LHR-G2-12-19 (To be filled in by the candidate)

(Academic Sessions 2015 – 2017 to 2017 – 2019)

HYSICS - 219-(INTER PART – II) Time Allowed : 20 Minutes

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

PAPER CODE = 8474

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 value of $\frac{e}{m}$ is smallest for : (A) Proton (B) Electron (C) β-particle (D) Positron
2	At what frequency will an inductor of 1.0 H have a reactance of 500Ω : (A) 50 Hz (B) 80 Hz (C) 500 Hz (D) 1000 Hz
3	The life time of an electron in an excited state is about $10^{-8}s$. What is its uncertainty in energy during this time : (A) $6.63\times10^{-34}J$ (B) $9.1\times10^{-31}J$ (C) $1.05\times10^{-26}J$ (D) $7.2\times10^{-15}J$
4	The binding energy per nucleon is maximum for : (A) Hydrogen (B) Nitrogen (C) Uranium (D) Iron
5	The electrostatic force between two charges is 42 N. If we place a dielectric of $\varepsilon_r = 2.1$ between the charges then the force become equal to : (A) 42 N (B) 84 N (C) 20 N (D) 2 N
6	The Boolean expression of NAND gate is : (A) $X = A.B$ (B) $X = \overline{A}$ (C) $X = \overline{A.B}$ (D) $X = A + B$
7	The value of charge on 1.0×10^{7} electrons is : (A) $1.6\times10^{-12}C$ (B) $1.6\times10^{+11}C$ (C) $1.6\times10^{-19}C$ (D) $1.6\times10^{+19}C$
8	Which factor does not affect the conductivity of PN-junction diode : (A) Doping (B) Temperature (C) Voltage (D) Pressure
9	By mass spectrograph we can find the value of mass by using formula : (A) $m=\left(\frac{e^2r^2}{2V}\right)B^2$ (B) $m=\left(\frac{er^2}{2V}\right)B^2$ (C) $m=\left(\frac{eV}{2r^2}\right)B$ (D) $m=\left(\frac{eV^2}{2r}\right)B$
10	Maximum emf generated in a generator is : (A) $\varepsilon_o = \varepsilon\sin\theta$ (B) $\varepsilon = \varepsilon_o\sin\theta$ (C) $\varepsilon_o = N\omega AB\sin\theta$ (D) $\varepsilon_o = N\omega AB$
11	It is required to suspend a proton of charge 'q' and mass 'm' in an electric field the strength of the field must be : (A) $E=\frac{mg}{qv}$ (B) $E=\frac{mg}{q}$ (C) $E=\frac{q}{mg}$ (D) $E=\frac{qv}{B}$
12	The velocity of an oscillating charge as it moves to and fro along the wire is : (A) Infinite (B) Constant (C) Changing (D) Zero
13	Henry is equal to = (A) VSA^{-1} (B) $VS^{-1}A$ (C) $V^{-1}S^{-1}A$ (D) $V^{-1}S^{-1}A^{-1}$
14	Good conductors have conductivities of the order of : (A) $10^{-7}(\Omega m)^{-1}$ (B) $10^{7}(\Omega m)^{-1}$ (C) $10^{2}(\Omega m)^{-1}$ (D) $10^{-2}(\Omega m)^{-1}$
15	The unit of $\vec{E}$ is NC^{-1} and that of $\vec{B}$ is $NA^{-1}m^{-1}$ then the unit of $\frac{E}{B}$ is : (A) ms^{-2} (B) ms (C) $m^{-1}s^{-1}$ (D) ms^{-1}
16	The numerical value of Stefen's constant is : (A) 5.67×10^{-8} (B) 2.9×10^{-3} (C) 6.63×10^{-34} (D) 1.6×10^{-19}
17	The numerical value of Rydberg's constant is : (A) 1.0974×10^{7} (B) 1.0974×10^{-7} (C) 1.0974×10^{14} (D) 1.0974×10^{-14}

CHR-G2-12-19 (To be filled in by the candidate)

(Academic Sessions 2015 – 2017 to 2017 – 2019)

HYSICS 219-(INTER PART – II) Time Allowed : 2.40 hours

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

SECTION – I

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

(i) What is electric intensity? What is its SI unit?

