Physics	(D)	**L.K.No. 1107**	Paper Code No. 6477
Paper I	(Objective Type)	**Inter – A – 2021**	(Group Ist)
Time :	20 Minutes	**Inter (Part I)**	BWP-91-21
Marks :	17	Session (2017 -19) to (2020 – 22)	

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.

Q.No.1 (1)	If the percentage uncertainty in the radius of sphere is 3 %, then total uncertainty in volume is : (A) 4 % (B) 7 % (C) 9 % (D) 13 %
(2)	The magnitudes of Dot and Cross Product of two vectors are $2\sqrt{3}$ and 2 respectively, then the angle between vectors is : (A) 30° (B) 45° (C) 60° (D) 90°
(3)	If two unit vectors are perpendicular to each other , then magnitude of their resultant is : (A) 1 (B) $\sqrt{2}$ (C) $\sqrt{2.5}$ (D) $2\sqrt{2}$
(4)	$\sqrt{\frac{F \times l}{m}}$ is equal to : (A) Torque (B) Frequency (C) Speed (D) Power
(5)	Acceleration of Rocket is given by the relation : (A) $a = \frac{M}{mv}$ (B) $a = \frac{mv}{M}$ (C) $a = \frac{m}{Mv}$ (D) $a = \frac{Mv}{m}$
(6)	The speed of hoop on reaching the bottom of an inclined plane is : (A) $\sqrt{\frac{3}{4}gh}$ (B) $\sqrt{gh}$ (C) $\sqrt{\frac{4}{3}gh}$ (D) $\sqrt{2gh}$
(7)	Kilo Watt - Second is the unit of : (A) Power (B) Energy (C) Momentum (D) Time
(8)	For which pair of angles , Range is same : (A) (15° , 60°) (B) (35° , 65°) (C) (30° , 60°) (D) (20° , 45°)
(9)	The ratio of Rotational and Translational K.E. of hoop is : (A) 1 : 2 (B) 1 : $\sqrt{2}$ (C) 1 : 1 (D) $\sqrt{2}$: 1
(10)	The value of γ for diatomic gas is : (A) 1.29 (B) 1.4 (C) 1.67 (D) 1.73
(11)	Time Period of Simple Pendulum is directly proportional to : (A) ℓ (B) ℓ^2 (C) $\ell^{1/2}$ (D) g
(12)	If Radius of Droplet is halved , then its Terminal Velocity becomes : (A) Half (B) Double (C) One Fourth (D) Four Times
(13)	The speed of sound at a given temperature is v , by doubling pressure speed of sound is : (A) 0.5 v (B) v (C) 2 v (D) 3 v
(14)	Pressure of a Gas is equal to : (A) $\frac{2}{3}\rho\langle v^2\rangle$ (B) $\frac{3}{2}\rho\langle v^2\rangle$ (C) $\frac{1}{3}\rho\langle v^2\rangle$ (D) $\rho\langle v^2\rangle$
(15)	If a Convex Lens of Focal Length 5 cm is used as a Simple Microscope , then its magnifying Power is : (A) 5 (B) 6 (C) 10 (D) 25
(16)	Angle between Wavefront and Ray of light is : (A) 0° (B) 45° (C) 60° (D) 90°
(17)	For a Diatomic Gas $C_v = \frac{5R}{2}$ then γ for this gas is equal to : (A) $\frac{5}{7}$ (B) $\frac{7}{5}$ (C) $\frac{4}{3}$ (D) $\frac{3}{4}$

Roll No.	1107 – 21000	Session (2017 –19) to (2020 – 22)	Inter (Part – I)
Physics (Subjective)	Inter – A – 2021	Time 2 : 40 Hours Marks : 68	Group Ist

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

BWP-41-24

Make Diagram where necessary.

Part - I

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) Show that the famous Einstein Equation $E = mc^2$ is dimensionally consistent.
(iii) The time of 30 vibrations of a simple pendulum recorded by a stop watch accurate upto one tenth of a second is 54 . 6 s. Find its period with uncertainty ?
(iv) The Wavelength of a Wave depends on the speed **V** and its frequency f , decide which of the given is correct $f = v\lambda$, $f = v/\lambda$?
(v) Can you add zero to a Null Vector ?
(vi) If all the components of the vectors $\overline{A_1}$ and $\overline{A_2}$ were reversed , how would this alter $\overline{A_1} \times \overline{A_2}$?
(vii) Show that the Vector Addition is Commutative .
(viii) At what point or points in its path does a projectile have its minimum speed , its maximum speed ?
(ix) How impulse is related to linear momentum ?
(x) Define two types of Collisions.
(xi) Show that the range of projectile is maximum when projectile is thrown at an angle of 45^0 with the horizontal ?
(xii) Why Fog Droplets appear to be suspended in air ?

Q.No.3
(i) In which case is more work done : when a 50 Kg bag of books is lifted through 50 cm OR when a 50 Kg crate is pushed through 2 m across the floor with a force of 50 N ?
(ii) Show that Power is the Dot Product of Force and Velocity.
(iii) Define Kilowatt Hour.
(iv) Show that a = rd where d is the Angular Acceleration.
(v) Write down three equations of Angular Motion.
(vi) When Mud Flies off the tyre of a moving Bicycle ? In what direction does it fly ? Explain.
(vii) Find the Time Period of Simple Pendulum if the value of " g " increases by 2 – times and mass of the Bob increases 2 - times ?
(viii) Define Resonance giving one example of Resonance.
(ix) When the Oscillation is given to the Mass Spring System , why this system do not oscillate indefinitely ?
(x) What is the difference between Open and Closed Organ Pipe ?
(xi) How the Velocity of Waves generated in a String change , if the tension in the String is made 4 – times ?
(xii) What is the effect of pressure and Density of the Medium on the Velocity of Sound ?

Q.No.4
(i) Define Diffraction Grating and Grating Element.
(ii) Can Visible light produce interference fringes ? Explain.
(iii) Under what conditions two or more sources of light behave as Coherent Sources of light ?
(iv) What do you mean by Normal Adjustment of Astronomical Telescope ?
(v) What is Spectrometer ? Give names of its main parts.
(vi) What are Source and Sink for Carnot Engine ?
(vii) Write down two Postulates for Kinetic Theory of Gases.
(viii) Specific Heat of a gas at constant pressure is greater than the specific heat at constant volume . Why ?
(ix) Is it possible to construct a heat engine that will not expel heat into atmosphere ?

Part - II

Q.No.5 (a) Explain the addition of Vectors by Rectangular Components. (5)
(b) A 1500 Kg car has its velocity reduced from 20 m / sec to 15 m / sec in 3 . 0 sec . How large was the average retarding force ?

Q.No.6 (a) Derive Newton's formula for the speed of sound in air and describe the correction by Laplace in it. (3)
(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 ? (5)

Q.No.7 (a) Define Centripetal Force and derive the relation of Centripetal Force. (3)
(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 ? (5)

Q.No.8 (a) Consider a Horizontal Spring Mass System. Discuss Law of Conservation of Energy for this System. (3)
(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 ? (5)

Q.No.9 (a) Describe the construction and working of Michelson's Interferometer. (3)
(b) An Astronomical Telescope having magnifying power of 5 consists of two thin lenses 24 cm apart. Find the Focal Lengths of these lenses. (5)

05-08-2021