Roll No. : _____

Objective
Paper Code
6477

Intermediate Part First - 903
PHYSICS (Objective) **GROUP - I**
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 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

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SECTION – I   F80-GL-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 $T = \frac{2}{3k} < \frac{1}{2}mv^2 >$

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-Gr22

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