(ii) Show that $\frac{1\,\text{volt}}{1\,\text{meter}} = \frac{1\,\text{Newton}}{1\,\text{Coulomb}}$

(iii) Describe the force or forces on a positive point charge when placed between parallel plates with similar and equal charges.

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

(v) Describe the change in the magnetic field inside a solenoid carrying a steady current I, if the length of the solenoid is doubled but the number of turns remains the same.

(vi) What is CRO? What is the function of grid in CRO?

(vii) Define ammeter. How can we increase the range of an ammeter?

(viii) Suppose that a charge q is moving in a uniform magnetic field with a velocity V. Why is there no work done by the magnetic force that acts on the charge q?

(ix) State Faraday's law of electromagnetic induction and also write expression for it.

(x) Define mutual inductance of the coils and also define its unit henry.

(xi) Does the induced emf in a circuit depend on the resistance of the circuit? Does the induced current depend on the resistance of the circuit?

(xii) In a transformer, there is no transfer of charge from the primary to secondary. How is, then the power transferred?

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

(i) Define temperature coefficient of resistance and write its formula.

(ii) A potential difference is applied across the ends of a copper wire. What is the effect on the drift velocity of free electrons by decreasing the length and the temperature of the wire?

(iii) Is the filament resistance lower or higher in a 500 w, 220 v light bulb than in a 100 w, 220 v?

(iv) What is impedance? Write its formula.

(v) A sinusoidal current has rms value of 10A. What is the maximum or peak value?

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

(vii) Differentiate between ductile and brittle substances.

(viii) Define stress and strain. What are their SI units?

(ix) What is meant by hysteresis loss?

(x) What is depletion region?

(xi) How does the motion of an electron in a n-type substance differ from the motion of holes in a p-type substance?

(xii) What is the principle of virtual ground?

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

(i) Define Compton effect. At what angle Compton shift becomes equal to the Compton wave length?

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

(iii) What happens to radiation energy from a blackbody if its temperature is doubled?

(Turn Over)

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4. (iv) Define excitation energy and ionization energy.

(v) How can spectrum of hydrogen contain so many lines when hydrogen contains one electron? Explain.

(vi) Can X-rays be reflected, refracted and polarized just like any other waves? Explain.

(vii) Write down two advantages of solid state detector.

(viii) Why are heavy nuclei unstable?

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

SECTION – II

Note : Attempt any THREE questions.

5. (a) What is Gauss's law? Applying Gauss's law find the electric intensity between two oppositely charged parallel plates. 5

(b) A rectangular bar of iron is 2.0 cm by 2.0 cm in cross-section and 40 cm long. Calculate the resistance if the resistivity of iron is $11\times10^{-8}\Omega m$. 3

6. (a) Derive an expression for torque acting on current carrying coil placed in uniform magnetic field. 5

(b) A circular coil has 15 turns of radius 2 cm each. The plane of the coil lies at 40° to a 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) Define comparator, describe how it is used as a night switch. 1,1,3

(b) A circuit has an inductance of $\frac{1}{\pi}H$ and resistance of 2000Ω. A 50 Hz A.C is supplied to it. Calculate the reactance and impedance offered by the circuit. 3

8. (a) Describe the formation of energy bands in solids. Explain the difference amongst electrical behaviour of conductors, insulators and semiconductors in terms of energy band theory. 5

(b) An electron is to be confined to a box of the size of the nucleus ($1.0\times10^{-14}m$). What would the speed of the electron if it were so confined? 3

9. (a) What are postulates of Bohr's model of the hydrogen atom? Show that energy of hydrogen atom is quantized. 5

(b) How much energy is absorbed by a man of mass 80 kg who receives a lethal whole body equivalent dose of 400 rem in the form of low energy neutrons for which RBE factor is 10? 3