) 1 % (B) 5 % (C) 6 % (D) 2 %
(17)	The number 56 . 8546 is rounded off to three significant figures as : (A) 57 . 0 (B) 56 . 8 (C) 56 . 9 (D) 56 . 854

Roll No:	1107 – 25000	Session (2020 – 22) to (2021 – 25)	Inter (Part – I)
Physics (Subjective)	**Inter – A – 2022**	Time 2 : 40 Hours Marks : 68	**Group 1st**

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-Gu-22 | 22 x 2 = 44

Q.No.2	(i)	What are the Dimensions and Units of Gravitational Constant G in the formula $F = G\frac{m_1 m_2}{r^2}$?
	(ii)	Why do we find it useful to have two units for the amount of substance, the kilogram and the mole ?
	(iii)	Write the dimensions of Pressure and Density.
	(iv)	Define Random Error and Systematic Error. How can these errors be reduced ?
	(v)	Can the velocity of an object reverse the direction when acceleration is constant? If so give an example.
	(vi)	Explain the circumstances in which the velocity $\vec{v}$ and acceleration $\vec{a}$ of a car are : (a) Anti Parallel (b) $\vec{v}$ is zero but $\vec{a}$ is not zero.
	(vii)	A football is thrown upward with an angle of 30° above the horizon. To throw a 40 m pass what must be the initial speed of ball ?
	(viii)	Differentiate clearly between Elastic and Inelastic Collision. What can you say about momentum during these Collisions?
	(ix)	For an Adiabatic Process, write down the form of first law of Thermodynamics.
	(x)	Give an example of natural process that involves an increase in entropy.
	(xi)	A thermos flask containing milk as a system is shaken rapidly. Does the temperature of milk rise ?
	(xii)	Why does the pressure of a Gas in a car tyre increase when it is driven through some distance ?
Q.No.3	(i)	Can a vector have a component greater than the vector magnitude?
	(ii)	Is it possible to Add a Vector Quantity to a Scalar Quantity ? Explain.
	(iii)	If $\vec{A} + \vec{B} = 0$ what can you say about the components of the two vectors ?
	(iv)	State First and Second Conditions of Equilibrium.
	(v)	Does the work done in raising a box on the platform depend upon how fast it is raised up ? If not why ?
	(vi)	When Rocket re - enters the atmosphere , its nose cone becomes very hot. Where does this heat energy come from ?
	(vii)	What is meant by Moment of Inertia ? Explain its role in angular motion.
	(viii)	Describe what should be the maximum velocity for a satellite to orbit close to the earth around it ?.
	(ix)	Differentiate between Angular Acceleration and Centripetal Acceleration.
	(x)	State the Huygen's Principle.
	(xi)	Under what conditions two or more sources of light behave as coherent sources ?
	(xii)	How would you manage to get more orders of spectra using a diffraction grating?
Q.No.4	(i)	Why Fog Droplets appear to be suspended in air ?
	(ii)	Does frequency depend on Amplitude for Harmonic Oscillators?
	(iii)	Can we realize an Ideal Simple Pendulum ?
	(iv)	What information would you use to elaborate the formula of time period of Simple Pendulum? Support your answer with varying different parameters.
	(v)	How are beats useful in tunning musical instruments ?
	(vi)	As a result of distant explosion , an observer senses a ground tremor and then hears the explosion. Explain the time difference.
	(vii)	How the power is lost in optical fibre through dispersion ? Explain.
	(viii)	How would you compile the facts for reflection of Waves ?
	(ix)	What information would you use to write for single mode step index fibre ?

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(Part II)

Q.No.5	(a)	Define and explain the term Torque. Calculate the Torque due to force acting on a rigid body.	(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 2.0×10^{7} ms^{-1} through a distance of 5.0 cm ?	(3)
Q.No.6	(a)	Discuss how Astronauts get Artificial Gravity in space ? Derive $f = \frac{1}{2\pi}\sqrt{\frac{g}{R}}$	(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.7	(a)	Define Bernoulli's Equation and prove that : $P + \frac{1}{2}\rho v^2 + \rho gh =$ constant for ideal Fluid.	(5)
	(b)	A steel wire hangs vertically from a fixed point, supporting a weight of 80 N at its lower end. The diameter of the wire is 0.50 mm and its length from the fixed point to the weight is 1.5 m. Calculate the fundamental frequency emitted by the wire when it is plucked ? (Density of Steel is 7.8×10^{3} Kgm^{-3})	(3)
Q.No.8	(a)	Discuss the energy conservation in Simple Harmonic Motion.	(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°.	(3)
Q.No.9	(a)	Define Molar Specific Heat of Gas. Show that $C_p - C_v = R$	(5)
	(b)	A compound Microscope has lenses of focal length 1.0 cm and 3.0 cm. An object is placed 1.2 cm from the object lens. If a virtual image is formed 25 cm from the eye, calculate the separation of the lenses and the magnification of the instrument.	(3)

