Roll No. : _____

Objective	**Intermediate Part First - 903**	☆ ☆
Paper Code	**PHYSICS** (Objective) **GROUP - I**	
6477	Time: 20 Minutes Marks: 17	☆ ☆

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

FBD-GI-22

S.#	Questions	A	B	C	D
1	Magnification of convex lens is:	$1+\dfrac{d}{f}$	$1-\dfrac{d}{f}$	$1+\dfrac{f}{d}$	$1-\dfrac{f}{d}$
2	According to Charles Law which relation is correct:	$v \propto T$	$v \propto \dfrac{1}{n}$	$p \propto \dfrac{1}{n}$	$p \propto \dfrac{1}{v}$
3	Which force is non-conservative?	Electric force	Magnetic force	Nuclear force	Gravitational force
4	Significant figures in 0.00567:	2	3	4	5
5	Pressure of gas is given as:	$\dfrac{2}{3}\rho <v^2>$	$\dfrac{1}{3}\rho <v^2>$	$\dfrac{3}{2}\rho <v^2>$	$\rho <v^2>$
6	The self cross product of vector $\vec{B}$ is:	Zero	1	A^2	AB
7	The distance covered by free falling in 4S is:	19.6m	39.2m	78.4m	4.9m
8	The angle 2π rad is equal to:	$0°$	$180°$	$90°$	$360°$
9	The angle $\theta = wt$ specify:	Critical angle	Solid angle	Phase angle	Plane angle
10	One giga is equal to:	10^9	10^6	10^{-7}	10^3
11	Magnitude of unit vector $\hat{i} \times \hat{j}$ is:	$\hat{k}$	-1	$-\hat{j}$	1
12	The value of 'g' at the center of earth is:	Infinite	2g	3g	Zero
13	Pull of the earth on 20kg body on surface of earth is:	20N	196N	19.6N	1960N
14	The unit of viscosity in S.I. is:	$Kg^{-1}ms^{-2}$	$Kgm^{-1}s^{-1}$	$Kg^{-1}m^{-2}s$	$Kgms^{-1}$
15	Energy stored in spring is:	Elastic P.E.	Gravitational P.E.	K.E.	Chemical P.E.
16	Sound travel faster in:	CO_2	H_2	O_2	He
17	The wavelength of x-ray is of the order:	10m	10^{-10}m	10^{-2}m	10cm

9-XI132029-40000

PHYSICS (Subjective) GROUP - I

Time: 02:40 Hours   Marks: 68

SECTION – I

FRD-GI-22

2. Write short answers to any EIGHT parts.   16

(i) Write the dimensions of (a) pressure (b) density.

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

(iii) Differentiate between random error and systematic error.

(iv) What are the uses of dimensions?

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

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

(vii) A projectile is thrown from ground with velocity of 10m/sec at an angle of 30° with horizontal. Find the time taken to reach maximum height.

(viii) Why do you keep your legs far apart when you have to stand in the aisle of a bumpy riding bus?

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

(x) Is it possible to convert internal energy into mechanical energy? Explain with an example.

(xi) A heat engine takes heat of 100J from source and rejects 20J heat to the sink. Find the percentage efficiency of heat engine.

(xii) Starting from the relation for pressure of the gas prove that $T = \dfrac{2}{3k} < \dfrac{1}{2}mv^2 >$

3. Write short answers to any EIGHT parts.   16

(i) Explain the multiplication of a vector by a scalar.

(ii) Two vectors have unequal magnitudes. Can their sum be zero? Explain.

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

(iv) Define conservative field and give two examples.

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

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

(vii) Why the objects in satellites appear to be weightless?

(viii) What is meant by moment of inertia? Explain its significance.

(ix) Show that the orbital angular momentum $L_0 = mvr$.

(x) How would you manage to get more order of spectra using a diffraction grating?

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

(xii) Explain the optical rotation of light.

4. Write short answers to any SIX parts.   12

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

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

(iii) Differentiate between forced and free oscillations?

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

(v) How can we find out unknown frequency of a turning fork by beats?

(vi) How can the speed of a car can be found by Doppler's effect?

(vii) Explain why sound travels faster in warm air than in cold air?

(viii) Explain in brief the single mode step index fiber.

