

Roll No

LHR-91-12-19 (To be filled in by the candidate)

(Academic Sessions 2015 – 2017 to 2017 – 2019)

PHYSICS

219-(INTER PART – II)

Time Allowed : 20 Minutes

Q.PAPER – II (Objective Type)

GROUP – I

Maximum Marks : 17

PAPER CODE = 8477

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 energy of photon is given by : (A) $\frac{1}{2}mv^2$ (B) v_0e (C) m_0c^2 (D) hf
2	The sum of negative and positive peak values is : (A) Average value (B) rms value (C) Peak value (D) p-p value
3	The unit of \bar{E} is NC^{-1} and that of \bar{B} is $NA^{-1}m^{-1}$ then the unit of $\frac{\bar{E}}{\bar{B}}$ is : (A) ms^{-2} (B) $m^{-1}s^{-1}$ (C) ms (D) ms^{-1}
4	The common emitter current amplification factor β is given by : (A) $\frac{I_C}{I_E}$ (B) $\frac{I_C}{I_B}$ (C) $\frac{I_E}{I_B}$ (D) $\frac{I_B}{I_C}$
5	Resistance in choke is : (A) Large (B) Very small (C) Zero (D) Infinite
6	Sec/Ohm is equal to : (A) Farad (B) Coulomb (C) Joule (D) Ampere
7	Number of neutrons in ${}_{92}^{235}U$: (A) 92 (B) 235 (C) 143 (D) 327
8	Commutators are used in : (A) D.C. generators (B) A.C. generators (C) A.C. motor (D) A.C. rotator
9	The factor $\frac{h}{m_0c}$ in Compton equation has the dimension of : (A) Pressure (B) Length (C) Mass (D) Momentum
10	If a charged body is moved against the electric field, it will gain : (A) P.E. (B) K.E. (C) Mechanical energy (D) Electrical potential energy
11	In p-type substances, the majority charge carriers are : (A) Electrons (B) Protons (C) Holes (D) Neutrons
12	When a wire of resistance R is cut into two equal parts then resistance of each wire is : (A) Double (B) Half (C) Remain same (D) One forth
13	Energy of the 4 th orbit in hydrogen atom is : (A) -2.51 eV (B) -3.50 eV (C) -13.6 eV (D) -0.85 eV
14	The gain of non-inverting amplifier is : (A) $1 + \frac{R_2}{R_1}$ (B) $1 + \frac{R_1}{R_2}$ (C) $\frac{-R_2}{R_1}$ (D) $\frac{-R_1}{R_2}$
15	X-rays are the electromagnetic radiations having the wavelength in range : (A) $10^{-12}m$ (B) $10^{-10}m$ (C) $10^{-8}m$ (D) $10^{-6}m$
16	To construct a step up transformer : (A) $N_s > N_p$ (B) $N_s < N_p$ (C) $N_s = N_p$ (D) $N_s N_p = 1$
17	The magnetic force is simply a : (A) Reflecting force (B) Restoring force (C) Deflecting force (D) Gravitational force

190-219-I-(Objective Type)- 11750 (8477)

SECTION – I

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

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- (i) State Gauss's law and write its mathematical relation.
- (ii) Define electron volt and show that $1 eV = 1.6 \times 10^{-19} J$.
- (iii) Electric lines of force never cross. Why?
- (iv) Do electrons tend to go to region of high potential or of low potential?
- (v) State Lorentz force and write its formula.
- (vi) Write two uses of cathode ray oscilloscope.
- (vii) How can you use a magnetic field to separate isotopes of chemical element?
- (viii) Why the resistance of an ammeter should be very low?
- (ix) How the induced current can be increased?
- (x) What is motional emf and write its mathematical relation?
- (xi) Does the induced emf in a circuit depend on the resistance of the circuit? Explain.
- (xii) Show that ϵ and $\frac{\Delta\phi}{\Delta t}$ have the same units.

