Paper Code Number: 2471	2023 (1st-A) INTERMEDIATE PART-I (11th Class)	Roll No: _____
PHYSICS PAPER-I	GROUP-I MTN-11-1-23	
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 dimensions of centripetal force is:	$[ML^{-2}T^{2}]$	$[MLT^{-2}]$	$[ML^{-1}T^{-2}]$	$[ML^{2}T^{-2}]$
2	Absolute uncertainty in a measuring instrument is equal to:	Least count	Accuracy	Fractional uncertainty	Percentage uncertainty
3	$(\hat{i} \times \hat{j}) \cdot \hat{k} =$	0	-1	$\hat{k}$	1
4	Angle between two vectors $3\hat{i} + 4\hat{j}$ and $4\hat{i} - 3\hat{j}$ is:	30^{o}	90^{o}	60^{o}	45^{o}
5	When the body moves with constant acceleration, the velocity time graph is:	Parabola	Hyperbola	Straight line	Curve
6	If a mass of a body is doubled, then acceleration becomes:	Half	Double	One forth	Constant
7	Consumption of energy by a 60 watt electric bulb in 2 seconds is:	60 J	30 J	0.5 J	120 J
8	The rate of change of angular momentum is equal to:	Force	Rotational K.E	Torque	Impulse
9	A wheel of radius 4 m turns through an angle of 114.6^{o}. It lays out a tangential distance:	4 m	8 m	458.4 m	28 m
10	The property of a fluid having constant density is called:	Compressible fluid	Non-ideal fluid	Turbulent fluid	Incompressible fluid
11	The K.E of a simple pendulum at equilibrium position is:	Maximum	Minimum	Zero	Medium
12	The types of waves are particularly useful for under sea communication and detection systems:	Radio waves	Microwaves	Ultrasonic waves	Infrared waves
13	Frequency range of hearing of dog is:	60 – 70,000 Hz	15 – 50,000 Hz	20 – 20,000 Hz	150 – 150,000 Hz
14	When light enters glass its suffers a change in:	Frequency only	Wavelength only	Velocity only	Both B and C
15	When the final image is formed at infinity, the magnification formula of simple microscope will be:	$1 + \frac{d}{f}$	$2 + \frac{d}{f}$	$\frac{d}{f}$	$\frac{f}{d}$
16	At constant temperature the graph between v and $\frac{1}{p}$ is:	Hyperbola	Straight line	Parabola	Semi circle
17	In irreversible process the entropy of system:	Increases	Decreases	Becomes zero	Remains constant

INTERMEDIATE PART-I (11th Class)	2023 (1st-A)	Roll No:
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

MTM-11-1-23

2. Attempt any eight parts. $8 \times 2 = 16$

(i)	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 following is correct, $f = v\lambda$ or $f = v/\lambda$
(ii)	Give the drawbacks to use the period of pendulum as a time standard.
(iii)	What rules should be followed in rounding of data?
(iv)	Distinguish between Random error and Systematic error.
(v)	If one of the rectangular components of a vector is not zero, can its magnitude be zero? Explain.
(vi)	If all the components of the vectors, A_1 and A_2 were reversed, how would this alter $\vec{A}_1 \times \vec{A}_2$?s
(vii)	Distinguish between Translational and Rotational equilibrium.
(viii)	Explain the circumstances in which the velocity "v" and acceleration "a" of a car are: (i) Parallel (ii) Anti-parallel
(ix)	At what point or points in its path does a projectile have its minimum speed, its maximum speed?
(x)	What do you mean by Inertia? How it is important in Newton's first law of motion?
(xi)	What does the slope of velocity-time graph show?
(xii)	A person is standing near a fast moving train. Is there any danger that he will fall towards it?

3. Attempt any eight parts. $8 \times 2 = 16$

(i)	When a rocket re-enters the atmosphere, its nose cone becomes very hot. Where does this heat energy come from?
(ii)	Write the two names of conservative forces and non-conservative forces.
(iii)	A boy uses a catapult to throw a stone which accidentally smashes a green house window. List the possible energy changes.
(iv)	Write down the four uses of Geostationary satellites.
(v)	Describe what should be the minimum velocity, for a satellite, to orbit close to the Earth around it.
(vi)	On what factors the moment of inertia of a body depends? Explain.
(vii)	What is a simple harmonic oscillator? Give an example.
(viii)	If a mass spring system is hung vertically and set into oscillations, why does the motion eventually stop?
(ix)	What is the total distance travelled by an object moving with SHM in a time equal to its period, if its amplitude is A ?
(x)	If the speed of sound is $332\,ms^{-1}$ in air at 0^oC then find its speed at 20^oC.
(xi)	Explain the terms (i) Crest and (ii) Trough
(xii)	Is it possible for two identical waves travelling in the same direction along a string to give rise to a stationary wave?

4. Attempt any six parts. $6 \times 2 = 12$

(i)	Could you obtain Newton's rings with transmitted light? If yes, would the pattern be different from that obtained with reflected light?
(ii)	How would you manage to get more orders of spectra using a diffraction grating?
(iii)	Write two uses of Michelson's interferometer?
(iv)	How the light signal is transmitted through optical fibre?
(v)	Calculate the value of critical angle for glass by total internal reflection.
(vi)	What happens to the temperature of the room, when an airconditioner is left running on a table in the middle of the room?
(vii)	What is effect of pressure and density on speed of sound?
(viii)	Does entropy of a system increase or decrease due to friction? Explain.
(ix)	What will be the efficiency of an engine if it performs 100J of work and rejects 400J of heat energy to the cold reservoir?

