

Roll No. \_\_\_\_\_ (To be filled in by the candidate)

(Academic Sessions 2020 – 2022 to 2022 – 2024)

PHYSICS

224-1<sup>st</sup> Annual-(INTER PART – II)

Time Allowed : 20 Minutes

Q.PAPER – II ( Objective Type )

GROUP – I

Maximum Marks : 17

PAPER CODE = 8477

LHR-1-24

Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1-1	The rest mass energy of electron positron pair is : (A) 0.51 MeV (B) 0.71 MeV (C) 1.02 MeV (D) 2 MeV
2	The SI unit of impedance is : (A) Ohm (B) Farad (C) Volt (D) Ampere
3	To convert galvanometer into voltmeter, high resistance is connected to the galvanometer in : (A) Parallel (B) Series (C) Anti parallel (D) Perpendicular
4	In transistor, concentration of impurity is highest in : (A) Collector (B) Emitter (C) Base and collector (D) Base
5	At high frequency, RLC series circuit behaves like : (A) R-C circuit (B) R-L circuit (C) RLC series circuit (D) L-C circuit
6	If electric and gravitational forces on an electron balance each other, then electric field intensity will be : (A) $mgq$ (B) $\frac{q \cdot mg}{m \cdot g}$ (C) $\frac{mg}{q}$ (D) $\frac{q}{4\pi\epsilon_0 r^2}$
7	The temperature of steam coming out of turbine in nuclear reactor is : (A) 200 °C (B) 300 °C (C) 600 °C (D) 1300 °C
8	The dimensions of motional emf are same as that of : (A) Magnetic induction (B) Magnetic flux (C) Potential difference (D) Magnetic force
9	The value of Stefan's constant ' $\sigma$ ' is given by : (A) $5.67 \times 10^{-8} Wm^{-2}K^{-2}$ (B) $5.67 \times 10^{-8} Wm^{-2}K^{-4}$ (C) $5.67 \times 10^{-8} Wm^2K^2$ (D) $5.67 \times 10^{-8} W^2m^2K^{-2}$
10	A charge of 4C is placed in the field of intensity $8NC^{-1}$ . The force on the charge is : (A) 2 N (B) 4 N (C) 16 N (D) 32 N
11	The example of crystalline solid is : (A) Zirconia (B) Natural rubber (C) Polystrene (D) Nylon
12	Heat sensitive resistors are called : (A) Resistor (B) Thermistor (C) Inductor (D) Capacitor
13	The atoms can reside in metastable state for about : (A) $10^{-2}s$ (B) $10^{-3}s$ (C) $10^{-4}s$ (D) $10^{-8}s$
14	$X = A + B$ is the mathematical notation for : (A) OR gate (B) NOR gate (C) NOT gate (D) NAND gate
15	Binding energy per nucleon for isotope iron-58 has a value of : (A) 6.6 MeV (B) 7.7 MeV (C) 8.8 MeV (D) 9.9 MeV
16	For step up transformer : (A) $N_s < N_p$ (B) $N_s > N_p$ (C) $N_s = N_p$ (D) $N_s \geq N_p$
17	Brightness of screen of CRO is controlled by : (A) Grid (B) Anode (C) Cathode (D) Filament

SECTION – I

LHR-1-24

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

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- (i) Write down dimensions of : (a) Pressure. (b) Density.
- (ii) Does a dimensional analysis give any information on constant of proportionality that may appear in an algebraic expression?
- (iii) Name two major types of errors.
- (iv) Write down factors of prefixes atto and tera.
- (v) Can magnitude of a vector have a negative value?
- (vi) If  $\vec{A} - \vec{B} = \vec{O}$ , what can you say about the components of the two vectors?
- (vii) Can you add zero to a null vector?
- (viii) Motion with constant velocity is a special case of motion with constant acceleration. Is this statement true? Discuss.
- (ix) An object is thrown vertically upward. Discuss sign of acceleration due to gravity relative to velocity, while the object is in air.
- (x) How impulse is equal to change in momentum?
- (xi) An object has 1J of potential energy. Explain what does it mean?
- (xii) Prove that  $P = \vec{F} \cdot \vec{v}$  where P,  $\vec{F}$  and  $\vec{v}$  are power, force and velocity.

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

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- (i) A wheel covers 200 m distance between two points. If its radius is 0.2 m, find the number of revolution completed by the wheel.
- (ii) Describe what should be the minimum velocity for a satellite, to orbit close to the earth around it.
- (iii) State the direction of the following vectors in simple situations, angular momentum and angular velocity.
- (iv) When mud flies off the tyre of a moving bicycle, in what direction does it fly? Explain.
- (v) A person is standing near a fast moving train. Is there any danger that he will fall towards it?
- (vi) Explain the working of a carburetor of a motorcar using Bernoulli's principle.
- (vii) Time period of a simple pendulum is 2.0 s and amplitude 20 cm, find its maximum speed.
- (viii) What are the conditions of constructive and destructive interference of two sound waves from coherent sources?
- (ix) Can we realize an ideal simple pendulum?
- (x) What is the total distance travelled by an object moving with SHM in a time equal, to its period, if its amplitude is A?
- (xi) Explain the terms : (i) crest. (ii) antinode.
- (xii) Why does sound travel faster in solids than in gases?

(Turn Over)

(2)

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

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- (i) Which principle is helpful to determine the shape and location of new wavefront? Explain briefly.
- (ii) Explain whether the Young's experiment is an experiment for studying interference or diffraction effects of light.
- (iii) What are different methods to get polarized light?
- (iv) What is multimode step index fibre? Explain in short.
- (v) Draw the ray diagram of compound microscope.
- (vi) Describe in short the construction and working of collimator.
- (vii) What will be efficiency of an engine if it performs 100 J of work and rejects 400 J of heat energy to the cold reservoir?
- (viii) Why the efficiency of real heat engine is always less than one?
- (ix) Give an example of a process in which no heat is transferred to or from the system but temperature of system changes.

SECTION – II

Note : Attempt any THREE questions.

- 5. (a) Find resultant of  $\vec{A}$  and  $\vec{B}$  using addition of vectors by rectangular components. 5
- (b) A football is thrown upward at an angle of  $30^\circ$  with respect to horizontal. To throw a 40 m pass what must be the initial speed of the ball? 3
- 6. (a) How would you describe the analytical approach of formula of absolute P.E., also derive the formula with diagrammatic explanation. 5
- (b) The frequency of the note emitted by a stretched string is 300 Hz. What will be the frequency of this note when the tension is increased by one third without changing the length of the wire? 3
- 7. (a) Define angular momentum and explain orbital and spin angular momentum. 5
- (b) A block of mass 4.0 kg is dropped from height of 0.80 m on to a spring of spring constant  $k = 1960 \text{ Nm}^{-1}$ . Find the maximum distance through which the spring will be compressed? 3
- 8. (a) Define pressure of gas. Prove that pressure exerted by the gas is directly proportional to the average translational kinetic energy of the gas molecules. 5
- (b) How large must a heating duct be if air moving along it can replenish the air in a room of  $300 \text{ m}^3$  volume every 15 min.? Assume the air's density remains constant. 3
- 9. (a) Explain Young's Double slit experiment to study the phenomenon of interference of light. 5
- (b) An astronomical telescope having magnifying power of 5 consist of two thin lenses 24 cm apart. Find the focal lengths of the lenses. 3