

PHYSICS	Intermediate Part-I (11th) (1st A 325)	Paper: I	First Group .
Time: 2:40 Hours	SUBJECTIVE	Marks: 68	

Note: Section I is compulsory. Attempt any THREE (3) questions from Section II.

SECTION – I

2. Write short answers to any EIGHT (8) questions.

(2x8 = 16)

- The period of simple pendulum is measured by a stopwatch. What type of error is possible in time period?
- Why do we find it useful to have two units for the amount of substance kilogram and mole?
- Write down names of several repetitive phenomenon occurring in nature which could serve as reasonable time standards.
- Show that famous Einstein equation $E = mc^2$ is dimensionally consistent.
- Can a body rotate about the centre of gravity under the action of its weight?
- Write down names of three different conditions that could make $\vec{A}_1 \times \vec{A}_2 = 0$.
- State Right Hand Rule for the cross product of two vectors.
- An object is thrown vertically upward. Discuss the sign of acceleration due to gravity relative to velocity while the object is in air.
- Show that range of projectile is maximum when it is thrown at an angle of 45° with horizontal.
- Can the velocity of an object in reverse direction when acceleration is constant? If so, give an example.
- A boy uses a catapult to throw a stone which accidentally smashes a greenhouse window. Make a list of the possible energy changes?
- What is meant by Kilo watt hour and show that $1 \text{ Kwh} = 3.6 \text{ MJ}$

3. Write short answers to any EIGHT (8) questions.

(2x8 = 16)

- Explain what is meant by centripetal force and why it must be furnished to an object if the object is to follow a circular path.
- 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?
- What is meant by angular momentum? Also state Law of Conservation of Angular Momentum.
- Define artificial gravity. What is the frequency necessary to produce artificial gravity in a spaceship?
- Write down a few characteristics of blood.
- Two row boats moving parallel in the same direction are pulled towards each other. Explain.
- Can we realize an ideal simple pendulum?
- Under what conditions does the addition of two simple harmonic motions produce a resultant, which is also simple harmonic?
- What are damped oscillations?
- How beats are useful in tuning musical instruments?
- How should a sound source move with respect to an observer so that the frequency of its sound does not change?
- What is sonic boom?

4. Write short answers to any SIX (6) questions.

(2x6 = 12)

- Prove that $\Delta y = \frac{\lambda L}{d}$
- If 5000 lines are ruled on grating per centimeter. Find grating element.
- How would you distinguish between plane polarized and unpolarized light?
- What do you mean by critical angle?
- What is the function of repeater in optical fibre communication system?
- Explain the difference between angular magnification and resolving power.
- Why does the pressure of gas in car tyre increase when it is driven through some distance?
- Does entropy of a system increase or decrease due to friction?
- How the efficiency of heat engine can be increased?

SECTION – II

- How would you interpret isolated system and also explain Law of Conservation of Momentum? **(5)**
 - The magnitude of dot and cross products of two vectors are $6\sqrt{3}$ and 6 respectively. Find the angle between the vectors. **(3)**
- Define the term absolute P.E. Derive its expression for an object of mass m on surface of the Earth. **(5)**
 - A gramophone record turntable accelerates from rest to an angular velocity of 45 rev min^{-1} in 1.60 s. What is its average angular acceleration? **(3)**
- State and prove Bernoulli's equation. **(5)**
 - What is the average translational Kinetic energy of molecules in a gas at temperature 27°C ? **(3)**
- What is the limitation of Newton's formula for the speed of sound in air? Show that how Laplace corrected it? **(5)**
 - A simple pendulum is 50.0 cm long. What will be its frequency of vibration at a place where $g = 9.8 \text{ ms}^{-2}$? **(3)**
- Derive the expression for time period, displacement and velocity of horizontal mass spring system. **(5)**
 - An organ pipe has a length of 50 cm. Find the frequency of its fundamental note and the next harmonic, when it is open at both ends. **(3)**