SECTION-II

NOTE: Attempt any three questions. $3 \times 8 = 24$

5.(a)	Explain vector product with its characteristics and examples.	5
(b)	A force (Thrust) of 400N is required to overcome road friction and air resistance in propelling an automobile at $80\,kmh^{-1}$. What power (kW) must the engine develop?	3
6.(a)	A projectile is thrown with initial velocity v_i making an angle θ with the horizontal. Find its time of flight, range and maximum range.	5
(b)	A gramophone record turntable accelerates from rest to an angular velocity of $45.0\ rev\ \min^{-1}$ in $1.60s$. What is its average angular acceleration?	3
7.(a)	Define and explain molar specific heats of a gas. Also, derive their relation.	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 $21\,ms^{-1}$?	3
8.(a)	How various factors affect the speed of sound? Discuss.	5
(b)	What should be the length of 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
9.(a)	Explain construction, ray diagram and magnification of an astronomical telescope.	5
(b)	In a double slit experiment the second order maximum occurs at $\theta = 0.25^o$. The wavelength is 650 nm. Determine the slit separation.	3

Paper Code Number: 2472	2023 (1st-A) INTERMEDIATE PART-I (11th Class)	Roll No: _____
PHYSICS PAPER-I GROUP-II MTN-11-2-23		
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	Dimensions of ratio of angular momentum to linear momentum is _____.	$[M^0LT^0]$	$[MLT]$	$[ML^2T]$	$[M^{-1}L^{-1}T^{-1}]$
2	Which of the following is a derived quantity?	Length	Mass	Time	Force
3	If a force of 5N is applied parallel to momentum arm of 5m, the torque is equal to:	Zero	5Nm	10Nm	25Nm
4	$AB\sin\theta\hat{n} \times AB\sin\theta\hat{n}$ is:	$A^2B^2\sin^2\theta$	A^2B^2	$A^2B^2\hat{n}$	$\vec{0}$
5	Impulse has the same units as that of:	Linear momentum	Force	Energy	Mass
6	The angle of projection for which its maximum height and horizontal range are equal:	46°	56°	66°	76°
7	If velocity and mass of a moving object are doubled, then K.E. becomes:	Double	4 times	6 times	8 times
8	The moment of inertia of thin rod is given by:	$12ML^2$	$\frac{1}{12}ML^2$	$\frac{2}{5}ML^2$	ML^2
9	The ratio of escape velocity to the critical orbital velocity is:	2	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\sqrt{2}$
10	The dimensions of ρgh is similar as that of:	K.E.	Pressure	Power	Volume
11	The dimensions of spring constant is:	$[MLT]$	$[MLT^{-2}]$	$[MLT^{-3}]$	$[ML^0T^{-2}]$
12	The value of 'γ' for polyatomic gas is:	1.67	1.69	1.40	1.29
13	In sonar, we use:	Ultrasonic waves	Ultraviolet waves	Radio waves	Micro waves
14	Bending of light around the edges of an obstacle is called:	Refraction	Interference	Diffraction	Polarization
15	Refractive index is given by:	$\frac{c}{v}$	$\frac{v}{c}$	$\sqrt{\frac{c}{v}}$	$\sqrt{\frac{v}{c}}$
16	Absolute zero corresponds to:	$-360^\circ F$	$-460^\circ F$	$360^\circ F$	$373^\circ F$
17	Carnot cycle consists of:	Single step	Two steps	Three steps	Four steps

INTERMEDIATE PART-I (11th Class)	2023 (1st-A)	Roll No:
PHYSICS PAPER-I GROUP-II MTN-11-2-23		
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)	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 following is correct $f=v\lambda$ or $f=\frac{v}{\lambda}$
(ii)	The period of simple pendulum is measured by a stop watch. What type of errors are possible in the time period.
(iii)	What is the Absolute uncertainty? What is its actual value?
(iv)	Check the correctness of the relation $v=\sqrt{\frac{F\times\ell}{m}}$ where 'v' is the speed of transverse wave on a stretched string of tension 'F', length 'ℓ' and mass 'm'.
(v)	Name the three different conditions that could make $A_1 \times A_2 = 0$.
(vi)	Can a body rotate about its centre of gravity under the action of its weight?
(vii)	Write two conditions of Equilibrium.
(viii)	Can the velocity of an object reverse direction when acceleration is constant? If so, give an example.
(ix)	Define impulse and show that how it is related to linear momentum?
(x)	How is the Time of Flight? Calculated for Projectile.
(xi)	What is the Maximum Range? Write its mathematical formula.
(xii)	Two row boats moving parallel in the same direction are pulled towards each other. Explain.

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

(i)	An object has 1J of potential energy. Explain what does it mean?
(ii)	When a rocket re-enters in the atmosphere, its nose cone becomes very hot. Where does this heat energy come from?
(iii)	A 70kg man runs up a long flight of stairs in 4.0s. The vertical height of the stairs is 4.5m. Calculate his power output in watts.
(iv)	When mud flies off the tyre of a moving bicycle, in what direction does it fly? Explain.
(v)	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?
(vi)	A disc without slipping rolls down a hill of height 10.0m. If the disc starts from rest at the top of the hill, what is its speed at bottom?
(vii)	What happens to the period of a simple pendulum if its length is doubled? What happens if the suspended mass is doubled?
(viii)	Does the acceleration of a simple harmonic oscillator remain constant during its motion? Is the acceleration ever zero? Explain.
(ix)	Define Resonance. Give its types.
(x)	Why does sound travel faster in solids than in gases?
(xi)	How are beats useful in tuning musical instruments?
(xii)	Why did Newton fail to calculate the velocity of sound accurately?

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

(i)	How does one can obtain a plane wave?
(ii)	An oil film spreading over a wet footpath shows colours. Explain how does it happen?
(iii)	Why the polaroid sunglasses are better than ordinary sunglasses?
(iv)	How the power is lost in optical fibre through dispersion? Explain.
(v)	A telescope is made of an objective of focal length 20cm and an eye piece of focal length 5.0cm, both convex lenses. Find the angular magnification.
(vi)	Why the efficiency of a real heat engine is always less than one?
(vii)	For an Adiabatic Process, write down the form of first law of thermodynamics.
(viii)	A thermos flask containing milk as a system is shaken rapidly. Does the temperature of milk rise?
(ix)	Does entropy of a system increase or decrease due to friction?

