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

**(Academic Sessions 2018 – 2020 to 2020 – 2022 )**

**PHYSICS** 222-(INTER PART – II) Time Allowed : 20 Minutes

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

**PAPER CODE = 8473** LHR-91-22

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 | Work done on a charge moving in a uniform magnetic field is :<br>(A) Zero (B) Positive (C) Negative (D) Maximum |
| 2 | The most common source of alternating voltage is :<br>(A) Motor (B) Cell (C) Generator (D) Thermocouple |
| 3 | Compton effect is associated with :<br>(A) Gamma rays (B) Beta rays (C) X-rays (D) Positive rays |
| 4 | Alpha particle carries a charge of :<br>(A) $+2e$ (B) $-2e$ (C) $+e$ (D) Zero |
| 5 | The difference of potential energy between two points per unit charge is :<br>(A) Electrical potential (B) Potential difference (C) Absolute potential (D) All of these |
| 6 | The devices which are used to convert various physical quantities into electrical voltages are called :<br>(A) Filters (B) Sensors (C) Rectifiers (D) Amplifiers |
| 7 | The current flowing through each resistor of equal resistances in parallel combination is :<br>(A) Different (B) Zero (C) Same (D) Infinite |
| 8 | The Boolean expression of NAND gate is :<br>(A) $X = A \,.\, B$ (B) $X = \overline{A}$ (C) $X = \overline{A.B}$ (D) $X = A + B$ |
| 9 | Energy released by conversion of 1 amu of mass is :<br>(A) $1.6\times10^{-19} ev$ (B) $1.6\times10^{-19} Mev$ (C) $200\,Mev$ (D) $931\,Mev$ |
| 10 | The energy stored in the inductor per unit volume is :<br>(A) $\frac{B^2}{2\mu_o^2}$ (B) $\frac{\mu_o}{2B}$ (C) $\frac{\mu_o}{2B^2}$ (D) $\frac{B^2}{2\mu_o}$ |
| 11 | The space between the plates of the capacitor is filled by a dielectric of dielectric constant 'k'. The capacitance of the capacitor :<br>(A) Increased by a factor ' k ' (B) Increased by a factor ' $k^2$ '<br>(C) Decreased by factor ' k ' (D) Remains unchanged |
| 12 | The mean value of A.C. in one complete cycle is :<br>(A) 1 (B) Zero (C) $I_o$ (D) $\frac{I_o}{\sqrt{2}}$ |
| 13 | Unit of self inductance is :<br>(A) Weber (B) Henry (C) Tesla (D) Farad |
| 14 | The number of crystal systems are :<br>(A) Three (B) Five (C) Fourteen (D) Seven |
| 15 | Beam of electron is also called :<br>(A) X-rays (B) Alpha rays (C) Gamma rays (D) Cathode rays |
| 16 | Light emitting diodes ( LEDs) are made from semiconductors :<br>(A) Silicon (B) Germanium (C) Gallium arsenide (D) Carbon |
| 17 | In electronic transition, atom cannot emit :<br>(A) Infrared radiations (B) Visible radiations<br>(C) Gamma radiations (D) Ultraviolet radiations |

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**(Academic Sessions 2018 – 2020 to 2020 – 2022 )**

**PHYSICS** 222-(INTER PART – II) Time Allowed : 2.40 hours

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

## SECTION – I

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

(i) Write down any two properties of electric field lines.

(ii) State Coulomb's law and Gauss's law.

(iii) Suppose that you follow an electric field line due to a positive point charge. Do electric field and the potential increase or decrease?

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

(v) Define stable or dead beat galvanometer.

(vi) Differentiate between magnetic flux and magnetic flux density. Also write units of both.

(vii) Two charged particles are projected into a region where there is a magnetic field perpendicular to their velocities. If the charges are deflected in opposite directions, what can you say about them?

(viii) How can a current loop be used to determine the presence of a magnetic field in a given region of space?

(ix) Differentiate between hadrons and leptons. Also give examples of each.

(x) Enlist the basic forces of nature.

(xi) What factors make fusion reaction difficult to achieve?

(xii) A particle which produces more ionization is less penetrating. Why?

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

(i) What are the difficulties in testing whether the filament of lighted bulb obeys Ohm's law?

(ii) Define temperature co-efficient of resistance and write its formula.

(iii) Prove that : Volt × Ampere = Watt.

(iv) What is meant by A.M. and F.M.?

(v) What is the main advantage of three phase A.C. supply?

(vi) What is difference between A.C. circuit and D.C. circuit?

(vii) Draw a stress-strain curve for a ductile material and then define the terms :
(i) Elastic limit. (ii) Ultimate tensile stress.

(viii) What are the two main differences between conductors and semi-conductors?

(ix) Describe energy band picture of insulators.

(x) Why charge carriers are not present in the depletion region?

(xi) Give four applications of a photodiode.

(xii) How is p-n junction formed?

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

(i) State Faraday's law of electromagnetic induction.

(ii) What is back emf effect in motor?

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4. (iii) Show that $\varepsilon$ and $\frac{\Delta\phi}{\Delta t}$ have the same units.

(iv) Can an electric motor be used to drive an electric generator with the output from generator being used to operate the motor?

(v) Explain uncertainty principle.

(vi) Write four uses of laser in medicine and industry.

(vii) What do you mean when we say that the atom is excited?

(viii) What is the advantage of NAVSTAR navigation system?

(ix) What happens to total radiation from a black body, if its absolute temperature is doubled?

## SECTION – II

**Note : Attempt any THREE questions.**

5. (a) What is Wheatstone Bridge? How Wheatstone Bridge can be used to determine an unknown resistance? 1,4

(b) A particle having charge of 20 electrons on it falls through a potential difference of 100 volts. Calculate the energy acquired by it in electron volts (ev). 3

6. (a) How can you determine $e/m$ of an electron? Explain how the path of electron beam is made visible? 5

(b) An emf of 5.6 V is induced in a coil while the current in a nearby coil is decreased from 100 A to 20 A in 0.02s. What is mutual induction of two coils? If secondary coil has 200 turns, find change in flux during this interval. 3

7. (a) Discuss RLC series circuit. Derive the formula for resonance frequency. Also properties of this circuit. 5

(b) The current flowing into the base is 100μA. Find its collector current $I_C$, its emitter current $I_E$ and $I_C / I_E$ if ' β ' current gain is 100. 3

8. (a) What is energy band theory? Explain the difference amongst electrical behaviour of conductors, insulators and semi-conductors in terms of energy band theory. 5

(b) What is the de-Broglie wavelength of an electron whose kinetic energy is 120eV? 3

9. (a) Derive an expression for the energy of electron revolving in nth orbit of hydrogen atom. 5

(b) A sheet of lead 5 mm thick reduces the intensity of beam of γ-rays by a factor 0.4. Find half value thickness of lead sheet which will reduce the intensity to half of its initial value. 3