Roll No. of Candidate : _____

PHYSICS		Intermediate Part-I (11 th) (1 st A 325-I)		Paper: I	Second Group
Time: 20 Minutes		OBJECTIVE Code: 6472		Marks: 17	
Q. No.	You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of the relevant question number. Use marker or pen to fill in the circles. Cutting or filling of two or more circles will result zero mark in that question.				
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S. #	Questions	A	B	C	D
1	No. of significant zero in the result 0.005023 is	3	2	1	4
2	In a simple pendulum experiment percentage error in L and T are 0.1% and 2% respectively. What is maximum percentage error in LT^2 ?	4.1%	3%	5%	2%
3	Resultant of two vectors of magnitude 5 and 6 is 1. Angle between them is	60°	180°	90°	30°
4	Vectors have	Numerical properties	Directional properties	Both A and B	None of these
5	Two masses m_1 and m_2 will interchange their velocities after collision if	$m_1 \gg m_2$	$m_1 < m_2$	$m_2 \gg m_1$	$m_1 = m_2$
6	Range of projectile are equal for pair of angles	45° , 50°	45° , 55°	20° , 60°	40° , 50°
7	K.E of body of mass 1Kg and momentum 2Ns is equal to	1J	2J	5J	10J
8	Dimension of angular acceleration is	[LT]	[LT^{-1}]	[T^{-2}]	[T^2]
9	10N centripetal force is revolving a body along a circular path of radius 1m. Work done by this force is	10J	20J	40J	Zero
10	If temperature rises, then the coefficient of viscosity of a gas	Increases	Decreases	Remains unchanged	Becomes zero
11	If suspended mass of simple pendulum is made double, time period of simple pendulum will	Increase two times	Decrease two times	Remain constant	Become infinity
12	Speed of sound is greatest in	Air	Steel	Water	Oxygen (O_2)
13	Speed of sound is higher in Hydrogen than in Oxygen by	2 times	4 times	8 times	16 times
14	If blue light is used instead of red light, then fringe spacing will	Increase	Decrease	Remain same	Become zero
15	Diameter of core of single mode step index fibre is	1000 μm	50 μm	5 μm	100 μm
16	When hot and cold water are mixed, the entropy	Decreases	Remains constant	Becomes maximum	Increases
17	For ideal gas, P.E associated with its molecule is	Maximum	Zero	Infinite	Negative

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SECTION – I

2. Write short answers to any EIGHT (8) questions.

(2x8 = 16)

- a) How many years in 1 second? b) How many nanoseconds in 1 year?
- Show that the famous "Einstein Equation" $E = mc^2$ is dimensionally consistent.
- Add the masses given in Kg upto appropriate precision 2.189, 0.089, 11.8 and 5.32.
- Define Radian and Steradian.
- Under what circumstances would a vector have components that are equal in magnitude?
- Is it possible to add a vector quantity to a scalar quantity? Explain.
- Why do you keep your legs far apart when you have to stand in the aisle of a bumpy-riding bus?
- Why does a motorcyclist use safety helmet?
- Define impulse and show how it is related to linear momentum.
- Can the velocity of an object reverse direction when acceleration is constant? If so, give an example.
- A boy uses a catapult to throw a stone which accidentally smashes a green-house window. Write down possible energy changes.
- Prove that $P = \vec{F} \cdot \vec{V}$. Also define Watt.

3. Write short answers to any EIGHT (8) questions.

(2x8 = 16)

- As a result of distant explosion an observer senses ground tremor and then hears the explosion. Explain the time difference.
- A wave is produced along a stretched string but some of its particles permanently show zero displacement. What type of wave is it?
- What is the effect of density on the speed of sound?
- Can we realize an ideal simple pendulum? Explain.
- Why it is important to test all the components in helicopters and aeroplanes before flight?
- Define S.H.M. Express it mathematically.
- Why the chimney works well, when it is tall?
- A person is standing near a fast moving train. Is there any danger that he will fall towards it?
- Show that orbital Angular Momentum $L_o = mvr$
- What is meant by Angular Momentum?
- Show that $v = r\omega$
- Why the axis of rotation of earth remains fixed in one direction with reference to the universe around us?

4. Write short answers to any SIX (6) questions.

(2x6 = 12)

- What happens when polarized light passes through a polarizer?
- What principle explains the colour seen in peacock feather? Use its vivid indescence nature to support your answer.
- Can visible light produce interference nature to support your answer?
- What are the uses of spectrometer?
- Find the total distance which light travels in Michelson's experiment of speed of light, when motor runs with a frequency of 50 rps.
- One can buy a cheap microscope for use by the children. The image seen in such a microscope have coloured edges. Why this is so?
- Estimate the average speed of Nitrogen molecules in air at S.T.P.
- State 2nd Law of Thermodynamics. Give one example to explain.
- Specific heat of a gas at constant pressure is greater than specific heat at constant volume. Why?

SECTION – II

- (a) Define Elastic Collision. Give an example. Find expression for velocities of two masses m_1 and m_2 after elastic collision in one dimension. (5)
(b) Find the work done when the point of application of force $3\hat{i} + 2\hat{j}$ moves in a straight line from the point (2, -1) to the point (6, 4) (3)
- (a) Prove that rotational Kinetic Energy of a body spinning about an axis is $K.E_{rot} = \frac{1}{2}I\omega^2$. Find rotational Kinetic Energy of a disc and a hoop. (5)
(b) Ten bricks, each 6.0cm thick and mass 1.5Kg, lie flat on a table. How much work is required to stack them one on the top of another? (3)
- (a) State 1st Law of Thermodynamics. Explain isothermal and adiabatic process. (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)
- (a) Derive the expression for time period, displacement and velocity of horizontal mass spring system. (5)
(b) A stationary wave is established in a string which is 120cm long and fixed at both ends. The string vibrates in four segments, at a frequency of 120Hz. Determine its wavelength and the fundamental frequency. (3)
- (a) Discuss Michelson's experiment for determination of speed of light. (5)
(b) Yellow sodium light of wavelength 589nm emitted by a single source passes through two narrow slits 1.00mm apart. The interference screen 225cm away. How far apart are two adjacent bright fringes? (3)