SECTION-II

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

5.(a)	Define Gravitational Field. Prove that work done in the Earth's gravitational field is independent of path followed.	5
(b)	Find the angle between the two vectors, $A=5\hat{i}+\hat{j}$ and $B=2\hat{i}+4\hat{j}$.	3
6.(a)	Define Linear momentum and explain the Law of Conservation of Linear momentum.	5
(b)	A body of moment of inertia $I=0.80\,kgm^2$ about a fixed axis, rotates with a constant angular velocity of 100 rad s^{-1}. Calculate its angular momentum L and the torque to sustain this motion.	3
7.(a)	What is Carnot's engine? Explain its working and calculate its efficiency. Also state Carnot's theorem.	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 15.0m?	3
8.(a)	What is Doppler effect? Find the change in frequency due to doppler effect when (i) Observer is moving towards the source at rest. (ii) Source is moving towards the observer at rest.	5
(b)	A block of mass 4.0 kg is dropped from a height of 0.80m on to a spring of spring constant $k=1960\,Nm^{-1}$, find the maximum distance through which the spring will be compressed.	3
9.(a)	Describe the diffraction of X-rays through crystals. Also verify Bragg's equation and describe its use.	5
(b)	An astronomical telescope having magnifying power of 5 consist of two thin lenses 24cm apart. Find the focal length's of these lenses.	3

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INTERMEDIATE PART-I (11th CLASS)

PHYSICS PAPER-I GROUP-I TIME ALLOWED: 20 Minutes

OBJECTIVE 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 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. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

(1) $[M^oLT^{-1}]$ are the dimensions of:

(A) Force (B) Velocity (C) Work done (D) Momentum

(2) The uncertainty in the time period of a vibrating body is found by:

(A) Least count × number of vibrations (B) Least count/number of vibrations

(C) $\frac{Number\ of\ vibration}{Least\ count} \times 100$ (D) Least count – number of vibrations

(3) $\hat{i} \times (\hat{j} \times \hat{k})$ is equal to:

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

(4) For which pair of angles of projection, the range of projectile are equal?

(A) $50^o, 42^o$ (B) $35^o, 55^o$ (C) $40^o, 47^o$ (D) $37^o, 47^o$

(5) Scalar product of two mutually perpendicular vectors, $\vec{A}$ and $\vec{B}$ is:

(A) $AB\cos\theta$ (B) 1 (C) $AB\sin\theta$ (D) 0

(6) Relation for the maximum range of projectile is:

(A) $\frac{2v_i^2}{g}$ (B) $\frac{v_i^2}{g}$ (C) $\frac{v_i^2 \sin 2\theta}{g}$ (D) $\frac{v_i^2}{2g}$

(7) One kilowatt hour (kWh) is equal to:

(A) $3.6\,MJ$ (B) $3.6\,KJ$ (C) $36\,MJ$ (D) $3.6\,J$

(8) Equation of continuity is the statement of law of conservation of:

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

(9) Angle subtended at the centre of a circle by an arc equal to circumference is:

(A) π rad (B) $\frac{\pi}{2}$ rad (C) 2π rad (D) $\frac{\pi}{4}$ rad

(10) If the velocity is doubled then the force required to move it in a circle becomes:

(A) One half (B) Four times (C) Two times (D) Remains same

(11) The length of second pendulum is: (A) 98cm (B) 99cm (C) 100cm (D) 101cm

(12) The wavelength of microwaves is: (A) 10cm (B) 12cm (C) 14cm (D) 15cm

(13) Two waves of equal frequencies travelling in same direction give rise to phenomenon called:

(A) Stationary waves (B) Beats (C) Interference (D) Compressional waves.

(14) Confinement of light into one plane of vibration is called:

(A) Diffraction (B) Interference (C) Polarization (D) Dispersion

(15) When object is placed at focal point, the image is formed:

(A) At focus (B) At infinity (C) Away from focus (D) Between focus and optical centre

(16) For an isothermal process, the first law of thermodynamics can be written as:

(A) $Q = \Delta U + W$ (B) $Q = W$ (C) $Q = \Delta U$ (D) $Q = -\Delta U$

(17) The Boltzmann constant is equal to:-

(A) RN_A (B) N_A/R (C) R/N_A (D) $\frac{1}{RN_A}$

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INTERMEDIATE PART-I (11th CLASS)

PCS PAPER-I GROUP-II TIME ALLOWED: 20 Minutes

OBJECTIVE 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 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. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

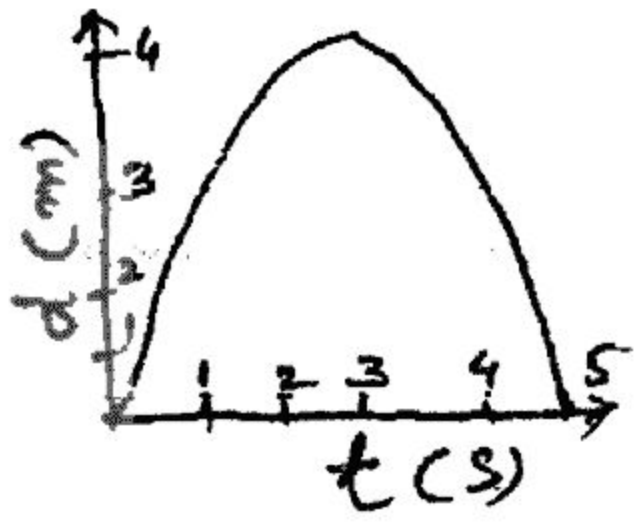
(1) Velocity of an object is 1% uncertainty and mass has 2% uncertainty. What is the total uncertainty in K.E: (A) 3% (B) 2% (C) 4% (D) 1%

(2) The dimensions of gravitational constant G is:
(A) $[M^3L^1T^2]$ (B) $[M^{-1}L^3T^{-2}]$ (C) $[M^0LT^{-2}]$ (D) $[M^1L^3T^1]$

(3) The reverse process of vector addition is called: (A) Subtraction of vector (B) Multiplication of vector (C) Negative of a vector (D) Resolution of a vector

(4) The angle of $\vec{A} = A_x\hat{i} - A_y\hat{j}$ with $x-$axis will be in between:
(A) $0^o \rightarrow 90^o$ (B) $90^o \rightarrow 180^o$ (C) $180^o \rightarrow 270^o$ (D) $270^o \rightarrow 360^o$

(5) How the displacement of a vertically thrown ball varies with time?
(A) Increase (B) Decrease
(C) Constant (D) First increases and then decreases



(6) What is the value of force required to break one's head covered with skin and hairs?
(A) 50N (B) 5N (C) 10N (D) 1N

(7) $K.E.$ of a body with constant mass 'm' has the relation with momentum:
(A) $K.E. \propto P$ (B) $K.E. \propto P^2$ (C) $K.E. \propto \frac{1}{P}$ (D) $K.E. \propto \frac{1}{P^2}$

(8) If a car moves with a uniform speed of $2m/s$ in a circle of radius $0.4m$. Its angular velocity is:
(A) $0.8\ rad/s$ (B) $2\ rad/s$ (C) $5\ rad/s$ (D) $20\ rad/s$

