

Physics

Paper : I

Roll No.

Inter (Part-I)-A-2021

(To be filled in by the candidate)

Time : 20 Minutes

Marks : 17

Objective - (III)

Paper Code 6 4 7 5

SWL-21

Note: - You have four choices for each objective type question as A, B, C and D. The choice which you think correct; fill that circle in front of that question number in your answer book. Use marker or pen to fill the circles. Cutting or filling up two or more circles will result no mark.

Q.1	Questions	A	B	C	D
1.	The term " ρgh " in Bernoulli's equation has the same units as:	work	energy	pressure	flow rate
2.	An ideal gas performs 10J of work while expanding adiabatically. The change in its internal energy is:	10J	-10J	100J	-200J
3.	Average translational K.E. of a gas molecule is:	$\frac{3}{2}KT$	$\frac{1}{2}KT$	$\frac{2}{3}KT$	KT
4.	The K.E of an object of mass " m " is " E ", its momentum will be:	$2Em$	$\sqrt{\frac{2E}{m}}$	$\sqrt{\frac{1}{2}Em}$	$\sqrt{2mE}$
5.	The frequency of waves produced in microwave oven is:	1435 MHz	2850 MHz	2450 MHz	4250 MHz
6.	The increase in velocity of sound in air for 1°C rise in temperature is:	61 cm/s	0.61 cm/s	61 m/s	1.61 m/s
7.	The ratio of velocity of disc to velocity of hoop is:	$\frac{2}{\sqrt{3}}$	$\frac{4}{\sqrt{3}}$	$\frac{2}{3}$	$\frac{4}{3}$
8.	The wave length of nth mode of stationary waves in closed pipe is:	$\frac{2l}{n}$	$\frac{4l}{2n-1}$	$\frac{4l}{n}$	$\frac{4l}{2n+1}$
9.	1 rev /min is equal to:	$\frac{\pi}{6}$ rad /s	$\frac{\pi}{30}$ rad /s	$\frac{\pi}{15}$ rad /s	2π rad /s
10.	If initial velocity of projectile becomes doubled. The time of flight will become:	4 times	Half	2 times	8 times
11.	Height of projectile is maximum at an angle of projection of:	45°	60°	30°	90°
12.	$\hat{i} \cdot (\hat{k} \times \hat{i}) =$	1	\hat{j}	\hat{i}	0
13.	If two non-zero vectors \vec{A} & \vec{B} are parallel to each other then:	$\vec{A} \cdot \vec{B} = 0$	$ \vec{A} \times \vec{B} = AB$	$\vec{A} \cdot \vec{B} = AB$	$\vec{A} \cdot \vec{B} = 1$
14.	The uncertainty in the time period of a vibrating body is:	least count \times No. of vibrations	least count + No. of vibrations	least count + No. of vibrations	least count - No. of vibrations
15.	Which pair of physical quantities have same dimensions?	work and power	momentum and impulse	force and torque	momentum and force
16.	Refractive index of water is:	1.5	1.33	1.0	1.2
17.	The fringe spacing is the greatest for:	Blue light	Yellow light	Green light	Red light

Roll No.

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 (To be filled in by the candidate)

Physics

Inter (Part-I)-A-2021

Time : 2:40 Hours

Paper : I

SWL-21

Subjective

Marks : 68

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

(SECTION-I)

2. Write short answers to any Eight parts.

(8 x 2 = 16)

- i. Check the correctness of the relation $v = \sqrt{\frac{F \times l}{m}}$ where v is the speed of transverse wave on a stretched string of tensile length l and mass m .
- ii. Does a dimensional analysis give any information on constant of proportionality that may appear in an algebra expression? Explain.
- iii. Add the following masses given in Kg upto appropriate precision. 2.189, 0.089, 11.8 and 5.32.
- iv. The volume of sphere $V=47.689 \text{ cm}^3$ with 1.2% uncertainty. What is the correct range of volume measurement?
- v. Suppose the sides of closed polygon represent vector arranged head to tail. What is the sum of these vectors?
- vi. Prove that $A \cdot B = A_x B_x + A_y B_y + A_z B_z$.
- vii. If all the components of vectors A_1 and A_2 were reversed, how would this alter $A_1 \times A_2$?
- viii. Define Law of Conservation of linear momentum and write its mathematical form.
- ix. Explain the difference between elastic and inelastic collisions. Explain how would a bouncing ball behave in each case? Give plausible reasons for the fact that K.E. is not conserved in most cases.
- x. Derive an expression for the time of flight of projectile.
- xi. What happens to the velocities of two bodies after collision when a light body collides with a massive body at rest for elastic collision?
- xii. Two row boats moving parallel in the same direction are pulled towards each other. Explain.

3. Write short answers to any Eight parts.

(8 x 2 = 16)

- i. A girl drops a cup from a certain height, which breaks into pieces. What energy changes are involved?
- ii. Show that $1 \text{ kWh} = 3.6 \times 10^6 \text{ J}$
- iii. What do you mean by variable force? Give its two examples.
- iv. Show that $v = r\omega$
- v. What is meant by moment of inertia? Explain its significance.
- vi. When mud flies off the tyre of a moving bicycle, in what direction does it fly? Explain.
- vii. What is meant by phase angle? Does it define angle between maximum displacement and driving force?
- viii. Define resonance, write one advantage and one disadvantage of resonance.
- ix. Differentiate between free and forced oscillations.
- x. Is it possible for two identical waves travelling in the same direction along a string to give rise to a stationary wave?
- xi. How temperature and density of the medium effect the speed of sound?
- xii. What happens when a jet plane like Concorde flies faster than the speed of sound?

4. Write short answers to any Six parts.

(6 x 2 = 12)

- i. How is the distance between interference fringes affected by separation between the slits of Young's experiment? Can fringes disappear?
- ii. How would you manage to get more orders of spectra using diffraction grating?
- iii. What are Newton's rings? How they are formed?
- iv. Explain the difference between angular magnification and resolving power of an optical instrument.
- v. What is meant by least distance of distinct vision?
- vi. Why does the pressure of a gas in a car tyre increases when it is driven through some distance?
- vii. What is meant by reversible process? Give its example.
- viii. Write down the postulates of kinetic theory of gases.
- ix. Specific heat of a gas at constant pressure greater than specific heat at constant volume. Why?

(SECTION-II)

(Each question carries Eight (5+3=8) Marks)

5. (a) Describe the method of addition of vectors by rectangular components.
(b) A truck weighing 2500 Kg and moving with a velocity of 21 ms^{-1} collides with stationary car weighing 1000 kg. The truck and the car move together after the impact. Calculate their common velocity.
6. (a) Define Absolute Potential Energy. Derive relation for absolute P.E of body of mass "m" at distance "r" from the center of earth.
(b) Find the temperature at which the velocity of sound in air is two times its velocity at 10°C .
7. (a) State and prove Bernoulli's equation.
(b) What is the least speed at which an aeroplane can execute a vertical loop of 1.0 km radius so that there will be no tendency for the pilot to fall down at the highest point.
8. (a) State first law of thermodynamics and explain: (i) Isothermal Process (ii) Adiabatic Process
(b) A simple pendulum is 50cm long. What will be its frequency of vibration at a place where $g = 9.8 \text{ ms}^{-2}$?
9. (a) Calculate the speed of light by Michelson's method.
(b) Yellow sodium light of wavelength 589 nm, emitted by a single source passes through two narrow slits 1.0 mm apart. The interference pattern is observed on a screen 225 cm away. How far apart are two adjacent bright fringes?

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