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Physics	(C)	L.K.No. 1108	Paper Code No. 6476
Paper I	(Objective Type)	Inter – A – 2022	(Group 2nd)
Time :	20 Minutes	Inter (Part I)	
Marks :	17	Session (2020 – 22) to (2021 – 23)	

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

Bwp-42-22

Q.No.1 (1)	The magnitude of the vector product of two non – zero vectors $\vec{A}$ and $\vec{B}$ making an Angle θ with each other is : (A) $AB\sin\theta \cdot \hat{n}$ (B) $AB\cos\theta$ (C) $AB\sin\theta$ (D) AB
(2)	Error in the measurement of Sphere is 1 %. The error in the calculated value of volume is : (A) 1 % (B) 3 % (C) 5 % (D) 7 %
(3)	The dimensions of the relation $\sqrt{\frac{F \times l}{m}}$ are equal to the dimensions of : (A) Force (B) Momentum (C) Acceleration (D) Velocity
(4)	If Cross Product of $\vec{A} \times \vec{B}$ is along y – axis, then $\vec{A}$ and $\vec{B}$ must lie in : (A) xy - Plane (B) yz – Plane (C) Space (D) xz - Plane
(5)	Tidal Energy is due to Gravitational Pull of : (A) Sun (B) Moon (C) Earth (D) Mars
(6)	In Projectile Motion , the Vertical Component of the Velocity : (A) Remains Constant (B) Becomes Zero (C) Varies Point to Point (D) Increases with time
(7)	For a typical rocket , how much mass of rocket is in the form of fuel : (A) 50 % (B) 60 % (C) 80 % (D) 100 %
(8)	If Linear Velocity and Radius are both made half of a body moving in a circle , the Centripetal Force becomes : (A) Fc (B) $\frac{Fc}{2}$ (C) $\frac{Fc}{4}$ (D) 2 Fc
(9)	In Mass Spring System , $\frac{1}{2} K x_o^2$ represents : (A) Total Energy (B) Kinetic Energy (C) Potential Energy (D) Velocity
(10)	The fluid is said to be incompressible if its density is : (A) Zero (B) Very High (C) Very Small (D) Constant
(11)	The ratio of Moment of Inertia of Disc and hoop is : (A) $\frac{1}{2}$ (B) $\frac{1}{4}$ (C) $\frac{3}{4}$ (D) $\frac{3}{2}$
(12)	Types of Waves used in Sonar are : (A) Light Waves (B) Heat Waves (C) Sound Waves (D) Water Waves
(13)	The light signal in Optical Fibre must by regenerated by a device called : (A) Motor (B) Generator (C) Repeater (D) Laser
(14)	What remains constant in an Adiabatic Process : (A) *Volume* (B) Pressure (C) *Temperature* (D) *Heat*
(15)	If a Stretched String is 4 m and has 4 loops of Stationary Wave , then Wavelength is : (A) 1 m (B) 2 m (C) 3 m (D) 4 m
(16)	If P = Pressure , V = Volume of a Gas , then PΔV represents : (A) *Work* (B) Density (C) *Power* (D) Temperature
(17)	Fringe Spacing increases if we use : (A) Red Light (B) Blue Light (C) Yellow Light (D) Green Light

