.o. _____ (To be filled in by the candidate)

(Academic Sessions 2020 – 2022 to 2022 – 2024)

PHYSICS 224-1st Annual-(INTER PART – II) Time Allowed : 20 Minutes

Q.PAPER – II (Objective Type) GROUP – II Maximum Marks : 17

PAPER CODE = 8476 LHR-2-24

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	What is the critical temperature of Yttrium Barium Copper Oxide ($YBa_2Cu_3.O_7$) : (A) 4.2 K (B) 110 K (C) 163 K (D) 7.2 K
2	One henry (H) is defined as : (A) $1H = 1VS^{-1}A^{-1}$ (B) $1H = 1VSA$ (C) $1H = 1VSA^{-1}$ (D) $1H = 1VS^{-1}A$
3	Choose the photon of highest energy among the following : (A) X-rays (B) Infrared (C) Radiowaves (D) Gamma rays
4	A particle having a charge of 2e falls through a potential difference of 3V. The energy acquired by it will be : (A) 5 eV (B) 1.5 eV (C) 6 eV (D) 0.6 eV
5	SI unit of equivalent dose is : (A) Sievert (B) Gray (C) Rad (D) Curie
6	If peak value of AC voltage is 100 V, then the peak to peak value will be : (A) 200 V (B) 50 V (C) 70 V (D) 1000 V
7	The direction of magnetic lines of force around a straight current carrying conductor is found by : (A) Ampere's law (B) Coulomb's law (C) Lenz's law (D) Right hand rule
8	Which of the following is the correct relation between electric intensity E and potential difference ΔV : (A) $E = -\frac{\Delta V}{\Delta r}$ (B) $\Delta V = -\frac{E}{\Delta r}$ (C) $E = \Delta V + \Delta r$ (D) $E = \frac{\Delta V^2}{\Delta r^2}$
9	Which of the following requires no external bias for its operation : (A) LED (B) Photo diode (C) Photo-voltaic cell (D) Transistor
10	The energy of K_α X-rays is : (A) $hf_{k\alpha} = E_M - E_K$ (B) $hf_{k\alpha} = E_L - E_K$ (C) $hf_{k\alpha} = E_K - E_M$ (D) $hf_{k\alpha} = E_N - E_M$
11	The power factor of a series resonance circuit at resonance frequency is : (A) Zero (B) Infinite (C) 2 (D) 1
12	In AVO meter, the part which connects the galvanometer with the relevant measuring circuit is known as : (A) Range switch (B) Diode (C) Ground (D) Function selector
13	How much time is required for the complete decay of a radioactive element : (A) Five half lives (B) Two half lives (C) Ten half lives (D) Infinite
14	Choose the device which converts electrical energy into mechanical energy : (A) Motor (B) Generator (C) Transformer (D) Inductor
15	The current-voltage graph of an ohmic material is : (A) Curve (B) Straight line (C) Parabolic (D) Circular
16	The phase shift between the input and output of a common-emitter transistor amplifier is : (A) 90° (B) 180° (C) 60° (D) 45°
17	Which of the following factor is called Compton Wavelength : (A) $\frac{h}{m_o c}$ (B) $\frac{m_o c}{h}$ (C) $\frac{hc}{m_o}$ (D) $\frac{m_o}{hc}$

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

(Academic Sessions 2020 – 2022 to 2022 – 2024)

PHYSICS 224-1st Annual-(INTER PART – II) Time Allowed : 2.40 hours

PAPER – II (Essay Type) GROUP – II Maximum Marks : 68

LHR-2-24

SECTION – I

2. Write short answers to any EIGHT (8) questions : **16**

(i) Do electrons tend to go to region of high potential or of low potential?

(ii) How can you identify that which plate of a capacitor is positively charged?

(iii) Define electric potential. Write its SI unit.

(iv) How Millikan concluded that minimum value of the charge is the charge on an electron?

(v) Why a voltmeter should have a very high resistance?

(vi) Why does the picture on a TV screen become distorted when a magnet is brought near the screen?

(vii) State Ampere's law. Write its mathematical form.

(viii) How the path of electrons is made visible in glass tube to measure e/m ratio?

(ix) What do we mean by the term critical mass?

(x) How can radioactivity help in treatment of cancer?

(xi) How do gamma rays photon interact with matter at low and high energy?

(xii) How did James Chadwick discover a neutron?

3. Write short answers to any EIGHT (8) questions : **16**

(i) How can a rheostat be used as a potential divider? Draw also diagram.

(ii) Do bends in a wire affect its electrical resistance? Explain.

(iii) Explain thermistors, their construction and shapes.

(iv) Define inductive reactance and capacitive reactance. Also write mathematical formula of each.

(v) At what frequency will an inductor of 1 H have a reactance of 500 Ω ?

(vi) How reception of a particular radio station is selected on your radio set?

(vii) Give a comparison of crystalline and amorphous solids briefly.

(viii) Differentiate between elasticity and plasticity.

(ix) What is meant by paramagnetic and ferromagnetic substances?

(x) What is the effect of forward biasing and reverse biasing of a diode on the width of depletion region?

(xi) Draw circuit diagram of full wave rectifier.

(xii) Why is the base current in a transistor very small?

4. Write short answers to any SIX (6) questions : **12**

(i) State the Lenz's law and explain the significance of -ve sign in Faraday's law.

(ii) Does the induced emf always acts to decrease the magnetic flux through a circuit?

(Turn Over)

4. (iii) What is the efficiency of a transformer? Describe methods to increase it.

(iv) As a solid is heated and begins to glow, why does it first appear red?

(v) Write two properties of intensity distribution diagram.

(vi) When does the light behave as a particle and when does it behave as a wave?

(vii) Which photon, red, green or blue carries the most (a) energy (b) momentum.

(viii) Bohr's theory of hydrogen atom is based upon several assumptions. Do any of these contradict classical physics?

(ix) Differentiate between spontaneous and stimulated emissions.

SECTION – II

Note : Attempt any THREE questions.

5. (a) Derive an expression for the energy stored in a capacitor. 5

(b) The resistance of an iron wire at 0 °C is $1\times10^{4}\Omega$. What is the resistance at 500 °C if the temperature co-efficient of resistance of iron is $5.2\times10^{-3}K^{-1}$? 3

6. (a) State Ampere's law. Calculate the magnetic field due to current carrying solenoid. 5

(b) A circular coil has 15 turns of radius 2 cm each. The plane of the coil lies at 40° to the uniform magnetic field of 0.2 T. If the field is increased by 0.5 T in 0.2 s, find the magnitude of induced emf. 3

7. (a) Discuss the behaviour of an inductor in an A.C. circuit and write expression for inductive reactance. 5

(b) In a certain circuit, the transistor has a collector current of 10 mA and a base current of 40μA. What is the current gain of transistor? 3

8. (a) What is meant by strain energy? Derive the relation for strain energy in deformed materials. 5

(b) X-rays of wavelength 22 pm are scattered from a carbon target. The scattered radiation being viewed at 85° to the incident beam. What is Compton Shift? 3

9. (a) How de-Broglie's interpret Bohr's 2nd postulate that an angular momentum is equal to integral multiple of $\frac{h}{2\pi}$? 5

(b) A sheet of lead 5.0 mm thick reduces the intensity of a beam of γ-rays by a factor 0.4. Find half value thickness of lead sheet which will reduce the intensity of half of its initial value. 3