

FSP

FBD-41-21

12

Objective  
Paper Code  
6475

Intermediate Part First

PHYSICS (Objective) GROUP - I

Time: 20 Minutes

Marks: 17

Roll No. : \_\_\_\_\_



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.

S.#	Questions	A	B	C	D
1	The moment of inertia of a ring is equal to:	$\frac{1}{12}mr^2$	$mr^2$	$\frac{1}{2}mr^2$	$\frac{2}{5}mr^2$
2	1kWh = :	3.6μJ	3.6mJ	3.6kJ	3.6MJ
3	The rate of change of momentum of a body equals to:	Work done	Applied power	Applied force	Impulse
4	The range of projectile is maximum when projectile is thrown at an angle of:	30°	45°	60°	90°
5	If $\vec{A} = 2\hat{i} - \hat{j} + 2\hat{k}$ then $A =$ :	2	3	5	9
6	The area of the parallelogram formed with $\vec{A}$ and $\vec{B}$ as two adjacent sides is equal to:	$AB \sin \theta$	$AB \cos \theta$	$AB \tan \theta$	$AB$
7	The units of gravitational constant have units:	$Nm^2kg^{-1}$	$Nmkg^{-2}$	$Nm^2kg^2$	$Nm^2kg^{-2}$
8	Work have same dimensions as that of:	Momentum	Power	Torque	Impulse
9	Carnot engine consists of:	Two steps	Three steps	Four steps	Five steps
10	For adiabatic process, the first law of thermodynamics gives:	$Q = W$	$W = -\Delta U$	$Q = \Delta U$	$Q = \Delta U + W$
11	If N is the number of rulings on the grating, then the resolving power in the mth order diffraction is equal to:	$R = \frac{N}{m}$	$R = \frac{m}{N}$	$R = mN$	$R = \frac{1}{mN}$
12	The light from the Sun reaches the Earth with:	Circular wave fronts	Plane wave fronts	Spherical wave fronts	Elliptical wave fronts
13	The distance between a node and the next antinode is:	$4\lambda$	$2\lambda$	$\frac{\lambda}{4}$	$\frac{\lambda}{2}$
14	The increase in the speed of sound for one degree Celsius rise in temperature by:	$0.61cms^{-1}$	$0.61ms^{-1}$	$0.16cms^{-1}$	$0.16ms^{-1}$
15	If the length of a simple pendulum is doubled, its period:	Will not change	Will also be doubled	Will be halved	Will increase by 1.4 times
16	A chimney works best when it is:	Tall	Wide	Short	Narrow
17	The SI unit of angular displacement is:	Meter	Degree	Radian	Revolution

35-XI121-38000

Intermediate Part First  
**PHYSICS** ( Subjective ) **GROUP - I**

Roll No. \_\_\_\_\_

Time: 02:40 Hours

Marks: 68 **FBD-41**

**SECTION – I**

**Write short answers to any EIGHT parts.**

16

- (i) Show that the expression  $v_f = v_i + at$  is dimensionally correct, where  $v_i$  is the initial velocity at  $t = 0$ , "a" is the acceleration and  $v_f$  is the velocity at time "t".
- (ii) The wavelength  $\lambda$  of the wave depends on the speed  $v$  of the wave and frequency  $f$ . Decide which of the following is correct?  $f = v\lambda$  or  $f = \frac{v}{\lambda}$
- (iii) Find the dimensions and hence the SI unit of coefficient of viscosity.
- (iv) Does a dimensional analysis give any information on constant of proportionality that may appear in an algebraic expression? Explain.
- (v) Define null vector. What is the difference between null vector and zero vector?
- (vi) Write the position vector in one coordinate system, two coordinate system and three coordinate system.
- (vii) If  $\vec{A} = 2\hat{i} - 10\hat{j}$  and  $\vec{B} = 6\hat{k}$ . Find  $\vec{A} \times \vec{B}$  (cross product).
- (viii) Explain how the swing is produced in a fast moving cricket ball?
- (ix) Show that the range of projectile is maximum when projectile is thrown at an angle of  $45^\circ$  with the horizontal.
- (x) Describe a case when a massive body collide with light body at rest.
- (xi) How the helmet safe from injury in accident?
- (xii) Water flows out from a pipe at  $3\text{ kgs}^{-1}$  and its velocity changes from  $5\text{ ms}^{-1}$  to zero on striking the wall. Find the force exerted by the water.

**3. Write short answers to any EIGHT parts.**

16

- (i) A girl drops a cup from a certain height which breaks into pieces. What energy changes are involved?
- (ii) When rocket re-enters the atmosphere, its nosecone becomes very hot. Where does this energy come from?
- (iii) Define absolute potential energy. Give its unit.
- (iv) Define angular momentum. What is its direction?
- (v) Define angular velocity and angular acceleration.
- (vi) What is meant by moment of inertia? Explain its significance.
- (vii) Under what conditions does the addition of two simple harmonic motions produce a simple harmonic motion also?
- (viii) Describe some common phenomena in which resonance plays an important role.
- (ix) Does the acceleration of simple harmonic oscillator remain constant? Is the acceleration zero anywhere?
- (x) What is period of 250 cycles per second of sound waves?
- (xi) Find the temperature at which the velocity of sound in air is two times its velocity at  $0^\circ\text{C}$ .
- (xii) If velocity of sound is  $332\text{ ms}^{-1}$  at  $0^\circ\text{C}$  then what will be its velocity at  $10^\circ\text{C}$ ?

**4. Write short answers to any SIX parts.**

12

- (i) Under what conditions two or more sources of light behave as coherent sources?
- (ii) How would you manage to get more order of spectra using a diffraction grating?
- (iii) State Huygen's principle.
- (iv) If a person was looking through a telescope at the full moon. How would the appearance of the moon be changed by covering half of the objective lens?
- (v) Why is the astronomical telescope preferred to use in normal adjustment?
- (vi) Why does the pressure of a gas in a car tyre increase when it is driven through some distance?
- (vii) Is it possible to construct a heat engine that will not expel heat into the atmosphere?
- (viii) State Carnot's theorem.
- (ix) Differentiate between internal energy of a substance and internal energy of an ideal gas.

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

5. (a) Define scalar product of two vectors with examples. Write any four characteristics of scalar product. 01,04  
(b) Two spherical balls of 2.0kg and 3.0kg masses are moving towards each other with velocities of 6.0 m/sec and 4 m/sec respectively. What must be the velocity of smaller ball after collision if velocity of bigger ball is 3.0 m/sec. 03
6. (a) Describe the stationary waves produced in a stretched string and prove that their frequencies are quantized. 05  
(b) A 70kg man runs up a long flight of stairs in 4.0 s. The vertical height of the stairs is 4.5m. Calculate his power output in watts. 03

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7. (a) Define laminar and turbulent flow and derive an expression for Bernoulli's equation. 05  
(b) A 1000kg car travelling with a speed of  $144\text{kmh}^{-1}$  rounds a curve of radius 100m. Find the necessary centripetal force. 03
8. (a) Define molar specific heats of a gas. Also show that  $C_p - C_v = R$  05  
(b) A block of mass 4kg is dropped from a height of 0.80m on to spring of spring constant  $k = 1960\text{Nm}^{-1}$ . Find the maximum distance through which the spring will be compressed. 03
9. (a) What is compound microscope? Describe its construction and working. Also calculate its magnifying power. 05  
(b) Sodium light ( $\lambda = 589\text{nm}$ ) is incident normally on a grating having 3000 lines per centimeter. What is the highest order of the spectrum obtained with this grating? 03

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