(ix) Differentiate between angular magnification and resolving power of an optical instrument.

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

5. (a) Define conservative field and show that earth's gravitational field is conservative.   05

(b) Show that three vectors $\hat{i} + \hat{j} + \hat{k}$, $2\hat{i} - 3\hat{j} + \hat{k}$ and $4\hat{i} + \hat{j} - 5\hat{k}$ are mutually perpendicular.   03

6. (a) Derive relations for rotational kinetic energy of a disc and a hoop. Calculate their velocities at the bottom of an incline of height h when both starts moving down at the same time.   05

(b) A truck weighing 2500kg and moving with a velocity of $21ms^{-1}$ collides with stationary car weighing 1000kg. The truck and the car move together after the impact. Calculate their common velocity.   03

FBD-G-22

7. (a) Discuss effect of pressure, density and temperature on speed of sound. Also prove that $v_t = v_0 + 0.61t$ 05

   (b) Water flows through a hose whose internal diameter is 1cm at a speed of $1ms^{-1}$. What should be the diameter of the nozzle if the water is to emerge at $21ms^{-1}$?   03

8. (a) How would you derive a relation for Bragg's equation. Also, compile the fact with at least two applications.   05

   (b) A block weighing 4.0kg extends a spring by 0.16m from its unstretched position. The block is removed and a 0.50kg body is hung from the same spring. If the spring is now stretched and then released, what is its period of vibration.   03

9. (a) What is Carnot engine? Explain its working and calculate its efficiency.   05

   (b) An astronomical telescope having magnifying power of 5 consists of two thin lenses 24cm apart. Find the focal lengths of the lenses.   03

Roll No. : _____

Objective
Paper Code
6478

Intermediate Part First - 103
PHYSICS (Objective) **GROUP - II**
Time: 20 Minutes   Marks: 17

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

FBD-G2-22

S.#	Questions	A	B	C	D
1	Dimensions of angular velocity are:	$[LT^{-1}]$	$[T^{-1}]$	$[L^{-1}T^{-1}]$	$[MLT^{-1}]$
2	Bernoulli's equation gives the dimensions of:	Pressure	Energy	Flow rate	Velocity
3	If the initial phase is $\frac{\pi}{2}$ rad, the instantaneous displacement in SHM will be:	$X_0 \sin \omega t$	$X_0 \cos \omega t$	$-X_0 \sin \omega t$	Zero
4	Human ear can recognize beats having maximum frequency equal to:	40Hz	30Hz	5Hz	10Hz
5	If 10 waves occupy 15cm, what is the wavelength?	0.6m	6cm	1.5cm	15m
6	When a red light is replaced with blue light in Young's experiment, fringe spacing:	Increases	Decreases	Remains same	Becomes infinite
7	If the focal lengths of objective and eye-piece are doubled, the length of telescope becomes:	Double	Half	Three times	Four times
8	When ice melts, entropy ___.	Increases	Decreases	Remains unchanged	Becomes more negative
9	The relation $-W = +\Delta U$, represents the process:	Isothermal expansion	Adiabatic expansion	Isothermal expansion	Adiabatic compression
10	Which is a base quantity?	Area	Charge	Electric current	Force
11	A measurement of a needle diameter, $D = 4.5 \pm 0.01$ mm has percentage uncertainty:	45 %	0.4 %	0.5 %	0.2 %
12	$|\hat{i} + \hat{j} + \hat{k}|$ is equal to:	$3\sqrt{2}$	$2\sqrt{3}$	$\sqrt{3}$	1
13	For what angle between velocity and magnetic field, the force on a charge particle will be maximum?	90°	45°	0°	180°
14	The dragless ballistic trajectory for spherical earth should be:	Parabolic	Elliptical	Hyperbolic	spherical
15	Horizontal acceleration of projectile motion is:	G	g	$0 ms^{-2}$	$12 ms^{-2}$
16	With increasing attitude, the absolute gravitational potential energy of an object:	Increases	Decreases	Becomes more negative	Remains constant
17	For uniform circular motion, tangential acceleration equals:	Centripetal acceleration	Centrifugal acceleration	Angular acceleration	Zero