(9) Moment of inertia of a solid sphere, when solid sphere is in orbital motion of a large circle:
(A) mr^2 (B) $\frac{2}{5}mr^2$ (C) $\frac{1}{2}mr^2$ (D) $\frac{1}{12}ML^2$

(10) What do you suggest about the parameter $\frac{1}{2}\rho v^2$ from the following choices?
(A) $K.E.$ (B) $P.E.$ (C) Pressure (D) Work

(11) The unit of _____ is same as that of spring constant.
(A) Torque (B) Surface tension (C) Work (D) Pressure

(12) Which of the following parameter remains constant when light waves transmitted to a denser medium from a rarer medium?
(A) Frequency (B) Velocity (C) Wavelength (D) Intensity

(13) When two identical waves are superposed, the velocity of the resultant wave:
(A) Increases (B) Decreases (C) Remains constant (D) Become zero

(14) What is your opinion about the quantity of fringes when wavelength is increased?
(A) No fringes (B) Remains same (C) Increased (D) Decreased

(15) What do you suggest about the angle of reflected ray in total internal reflection when angle of incident ray is increased continuously from critical angle?
(A) Reflected angle is increased towards interface of two media
(B) Reflected angle is decreased away from the interface of two media
(C) Reflected light will be refracted out of the medium (D) No change in the position of reflected light

(16) Which one of the following parameters is kept constant in order to compare two specific heats of a thermodynamic system?
(A) Work (B) Internal energy (C) Pressure (D) Volume

(17) The equation $\rho v^r = \text{constant}$ holds good in:
(A) Isochoric process (B) Isobaric process (C) Adiabatic process (D) Isothermal process

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INTERMEDIATE PART-I (11th CLASS)

PAPER-I GROUP-I TIME ALLOWED: 2.40 Hours

SUBJECTIVE MAXIMUM MARKS: 68

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

SECTION-I

2. Write short answers to any eight parts. $8 \times 2 = 16$

(i) What is physics and nuclear physics? Define both (1+1)

(ii) What are derived units give two examples. Unit + 2 Ex (1+0.5+0.5)

(iii) The period of simple Pendulum is measured by stop watch. What types of error are possible in the time period? (1+1) Two errors ① For each

(iv) Write the dimensions of (i) Pressure (ii) Density Define P+D (1+1)

(v) When two objects move in opposite direction one will have positive momentum and other negative momentum why? Reason (2)

(vi) State Newton's 2nd and 3rd Laws of Motion. Define 2nd + 3rd Low (1+1)

(vii) Explain the circumstances in which the velocity $\vec{v}$ and acceleration $\vec{a}$ of a car are (1+1)
(i) parallel (ii) Perpendicular to each other

(viii) Show that range of projectile is maximum when projectile is thrown at an angle of 45° with horizontal.
↳ $R = \frac{v_i^2}{g}\sin 2\theta$
Formula (i) Mark
Explanation (i) Mark

(ix) Write down two examples of adiabatic process.

(x) How petrol engine differ from diesel engine? Difference (1+1)

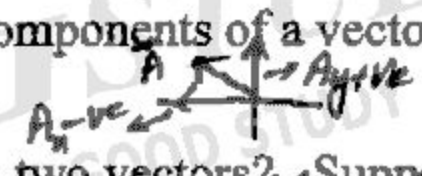
(xi) Does entropy increase or decrease due to friction? Increase ① Explanation ①
Reason (2)

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

3. Write short answers to any eight parts. $8 \times 2 = 16$

(i) Under what circumstances would a vector have components that are equal in magnitude? → At an angle 45°

(ii) What do you know about the signs of the components of a vector in second and fourth quadrant? Signs (1+1)
Make a diagram.



(iii) How would you determine null vector from two vectors? Support your reason with an equation. Reason + eq (1+1)
$\vec{A}+(-\vec{A})=\vec{0}$

(iv) When a 50kg crate is pushed through 2m across the floor with a force of 50N. Calculation (2)
Calculate the work done. → $W = \vec{F}\cdot\vec{d} = Fd\cos\theta = Fd = (50)(2) = 100\,J$

(v) What do you understand by the use of geo-thermal energy as geyser? use + example (1+1)
Support your answer with an example.

(vi) How can you describe direct combustion and fermentation? Combustion ① Mark Fermentation ① Mark
Define both (1+1)

(vii) Why does a diver change his body position before and after diving in the pool? Reason (2)

(viii) Rank the views of gravitation. Explain your rating.
↳ To conserve angular momentum
$I_1\omega_1 = I_2\omega_2$
Def + Reason (1+1)

(ix) What do you understand by the term "weightlessness"? Support your answer by proper reasoning.

(x) An oil film spreading over a wet footpath shows colours. Explain how does it happen? → Due to interference

(xi) What do you know about the term optical rotation? Give its one application. Define + Application (1+1)

(xii) Predict the outcome of light when two polaroids are perpendicular and parallel to each other.
Support your answer with a diagram.

4. Write short answers to any six parts. $6 \times 2 = 12$

(i) Why fog droplet appears to be suspended in air? Reason (2)

(ii) Can we realize an ideal simple pendulum? (2)

(iii) What is difference between free and forced oscillations? Difference (1+1)

(iv) Explain restoring force and what is its direction? Define + Direction (1+1)

(v) What features do longitudinal waves have in common with transverse waves?

Common features P.T.O. (1+1)

(vi) Explain the term red and blue shift in Doppler's effect. Define both (1+1)

(vii) What is effect of pressure and density on speed of sound? Both effects (1+1)

(viii) What do you understand by linear magnification and angular magnification? Define both (

(ix) What is optical fibre? Write down two uses of optical fibre. Define + Uses (1+0.5+0

SECTION-II

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

5.(a) Discuss interconversion of K.E and P.E. What happens when frictional forces present? 5

(b) Find the work done when the point of application of the force $3\hat{i} + 2\hat{j}$ moves in a straight line from the point $(2, -1)$ to the point $(6, 4)$ 3

6.(a) Define law of conservation of linear momentum. Prove that $m_1v_1 + m_2v_2 = m_1v_1' + m_2v_2'$ 5

(b) An earth satellite is in circular orbit at a distance of 384,000km from the earth's surface. What is its period of one revolution in days? Take mass of earth $M = 6.0 \times 10^{24}\,kg$ and its radius $R = 6400\,km$ 3

7.(a) What is the principle of superposition of waves? Discuss the interference of waves. 5

(b) Water is flowing smoothly through a close pipe system. At one point the speed of water is $3.0ms^{-1}$. While at another point $3.0m$ higher, the speed is $4.0ms^{-1}$. If the pressure is 80 kPa at the lower point, what is pressure at the upper point? 3

8.(a) Describe the diffraction of X – rays through crystals. Also derive the "Bragg's Equation" and its different uses. 5

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

9.(a) What is compound microscope? Write its construction and working. Also find the expression of its magnification. 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

2022 (A) (243) Roll No: _____

INTERMEDIATE PART-I (11th CLASS)

PAPER-I GROUP-II TIME ALLOWED: 2.40 Hours

SUBJECTIVE MAXIMUM MARKS: 68

***Write* same question number and its part number on answer book, as given in the question paper.**

SECTION-I

2. Write short answers to any eight parts. **8 × 2 = 16**

(i) Write the dimensions of (a) Pressure (b) Density

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

(iii) Define radian and steradian.