Physics (Subjective)	Inter – A – 2022	Time 2 : 40 Hours Marks : 68	Group 2nd

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-Gz-22 | 22 x 2 = 44

Q.No.2	(i)	Time for 40 vibrations of Simple Pendulum recorded by a stop watch with least count one tenth of a second is 80 . 6 s . Find Time Period.
	(ii)	The length and width of a rectangular plate are measured to be 15 . 3 cm and 12 . 80 cm respectively. Find area of plate .
	(iii)	The Wavelength λ of a Wave depends on the speed v of the wave and its frequency f , knowing that $[\lambda] = [L]$, $[V] = [LT^{-1}]$ and $[f] = [T^{-1}]$. Decide which of the given is correct $f = v\lambda$ or $f = \frac{v}{\lambda}$
	(iv)	Give the drawbacks to use the period of Pendulum as Time Standard.
	(v)	Water is projected from two rubber pipes at the same speed from one at an angle of 30^{o} and from the other at 60^{o} . Why are the ranges equal ?
	(vi)	Define Projectile. Give examples and discuss its Horizontal and Vertical Accelerations.
	(vii)	Explain the difference between Elastic and Inelastic Collisions. Explain how would a bouncing ball behave in each case. Give Plausible reasons for fact that K.E. is not conserved in most cases ?
	(viii)	Can the velocity of an object reverses the direction when acceleration is constant ? If so give example.
	(ix)	A thermos flask containing milk as a system is shaken rapidly. Does the temperature of the milk rise ?
	(x)	Is it possible to a heat engine that will not expel heat into the atmosphere ?
	(xi)	Give an example of a natural process that involves an increase in entropy.
	(xii)	Write the Postulates of Kinetic Molecular Theory of Gases.
Q.No.3	(i)	A vector can not have a component greater than the Vector's Magnitude why ?
	(ii)	What is the magnitude of a vector $\vec{A} = -4\hat{i} + 5\hat{j}$? In which quadrant does the vector lie ?
	(iii)	If all the components of the vectors , $\overrightarrow{A_1}$ and $\overrightarrow{A_2}$ were reversed, how would this alter $\overrightarrow{A_1} \times \overrightarrow{A_2}$?
	(iv)	A girl drops a cup from a certain height which breaks into pieces. What energy changes are involved ?
	(v)	Calculate the work done in kilo Joules in lifting a mass of 10 Kg through a vertical height of 10 m at steady velocity.
	(vi)	Define Kilowatt Hour. Show that 1 kWh = 3 . 6 MJ .
	(vii)	Obtain a relation for Orbital Velocity of a Satellite orbiting around the earth at a distance " r " from centre of the earth.
	(viii)	What is meant by Moment of Inertia ? Explain its role in angular motion.
	(ix)	Explain the difference between Tangential and Angular Velocity. How can these Velocities be related to each other ?
	(x)	Define Grating Element. A diffraction grating has 5000 lines / cm , calculate Grating Element.
	(xi)	An oil film spreading over a wet footpath shows colours. Explain how does it happen ?
	(xii)	Write down the two postulates of Huygen's Principle.
Q.No.4	(i)	What is Drag Force ? What will be the effect of Drag Force acting upon a small sphere of Radius " r " , moving down through a liquid , depend ?
	(ii)	What is meant by Phase Angle ? Does it define angle between maximum displacement and the driving force ?
	(iii)	If a Mass Spring System is hung vertically and set into oscillations, why does the motion eventually stop ?

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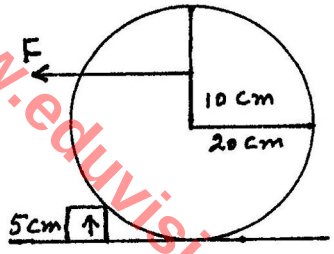
	(iv)	What is the frequency of Simple Pendulum if its length is 100 cm ?
	(v)	What are the conditions of Constructive and Destructive Interference of Sound ?
	(vi)	What features do Longitudinal Waves have in common with Transverse Waves ?
	(vii)	Explain why sound travel faster in Warm Air than in Cold Air ?
	(viii)	What do you mean by Linear Magnification and Angular Magnification ? Explain how a Convex Lens is used as Magnifier ?
	(ix)	What is function of Repeaters in Transmission of Signals through Optical Fibres ?

Part - II

Q.No.5	(a)	How would you prove that work done is independent of the path followed by a body? Also define conservative field.	(5)
	(b)	A Spherical Ball of weight 50 N is to be lifted over the step as shown in the figure. Calculate the minimum force needed just to lift it above the floor. 	(3)
Q.No.6	(a)	Define Projectile. Also derive the relation for : (i) Height of Projectile (ii) Time of Flight	(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.7	(a)	What is Doppler's Effect ? Discuss its two cases for source and observer relative to each other .	(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)
Q.No.8	(a)	Define Simple Harmonic Motion. Prove that the motion of Simple Pendulum is Simple Harmonic Motion. Also derive the expression for its time period.	(5)
	(b)	Yellow Sodium light of Wavelength 589 nm , emitted by a single source passes through two narrow slits 1 . 00 mm apart . The Interference pattern is observed on a screen 225 cm away. How far apart are two adjacent bright fringes ?	(3)
Q.No.9	(a)	What is meant by Molar Specific Heat of a Gas ? Show that $C_p - C_v = R$	(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)

13-07-2022