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

16

- (i) Define conventional current and solar cell.
- (ii) Define electrolysis and basic principle of electroplating.
- (iii) Why does the resistance of a conductor rise with temperature?
- (iv) Define peak value and peak to peak value of voltage or current.
- (v) A sinusoidal current has rms of 10A. What is the peak value?
- (vi) What are superconductors?
- (vii) What is meant by para, diamagnetic substances?
- (viii) What is meant by strain energy?
- (ix) Draw the truth table of XNOR gate.
- (x) Why ordinary silicon diodes do not emit light?
- (xi) Why is the base current in a transistor very small?
- (xii) Define intrinsic and extrinsic semi-conductor.

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

12

- (i) Will higher frequency light eject greater number of electrons than low frequency light?
- (ii) Photon A has twice the energy of photon B. What is the ratio of momentum of A to that of B?
- (iii) What is the energy of photon in a beam of infrared radiation of wavelength 1240 nm?
- (iv) What are the advantages of LASER over ordinary light?
- (v) Can the electron in ground state of hydrogen absorb a photon of energy 13.6 eV and greater than 13.6 eV?
- (vi) Define the isotopes of an element. Write down the isotopes of hydrogen.

(Turn Over)

(2)

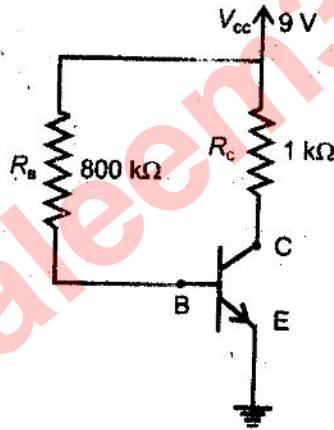
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4. (vii) What is radioactive decay? Give an example.
does
(viii) What factor/make a fusion reaction difficult to achieve?
(ix) How can radioactivity help in the treatment of cancer?

SECTION - II

Note : Attempt any THREE questions.

5. (a) State Gauss's law and apply it to find electric field intensity due to an infinite sheet of charge. 5
(b) A platinum wire has resistance of 10Ω at 0°C and 20Ω at 273°C . Find the value of temperature co-efficient of resistance. 3
6. (a) Define galvanometer. How it is converted into an ammeter and voltmeter? 5
(b) A pair of adjacent coils has a mutual inductance of 0.75 H . If the current in the primary changes from 0 to 10 A in 0.025 s , what is the average induced emf in the secondary? What is the change in flux in it, if the secondary has 500 turns? 3
7. (a) Discuss the behaviour of an inductor in an A.C. circuit and write an expression for the inductive reactance. 5
(b) In circuit as shown in fig. there is negligible potential drop between B and E. If β is 100 , calculate : (i) base current. (ii) collector current. 3
(iii) potential drop across R_c (iv) V_{CE}



8. (a) Write down the postulates of special theory of relativity. Discuss the relation of time dilation, length contraction, mass variation and energy-mass relation with reference of this theory. 5
(b) A 1.0 m long copper wire is subjected to stretching force and its length increased by 20 cm . Calculate the percent elongation which the wire undergoes. 3
9. (a) What are inner shell transitions? Describe the production of X-rays and their uses. 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

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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) $6.63 \times 10^{-34}J$	(B) $9.1 \times 10^{-31}J$	(C) $1.05 \times 10^{-26}J$	(D) $7.2 \times 10^{-15}J$
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 $\epsilon_r = 2.1$ 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) $X = \bar{A}$	(C) $X = \overline{A.B}$	(D) $X = A + B$
7	The value of charge on 1.0×10^7 electrons is :	(A) $1.6 \times 10^{-12}C$	(B) $1.6 \times 10^{+11}C$	(C) $1.6 \times 10^{-19}C$	(D) $1.6 \times 10^{+19}C$
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) $m = \left(\frac{e^2 r^2}{2V}\right) B^2$	(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) $\epsilon_o = \epsilon \sin \theta$	(B) $\epsilon = \epsilon_o \sin \theta$	(C) $\epsilon_o = N\omega AB \sin \theta$	(D) $\epsilon_o = N\omega AB$
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 Stefan'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}

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)

(2)

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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 $11 \times 10^{-8} \Omega m$. 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 ($1.0 \times 10^{-14} m$). 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

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