(iv) Find the dimensions and SI units of coefficient of viscosity in $F = 6\pi\eta rv$.

(v) Explain the difference between elastic and inelastic collision.

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

(vii) Does a moving object have impulse? Explain.

(viii) The horizontal range of projectile is four times of its maximum height. What is angle of projection?

(ix) What happens to the temperature of the room, when an air conditioner is left running on a table in the middle of the room?

(x) Does entropy of a system increase or decrease due to friction?

(xi) Name the four strokes of the petrol engine.

(xii) State second law of thermodynamics in terms of entropy.

3. Write short answers to any eight parts. **8 × 2 = 16**

(i) Can you add zero to null vector?

(ii) Define the term unit vector, position vector, component of a vector.

(iii) Define rectangular coordinate system.

(iv) Define head to tail rule for vector addition.

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

(vi) Prove $P = \vec{F}.\vec{V}$

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

(viii) Why does a diver change his body position before and after diving in the pool?

(ix) Define angular momentum and spin angular momentum.

(x) Define centripetal force. Write its formula.

(xi) How is the distance between interference fringes affected by the separation between the slits of Young's experiment? Can fringes disappear?

(xii) Define constructive and destructive interference of light.

4. Write short answers to any six parts. **6 × 2 = 12**

(i) Water enters one end of a pipe whose area is $2cm^2$ with a speed of $20m\,sec^{-1}$, emerges at other end of pipe with speed of $5m\,sec^{-1}$. Find the area at the other end of the pipe.

(ii) Can we realize an ideal simple pendulum?

(iii) Write any two advantages of resonance.

(iv) Show that in S.H.M the acceleration is zero when the velocity is greatest and velocity is zero when the acceleration is greatest.

(v) What is the effect of pressure and density on the speed of sound?

P.T.O.

2022 (A) (243) Roll No: _____

INTERMEDIATE PART-I (11th CLASS)

PAPER-I GROUP-II TIME ALLOWED: 2.40 Hours

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P.T.O.

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(vii) As a result of a distant explosion, an observer senses a ground tremor and then hears the explosion. Explain the time difference.

(viii) Why would it be advantageous to use blue light with a compound microscope?

(ix) Define resolving power and magnifying power of an optical instrument.

SECTION-II

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

5.(a) Define absolute potential energy. Derive the relation for absolute potential energy on surface of earth. 5

(b) Find the angle between two vectors, $\overline{A} = 5\hat{i} + \hat{j}$ and $\overline{B} = 2\hat{i} + 4\hat{j}$ 3

6.(a) What are "Geostationary Orbit" and Geostationary satellite? Find orbital radius of Geostationary orbit. 5

(b) A 100g golf ball is moving to the right with velocity of $20\,m/s$. It makes head on collision with an 8.0kg steel ball; initially at rest. Compute velocities of the ball after collision. 3

7.(a) What is terminal velocity? Derive $V_t = \frac{2gr^2\rho}{9\eta}$ 5

(b) The wavelength of the signals from a radio transmitter is 1500m and the frequency is 200 kHz. What is the wavelength for a transmitter operating at 1000 kHz and with what speed the radio waves travel? 3

8.(a) What is Michelson's interferometer? Explain its construction and working. 5

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

9.(a) Write a detailed note on isothermal process and an adiabatic process. 5

(b) The critical angle of glass light pipe in air is 39^o. What is the critical angle of pipe if pipe is in water? (refractive index of water = 1.33) 3

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Paper Code Number: 2471

2022 (2nd-A)

Roll No. 25

INTERMEDIATE PART-I (11th CLASS)

PHYSICS PAPER-I

TIME ALLOWED: 20 Minutes
MAXIMUM 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 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. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

(1) The dimensions of "light year" are:

(A) $\left[M^0LT^{-1}\right]$ (B) $\left[ML^2T^{-2}\right]$ (C) $\left[L\right]$ (D) $\left[M^0L^0T\right]$

(2) Zero error is the example of:

(A) Personal error (B) Random error (C) Systematic error (D) None of these

(3) If slope of velocity time graph is not constant at different points then body is moving with:

(A) Uniform velocity (B) Average acceleration
(C) Increasing acceleration (D) Constant acceleration

(4) The product of mass flow per second with velocity is:

(A) Momentum (B) Acceleration (C) Force (D) Displacement

(5) Minimum number of unequal forces whose vector sum can be zero is:

(A) 2 (B) 3 (C) 4 (D) 5

(6) In which quadrant, vector $-3\hat{i}-5\hat{j}$ lies:

(A) 1st (B) 2nd (C) 3rd (D) 4th

(7) The rate at which work is being done is called:

(A) Power (B) Energy (C) Force (D) Density

(8) As we go below the surface of earth, the value of 'g':

(A) Increases (B) Decreases (C) Remains constant (D) None of these

(9) The apparent weight of a man in ascending lift moving with acceleration 'a':

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

(10) The dimensions of potential energy per unit volume are same as that of:

(A) Pressure (B) Work (C) Density (D) Power

(11) The length of second pendulum is:

(A) 9.92 cm (B) 9.92 m (C) 99.2 cm (D) 99.2 m

(12) Waves produced in organ pipes are:

(A) Transverse waves (B) Longitudinal waves (C) Electromagnetic waves (D) Microwaves

(13) In which of the following, speed of sound wave is greatest?

