

Objective  
Paper Code  
**6476**

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

**F00-42-21**

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	If $\vec{A} \cdot \vec{B} =  \vec{A} \times \vec{B} $ then angle between $\vec{A}$ and $\vec{B}$ is:	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\pi$
2	Dimensions of ratio of angular momentum to linear momentum is:	$[M^0 L T^0]$	$[M^1 L^1 T^1]$	$[M^1 L^2 T^1]$	$[M^{-1} L^{-1} T^1]$
3	Dimensions of $\sqrt{F \frac{\ell}{m}}$ are:	$[M^0 L T^{-1}]$	$[M L^{-1} T]$	$[M L^2 T^{-3}]$	$[M L^{-1} T^{-1}]$
4	Magnifying power of telescope is:	$\frac{f_e}{f_o}$	$\frac{f_o}{f_e}$	$f_e f_o$	$\frac{1}{f_o f_e}$
5	In Michelson interferometer a fring is shifted each time the mirror is displaced through:	$\frac{\lambda}{2}$	$\frac{\lambda}{4}$	$\frac{\lambda}{8}$	Zero
6	If pendulum vibrate with frequency 0.5Hz, then its length will be:	10cm	50cm	80cm	99cm
7	Bernoulli's equation is based upon law of conservation of:	Momentum	Energy	Mass	Charge
8	If speed of moving body is doubled its K.E. is:	Doubled	Halved	Unchanged	4 times
9	SI unit of molar specific heat is:	$J \text{ mol}^{-1} K^{-1}$	$J \text{ mol} K^{-1}$	$J \text{ mol} K$	$J \text{ mol}^{-1}$
10	Highest efficiency of heat engine whose lower temperature is $17^\circ C$ and higher temperature is $200^\circ C$ is:	70%	100%	35%	38%
11	The stretched string of length 2m vibrates in 2 segments. The distance between two consecutive nodes is:	1m	2m	0.5m	4m
12	Tuning fork is source of:	Heat	Light	Sound	Electro-magnetic waves
13	Rotational kinetic energy of the hoop moving down on inclined plane is:	$\frac{1}{2} mv^2$	$mv^2$	$\frac{1}{4} mv^2$	$\frac{3}{4} mv^2$
14	Pull of the Earth on 20kg body on surface of Earth is:	20N	196N	19.6N	1960N
15	Rate of change of momentum is called:	Force	Pressure	Tension	Impulse
16	Mass of fuel consumed by a typical rocket to overcome earth's gravity is:	1000kg/s	100kg/s	10000kg/s	10kg/s
17	$\hat{i} \cdot \hat{i} = \hat{j} \cdot \hat{j} = \hat{k} \cdot \hat{k}$ is equal to:	0	1	-1	2

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

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

Time: 02:40 Hours

Marks: 68

**FBD-42-21**

**SECTION – I**

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

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- (i) Show that formula  $T = 2\pi \sqrt{\frac{\ell}{g}}$  is dimensionally correct.
- (ii) Add the following velocities given in m/s up to appropriate precision: 23.1 , 0.002 , 0.00023 , 5 – 12
- (iii) Define the terms (a) Precision (b) Dimensions of physical quantities.
- (iv) Write the dimensions of (a) Coefficient of viscosity  $\eta$  (b) Energy.
- (v) Define the terms (a) Resultant vector (b) Subtraction of vector.
- (vi) What is the unit vector in the direction of the vector  $\vec{A} = 4\hat{i} - 3\hat{j}$  ?
- (vii) Suppose the sides of a closed polygon represent vector arranged head to tail. What is the sum of these vectors?
- (viii) Define the terms (a) The time of flight (b) The range of projectile.
- (ix) What happened when light body collides with a massive body at rest?
- (x) Find the time of flight of projectile when it is thrown at an angle of  $30^\circ$  with horizontal.
- (xi) Explain the difference between laminar flow and turbulent flow.
- (xii) Explain what do you understand by rocket motion?

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

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- (i) Calculate the work done in kilo joules in lifting a mass of 10kg through a vertical height of 10m.
- (ii) A person holds a bag of groceries while standing still, talking a friend. A car is stationary with its engine running. From the stand point of work, how are these two situations similar?
- (iii) Derive the mathematical expression for escape velocity.
- (iv) What is meant by moment of inertia? Explain its significance.
- (v) What is meant by angular momentum? Also define law of conservation of angular momentum.
- (vi) Define angular acceleration. How angular and linear velocities are related? Explain.
- (vii) What should be the length of a simple pendulum whose period is 1 second at a place where  $g = 9.8\text{ms}^{-2}$ .
- (viii) If a mass spring system is hung vertically and set into oscillations, why does the motion eventually stop?
- (ix) Describe two common phenomena in which resonance plays an important role.
- (x) Is it possible for two identical waves travelling in the same direction along a string to give rise to a stationary wave? Explain.
- (xi) Find the frequencies produced in organ pipe when it is open at both ends.
- (xii) What are beats? Also mention one use of beats.

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

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- (i) In the Young's experiment, one of the slits is covered with blue filter and other with red filter. What would be the pattern of light intensity on the screen?
- (ii) Differentiate the interference and diffraction patterns of light.
- (iii) Write the conditions for detectable interference of light waves.
- (iv) Why would it be advantageous to use blue light with a compound microscope?
- (v) How convex lens act as a magnifying glass? Explain.
- (vi) Give an example of a process in which no heat is transferred to or from the system but the temperature of the system changes.
- (vii) Is it possible to convert internal energy into mechanical energy? Explain with an example.
- (viii) Define internal energy of a substance. Is it state function?
- (ix) How first law of thermodynamics explains human metabolism? Explain.

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

5. (a) State and prove law of conservation of linear momentum. 05  
(b) Two forces of magnitude 10N and 20N act on a body in directions making angle  $30^\circ$  and  $60^\circ$  with x-axis respectively. Find the resultant force. 03
6. (a) Explain the interconversion of potential energy and kinetic energy (i) When there is no frictional force 05  
(ii) When frictional force is present. 03  
(b) The frequency of the note emitted by a stretched string is 300Hz. What will be the frequency of the note when the length of the wave is reduced by one third without changing the tension? 03

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7. (a) State and prove Torricelli's Theorem with diagram. 05  
(b) Calculate the angular momentum of a star of mass  $2.0 \times 10^{30}$  kg and radius  $7.0 \times 10^5$  km, if it makes one complete rotation about its axis once in 20 days. What is its kinetic energy? 03
8. (a) Define simple pendulum. Show that its motion is SHM. Discuss its working derive relation for its time period. 05  
(b) Estimate average speed of nitrogen molecules in air under standard conditions of pressure and temperature. 03
9. (a) Explain the diffraction of X-rays by crystal and derive Bragg's law. What are the uses of diffraction of X-rays. 02,02,01  
(b) A simple astronomical telescope in normal adjustment has an objective of focal length 100cm and eye piece of focal length 5.0cm.  
(i) Where is the final image formed? (ii) Calculate the angular magnification. 03

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