10-XI132021-17000

PHYSICS   (Subjective)   GROUP - II
Time: 02:40 Hours   Marks: 68

SECTION – I

2. Write short answers to any EIGHT parts. FBD-G2-22   16
   (i)   Write the dimensions of (a) pressure (b) density.
   (ii)   Write that the famous Einstein equation $E = mc^2$ is dimensionally constant.
   (iii) Illustrate with an example, how uncertainty is calculated in addition of quantities?
   (iv)   What is systematic error? How can it be reduced?
   (v)   Define impulse and show how it is related to linear momentum.
   (vi)   At what point or points in its path does a projectile have its minimum speed, its maximum speed?
   (vii) Why the kinetic energy is not conserved in inelastic collision?
   (viii) What happens to the velocities of the body in an elastic collision when a light body collides with a massive body at rest?
   (ix)   Is it possible to construct a heat engine that will not expel heat into the atmosphere? Explain in brief.
   (x)   What happens to the temperature of the room, when an air conditioner is left running on the table in the middle of the room?
   (xi)   Discuss in brief the power stroke for a petrol engine.
   (xii) Differentiate between reversible and irreversible process.

3. Write short answers to any EIGHT parts.   16
   (i)   Define torque. Write its unit and dimensions.
   (ii)   The vector sum of three vectors give zero resultant. What can be the orientation of the vectors?
   (iii) State the conditions of equilibrium.
   (iv)   State work energy principle.
   (v)   What is Salter's duck? How it is used to produce energy from waves?
   (vi)   A boy uses a catapult to throw a stone which accidentally smashes a green house window. List the possible energy changes.
   (vii) State law of conservation of angular momentum. Write its one application.
   (viii) Explain the difference between tangential velocity and angular velocity. If one of these is given for a wheel of known radius, how will you find the other?
   (ix)   What is "INTELSAT"? Write the capacity of "INTELSAT-VI".
   (x)   What is the difference between diffraction and polarization?
   (xi)   Define thin film. Give its two examples.
   (xii) Could you obtain Newton's rings with transmitted light? If yes, would the pattern be different from that obtained with reflected light?

4. Write short answers to any SIX parts.   12
   (i)   Why fog droplets appear to be suspended in air?
   (ii)   Show that in SHM the acceleration is zero when velocity is greatest and the velocity is zero when the acceleration is the greatest.
   (iii) Write the two characteristics of simple harmonic motion.
   (iv)   What is meant by damped oscillations?
   (v)   What are the factors common in transverse and longitudinal waves?
   (vi)   How beats are useful in turning musical instruments?
   (vii) What is the frequency of fundamental note for an organ pipe of length 50cm, open at both ends? (speed of sound = 340m/s)
   (viii) An astronomical telescope having magnifying power of 5 consist of two thin lenses 24cm apart. Find the focal lengths of the lenses.
   (ix)   What is meant by total internal reflection? Explain by a ray diagram.

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

5. (a) Show that work done in earth's gravitational field is independent of the path followed.   05

   (b) Find work done when the point of application of force $3\hat{i} + 2\hat{j}$ moves in straight line from the point (2 , – 1) to the point (6 , 4).   03

FBD-G2-22

6. (a) What is the difference in real and apparent weight? Discuss the change in apparent weight with up and down accelerated motion. 05

   (b) A truck weight 2500kg and moving with a velocity of 21ms⁻¹ collides with a stationary car weighing 1000kg. The truck and the car move together after the impact. Calculate their common velocity. 03

7. (a) State and explain Torricelli's theorem. 05

   (b) A church organ consists of pipes, each open at one end of different lengths. The minimum length is 30mm and longest is 4m. calculate the frequency range of the fundamental notes. (speed of sound = 340ms⁻¹) 03

8. (a) Discuss the diffraction of light through diffraction grating and prove that $d\sin\theta = n\lambda$ 05

   (b) A 100.0gm body hung on a spring elongates a spring by 4.0cm. When a certain object is hung on the spring and set vibrating, its period is 0.568s. What is the mass of the object pulling the spring? 03

9. (a) Write the principle, construction and working of astronomical telescope. Also find its magnifying power. 05

   (b) A reversible engine works between two temperatures whose difference is 100°C. If it absorbs 746J of heat from the source and rejects 546J to the sink, calculate the temperature of the source and the sink. 03

10-XI122-17000