(A) Water (B) Air (C) Steel (D) Vacuum

(14) When Newton's rings are observed with reflected light, the control spot is:

(A) Blue (B) Red (C) Bright (D) Dark

(15) Repeaters are placed in the new fibre optic system at a distance of:

(A) 30 km (B) 50 km (C) 80 km (D) 100 km

(16) If pressure is increased, melting point of ice:

(A) Increases (B) Decreases (C) Remains constant (D) None of these

(17) Triple point of water is:

(A) $273.16^{o}C$ (B) $273.16^{o}F$ (C) 273.16K (D) 373.16K

2022 (2nd-A) Roll No: _____

INTERMEDIATE PART-I (11th CLASS)

PHYSICS PAPER-I TIME ALLOWED: 2.40 Hours

SUBJECTIVE MAXIMUM MARKS: 68

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

SECTION-I

2. Write short answers to any eight parts. **8 × 2 = 16**

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

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

(iii) Give the dimension of (i) Pressure (ii) Density

(iv) At what point or points in its path does a projectile have its minimum speed, its maximum speed?

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

(vi) Why is the average velocity of the molecules in a gas zero but the average of the square of velocities is not zero?

(vii) Show that equation $F = ma$ is dimensionally correct.

(viii) What is meant by Scientific Notation?

(ix) Define Linear momentum write its formula.

(x) Define Isolated System. Give example.

(xi) What is first Law of Thermodynamics?

(xii) Define Entropy. Give its unit.

3. Write short answers to any eight parts. **8 × 2 = 16**

(i) Can a body rotate about its centre of gravity under the action of its weight?

(ii) Can a vector have a component greater than the vector's magnitude?

(iii) What is the unit vector in the direction of the vector $A = 4\hat{i} + 3\hat{j}$?

(iv) How the energy is obtained from tides?

(v) In which case is more work done? When a 50 kg bag of books is lifted through 50cm, or when a 50kg crate is pushed through 2m across the floor with a force of 50N?.

(vi) A 50kg man runs up a long stairs in 10 sec. Height of the stairs is 10m. Calculate his power output in watts.

(vii) Define Real and Apparent Weight.

(viii) Why does a diver change his body positions before and after diving in the pool?

(ix) Explain why an object, orbiting the Earth, is said to be freely falling. Use your explanation to point out why objects appear weightless under certain circumstances.

(x) What is fringe spacing? On what factors it does depend?

(xi) An oil film spreading over a wet foot path shows colours. How does it happen? Explain?

(xii) Why the centre of Newton's ring's is dark for reflected light?

4. Write short answers to any six parts. **6 × 2 = 12**

(i) Explain, how the swing is produced in a fast moving cricket ball?

(ii) Define simple harmonic motion and derive relation for it.

(iii) What are the requirements for a system to get oscillations?

(iv) Can we realize an ideal simple pendulum?

(v) What is the effect of pressure and temperature on the speed of sound?

P.T.O.

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

(vii) How should a sound source move with respect to an observer so that the frequency of its sound does not change?

(viii) Define total internal reflection and draw ray diagram.

(ix) Why would it be advantageous to use blue light with a compound microscope?

SECTION-II

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

5.(a) Describe the method of addition of two vector's by rectangular components. 5

(b) A brick of mass 2.0 kg is dropped from a rest position 5.0m above the ground. What is its velocity at a height of 3.0m above the ground? 3

6.(a) Define Projectile Motion. Derive relations for height of projectile and 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

7.(a) What is Doppler's Effect? Discuss its cases when
(i) Listener is moving towards a stationary source of sound
(ii) Source of sound moving towards stationary listener 5

(b) How large must a heating duct be if air is moving $3.0ms^{-1}$ along it can replenish the air in a room of $300m^3$ volume every 15 min? 3

8.(a) Derive the relation for the time period of a simple pendulum of length ℓ. 5

(b) In a double slit experiment the second order maximum occurs at $\theta = 0.25°$. The wavelength is 650 nm. Determine the slit separation. 3

9.(a) What is Astronomical Telescope? Give its construction and working. Also derive its magnifying power. 5

(b) A Carnot engine whose low temperature reservoir is at 7°C has an efficiency of 50%. It is desired to increase the efficiency to 70%. By how many degrees the temperature of the source be increased. 3

Paper Code Number: 2471

2021 (A) Roll No._____

INTERMEDIATE PART-I (11th CLASS)

PHYSICS PAPER-I **GROUP-I** MTN-G1-21 TIME ALLOWED: 20 Minutes

OBJECTIVE 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 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. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

(1) The dimensions of $\sqrt{\frac{m}{k}}$ is same as that of:

(A) Momentum (B) Time (C) Acceleration (D) Force

(2) The % uncertainty in the measurement of radius of a sphere is 2 %. The % uncertainty in the volume of sphere is: (A) 6 % (B) 2 % (C) 4 % (D) 8 %

(3) If $\left|\vec{A}\times\vec{B}\right| = \left|\vec{A}\cdot\vec{B}\right|$ then angle between vectors $\vec{A}$ and $\vec{B}$ is:

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

(4) Projection of $\vec{A}$ on $\vec{B}$ is:

(A) $B\cos\theta$ (B) $A\sin\theta$ (C) $\vec{B}\cdot\hat{A}$ (D) $\vec{A}\cdot\hat{B}$

(5) The horizontal acceleration of projectile is:

(A) Equal to "g" (B) Positive (C) Negative (D) Zero

(6) In a typical rocket, the fuel burns at the rate of:

(A) 4000 kg/s (B) 1000 kg/s (C) 10,000 kg/s (D) 40,000 kg/s

(7) The rotational $K.E$ of solid sphere is:

(A) $\frac{2}{5}mr^2\omega^2$ (B) $\frac{1}{5}mr^2\omega^2$ (C) $\frac{2}{3}mr^2\omega^2$ (D) $\frac{1}{5}I\omega^2$

(8) The ratio of orbital velocity to the escape velocity is:

(A) $\sqrt{\frac{1}{2}}$ (B) $\frac{1}{2}$ (C) 1 (D) $\sqrt{2}$

(9) The wavelength of waves produced in microwave oven is:

(A) 12 cm (B) 20 cm (C) 24 cm (D) 10 cm

(10) The speed of sound in air at 30^oC is approximately equal to:

(A) 332 m/s (B) 350 m/s (C) 340 m/s (D) 335 m/s

(11) The distance between 1st node and 4th antinode is:

(A) $\frac{5}{4}\lambda$ (B) $\frac{13}{4}\lambda$ (C) $\frac{7}{4}\lambda$ (D) $\frac{11}{4}\lambda$

(12) Escape velocity of object depends upon:

(A) Mass of object (B) Size of object (C) Shape of object (D) Radius of planet

(13) A carnot engine operating between the temperatures has greatest efficiency:

(A) 40k and 20k (B) 60k and 40k (C) 80k and 60k (D) 100k and 80k

(14) Which one is true for isothermal process?

(A) $Q = 0$ (B) $Q = W$ (C) $W = 0$ (D) $Q = \Delta\mu$

(15) The term $\frac{1}{2}\rho v^2$ in Bernoulli's equation represents:

(A) K.E of fluid (B) Pressure energy (C) K.E per unit volume (D) P.E of fluid

(16) The phase difference between two points on the same wave front is:

(A) $\frac{\pi}{2}$ (B) π (C) $\frac{\pi}{4}$ (D) 0

(17) Final image formed by compound microscope is:

(A)Real; Inverted; Magnified (B) Virtual; Erect; Magnified

(C) Real; Erect; Diminished (D) Virtual; Inverted; Diminished

2021 (A) Roll No: _____

INTERMEDIATE PART-I (11th CLASS)

PHYSICS PAPER-I GROUP-I MTN-91-21 TIME ALLOWED: 2.40 Hours

SUBJECTIVE MAXIMUM MARKS: 68

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

SECTION-I

2. Write short answers to any eight parts. **8 × 2 = 16**

(i) Show that the expression $v_f = v_i + at$ is dimensionally correct where v_i is the velocity at $t = 0$, a is the acceleration and v_f is the velocity at time t.

(ii) Write the dimensions of (i) Pressure (ii) Density

(iii) Define Precision and Accuracy.

(iv) Find the dimensions and hence the S.I units of coefficient of viscosity η in relation of stokes law for the drag force F for a spherical object of radius r moving with velocity v given as $F = 6\pi\eta r v$

(v) Define position vector and write its general formula in three dimension.

(vi) Prove that $\vec{A} \cdot \vec{B} = \vec{B} \cdot \vec{A}$

(vii) If all the components of the vectors $\overrightarrow{A_1}$ and $\overrightarrow{A_2}$ were reversed, how would this alter $\overrightarrow{A_1} \times \overrightarrow{A_2}$.

(viii) Water flows out from a pipe at $3kgs^{-1}$ and its velocity changes from $5ms^{-1}$ to zero on striking the wall, then find the force due to flow of this water.

(ix) Derive the formula for the vertical distance covered by the projectile when it is thrown from a certain height h.

(x) Define the range of projectile and show that the range of projectile is maximum when projectile is thrown at an angle of 45^o with the horizontal.

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

(xii) Define Torricelli's theorem and write the formula for the speed of efflux.

3. Write short answers to any eight parts. **8 × 2 = 16**

(i) Prove that $P = \vec{F} \cdot \vec{V}$

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

(iii) Differentiate between conservative and non conservative force.

(iv) Show that 1 rad = $57 \cdot 3^o$

(v) Why does a diver change his body position before and after diving in the pool?

(vi) What do you mean by orbital velocity? Write down its formula.

(vii) What happens to the period of simple pendulum if its length is doubled? What happens if the suspended mass is doubled?

(viii) Why soldiers are advised to break their steps when marching on bridge?

(ix) What is driven harmonic oscillator? Give example.

(x) Define beats and explain with one example.

(xi) Explain why sound travel faster in warm air than in cold air.

(xii) Speed of sound in air at 0^oC is $332ms^{-1}$. Find its speed at 20^oC.

P.T.O.

4. **Write short answers to any six parts.** MTN-G1-21 $6 \times 2 = 12$

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

(ii) Could you obtain Newton's rings with transmitted light if yes, would the pattern be different from that obtained with reflected light?

(iii) What is meant by fringe spacing?

(iv) What do you understand by linear magnification and angular magnification?

(v) What is the length of the telescope in state of normal adjustment?

(vi) Why is the average velocity of the molecules in a gas zero but the average of square of velocities is not zero?

(vii) What is meant by reversible process? Give its example.

(viii) Find the average speed of oxygen molecule in the air at STP.

(ix) Why does the pressure of gas in a car tyre increase when it is driven through some distance?

SECTION-II

NOTE: Attempt any three questions. $3 \times 8 = 24$

5.(a) Define and explain vector product of two vectors. Also write down the four characteristics of vector product of two vectors. 5

(b) A ball is thrown horizontally from a height of 10m with velocity of $21 ms^{-1}$. How far off it hit the ground? 3

6.(a) What is Gravitational field? Show that gravitational field is a conservative 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 tension is increased by one-third without changing the length of the wire? 3

7.(a) Define centripetal force. Derive its relation. 5

(b) A tiny water droplet of radius 0.01 cm descends through air from high building. Calculate its terminal velocity. Given that η for air is $19 \times 10^{-6} kg\, m^{-1} s^{-1}$ and density of water is $\rho = 1000 kgm^{-3}$. 3

8.(a) Define and explain the phenomenon of resonance with an example. $1 + 3 + 1 = 5$

(b) A mechanical engineer develops an engine working between $327^{o}C$ and $27^{o}C$ and claims to have an efficiency of 52% . Does he claim correctly? Explain. 3

9.(a) What is diffraction grating? Calculate the wavelength of light used by diffraction grating. 5

(b) A telescope is made of an objective of focal length 20 cm and an eye piece of 5.0 cm. Both are convex lenses. Find the angular magnification. 3

Paper Code Number: 2476

2021 (A) Roll No._____

INTERMEDIATE PART-I (11th CLASS)

PHYSICS PAPER-I **GROUP-II** MTN-92-21

TIME ALLOWED: 20 Minutes

OBJECTIVE 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 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. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

(1) If velocity and mass of a moving object are doubled then K.E becomes:

(A) Double (B) 4 times (C) 6 times (D) 8 times

(2) If a body is moving counter clockwise, then angular displacement is:

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

(3) The direction of angular momentum $\vec{L} = \vec{r} \times \vec{p}$ is:

(A) Along the direction of $\vec{p}$ (B) Along the direction of $\vec{r}$

(C) Parallel to the plane containing $\vec{r}$ and $\vec{p}$ (D) Perpendicular to the plane containing $\vec{r}$ and $\vec{p}$

(4) Venturi relation is given by:

(A) $P_1 + P_2 = \frac{1}{2}\rho v_2^2$ (B) $P_1 - P_2 = \frac{1}{2}\rho v_2^2$ (C) $P_1 + P_2 = \frac{1}{2}\rho v_2$ (D) $P_1 - P_2 = \frac{1}{2}\rho^2 v_2$

(5) The frequency of the first pendulum is:

(A) $2.0\,Hz$ (B) $1.5\,Hz$ (C) $1.0\,Hz$ (D) $0.5\,Hz$

(6) Speed of sound in air at S.T.P is:

(A) $280\,m/s$ (B) $330\,m/s$ (C) $331\,m/s$ (D) $332\,m/s$

(7) When the stretched string is plucked from one quarter of length, then stretched string will vibrate in:

(A) One loop (B) Two loops (C) Three loops (D) Four loops

(8) The regular array of atoms in a crystal forms a natural diffraction grating with spacing of the order of:

(A) $10^{-8}\,m$ (B) $10^{-9}\,m$ (C) $10^{-10}\,m$ (D) $10^{-11}\,m$

(9) Compound microscope consist of:

(A) Two convex lens (B) Two concave lens

(C) Convex lens and concave mirror (D) Concave lens and convex mirror

(10) If one mole of an ideal gas is heated at constant pressure; then:

(A) $Q_p = C_p \Delta T$ (B) $\Delta U = C_p \Delta T$ (C) $\Delta U = C_V \Delta T$ (D) $Q_p = C_V \Delta T$

(11) In carnot engine, each process is:

(A) Reversible (B) Perfectly reversible (C) Irreversible (D) Perfectly irreversible

(12) The appropriate precision on addition of following masses 0.089, 2.189, 5.32, 11.8 in kg is:

(A) 19.398 kg (B) 19.39 kg (C) 19.4 kg (D) 19.41 kg

(13) Dimension of coefficient of viscosity are:

(A) $[ML^{-1}T]$ (B) $[ML^{-1}T^{-1}]$ (C) $[ML^{-1}T^{-2}]$ (D) $[ML^2T^{-1}]$

(14) The resultant magnitude of two forces 6N and 8N acting at right angle to each other is:

(A) 10N (B) 8N (C) 6N (D) 4N

(15) The angle between the vectors $\hat{i} + 3\hat{j} - 2\hat{k}$ and $\hat{i} - \hat{j} - \hat{k}$ is:

(A) 0^o (B) 45^o (C) 90^o (D) 180^o

(16) When a shell explodes in mid-air, the total momentum of its fragments:

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

(17) An Un-powered and unguided missile is:

(A) Remote control (B) Long range (C) Powered (D) Ballistic

2021 (A) Roll No: _____

INTERMEDIATE PART-I (11th CLASS)

PHYSICS PAPER-I GROUP-II MTN-G2-21 TIME ALLOWED: 2.40 Hours

SUBJECTIVE MAXIMUM MARKS: 68

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

SECTION-I

2. Write short answers to any eight parts. **8 × 2 = 16**

(i) Show that $T = 2\pi\sqrt{\frac{\ell}{g}}$ is dimensionally correct.

(ii) Describe the principle homogeneity of dimensional analysis.

(iii) Write the dimensions of (i) Pressure (ii) Density

(iv) What are dimensions and units of G in the formula $F = G\frac{m_1 m_2}{r^2}$?

(v) Can you add zero to null vector.

(vi) Define Torque, give its units and dimensions.

(vii) What is method to find the direction of cross product of two vectors, describe it.

(viii) Define horizontal range and time of flight of projectile.

(ix) Define impulse and show that how it is related to linear momentum.

(x) What is isolated system, state law of conservation of linear momentum?

(xi) Write down three equations of motion.

(xii) State Bernoulli's theorem. Give its mathematical form.

3. Write short answers to any eight parts. **8 × 2 = 16**

(i) Derive the relation of power in term of $P = \vec{F} \cdot \vec{V}$.

(ii) A person holds a bag of groceries while standing still, talking to a friend. A car is stationary with its engine running. From the stand point of work, how are these two situations similar?

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

(iv) What do you understand by real and apparent weight? Explain.

(v) What is meant by angular momentum? Show angular momentum in mathematical form.

(vi) 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?

(vii) What should be the frequency of a simple pendulum whose period is one second at a place where $g = 9.8\,ms^{-2}$?

(viii) If a mass-spring system is hung vertically and set into oscillations, why does the motion eventually stops.

(ix) What is meant by phase angle? Does it define angle between maximum displacement and the driving force?

(x) How much greater is the speed of sound in hydrogen to that of oxygen? Explain.

(xi) What do you mean by quantization of frequency for stationary waves?

(xii) How are beats useful in tuning musical instruments?

4. Write short answers to any six parts. **6 × 2 = 12**

(i) What is meant by diffraction of light? Explain with an example.

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

(iii) Could you obtain Newton's rings with transmitted light? If yes, would the pattern be different from that obtained with reflected light?

P.T.O.

(iv) Define magnifying power and resolving power of optical instruments.

(v) A telescope is made of an objective of focal length 20 cm and an eye piece of 5 cm, both convex lenses. Find the angular magnification.

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

(vii) A mechanical engineer develops an engine, working between 600k and 300k claims to have efficiency of 52%. Does he claim correctly? Explain.

(viii) Define molar specific heats of a gas at constant pressure and constant volume.

(ix) Why is the average velocity of the molecules in a gas zero but the average of the square of velocities is not zero?

SECTION-II

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

5.(a) Differentiate between Elastic and Inelastic Collision. Derive the expressions for the velocities of two spherical bodies m_1 and m_2 after elastic collision in one dimension. 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 $\vec{A}$ on $\vec{B}$. 3

6.(a) Define gravitational field. Show that work done in gravitational field is independent of path followed. 5

(b) Find the temperature at which the velocity of sound in air is two times its velocity at $10^{o}C$. 3

7.(a) Define centripetal force and derive its relation for an object travelling with uniform speed V in a circle of radius r. 1 + 4

(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 15.0m. 3

8.(a) What is Carnot engine? Calculate the efficiency of Carnot engine. 5

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

9.(a) Define pressure of gas. Derive relation of pressure of gas. Show that $P \propto < K.E >$ of gas molecules. 5

(b) An astronomical telescope having magnifying power 5. Consistants of two thin lenses, 20cm apart. Find the focal lengths of the lenses. 3