Roll No. LHR-G1-12-18 (To be filled in by the candidate)

(Academic Sessions 2015 – 2017 & 2016 – 2018)

PHYSICS 218-(INTER PART – II) Time Allowed : 20 Minutes

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

PAPER CODE = 8473

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	If F_1 and F_2 are the magnetic forces acting on α-particle and electron respectively, when moving perpendicular to the magnetic field then : (A) $F_1 = F_2$ (B) $F_1 > F_2$ (C) $F_1 < F_2$ (D) $F_1 = 4F_2$
2	For non-inverting amplifier, $R_1 = \infty$ and $R_2 = 0$ ohm, the gain of non-inverting amplifier is : (A) – 1 (B) Zero (C) + 1 (D) Infinite
3	The half life of Radon is : (A) 23.5 minutes (B) 3.8 days (C) 1620 years (D) 4.5×10^9 years
4	Lenz's law deals with : (A) Induced emf (B) Induced current (C) Power (D) Electrical energy
5	Two oppositely charged balls A and B attract the third ball C, when placed near them turn by turn. The third ball C must be : (A) Positively charged (B) Negatively charged (C) Electrically neutral (D) Positively and negatively charged
6	The energy of the photon of wavelength 500 nm is : (A) 3.10 eV (B) 2.49 eV (C) 1.77 eV (D) 1.52 eV
7	mho m^{-1} is the SI unit of : (A) Conductance (B) Conductivity (C) Resistance (D) Resistivity
8	The longest wavelength of Paschen series is : (A) 656 nm (B) 1094 nm (C) 1875 nm (D) 2000 nm
9	The unit of $\sqrt{LC}$ is : (A) Second (B) Ampere (C) Hertz (D) Farad
10	At what frequency, 1 H inductance offers same impedance as $1\mu F$ capacitor : (A) 50 Hz (B) 159 Hz (C) 512 Hz (D) 1590 Hz
11	The electric potential at a mid-point in an electric dipole is : (A) 0 V (B) 0.5 V (C) 1 V (D) 1.5 V
12	Very weak magnetic field produced by brain can be detected by : (A) Compass (B) Metallic needle (C) Squids (D) Liquids
13	If a step-up transformer were 100% efficient, the primary and secondary windings would have the same : (A) Current (B) Power (C) Voltage (D) Direction of winding
14	The factor $h / m_o C$ in Compton equation has the dimensions of : (A) Pressure (B) Length (C) Momentum (D) Plank constant
15	When a metal is heated sufficiently electrons are given off by the metal. This phenomenon is known as : (A) Photoelectric effect (B) Piezo electric effect (C) Thermionic emission (D) Secondary emission
16	The mass spectrum of naturally occurring neon shows the most abundant isotope has atomic mass : (A) 19 (B) 20 (C) 21 (D) 22
17	The wavelength associated with the proton moving at a speed of 40 m/s is : (A) 7.20 nm (B) 9.02 nm (C) 15.7 nm (D) 17.3 nm

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PHYSICS 218-(INTER PART – II) Time Allowed : 2.40 hours

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

SECTION – I

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

(i) Prove that Coulomb's law obeys third law of motion.

(ii) Define potential gradient and give its SI units.

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

(iv) Define electric polarization and electric dipole.

(v) Define electromagnetism and give the name of one device in which electromagnetism is used.

(vi) State Ampere's law and write it in mathematical form.

(vii) What is Lorentz force? Write its in mathematical expression

(viii) What is CRO? Write the name of any four main parts of it.

(ix) Give the two techniques to improve the efficiency of a transformer.

(x) Define self induction and self inductance.

(xi) State Faraday's law and write it in mathematical form.

(xii) Show that emf (ε) and $\frac{\Delta\phi}{\Delta t}$ have the same units.

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

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

(ii) Write two uses of rheostat and draw their diagrams.

(iii) 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?

(iv) Define choke and write its advantage in A.C. circuits.

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

(vi) A sinusoidal current has rms value of 15A. What is the maximum value?

(vii) Define crystal lattice and give one example.

(viii) Define modulus of elasticity and write its formula.

(ix) What is meant by strain energy?

(x) Define open loop gain of an operational amplifier and write its formula.

(xi) Draw diagram of exclusive OR gate and write its formula.

(xii) Why ordinary silicon diodes do not emit light?

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

(i) Is it possible for an object to move with speed of light? Justify your answer.

(ii) What are black body radiations and how can you get a black body?

(iii) Which photon, red, green or blue carries the most : (a) energy and (b) momentum?

4. (iv) Find the speed of the electron in the first Bohr orbit.

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

(vi) In $^{235}_{92}U$, find : (a) Atomic number (b) Charge number
(c) Number of neutrons (d) Number of electrons

(vii) What is radioactive decay? Give an example.

(viii) What information is revealed by the length and shape of the tracks of an incident particle in Wilson cloud chamber?

(ix) How can radioactivity help in the treatment of cancer?

SECTION – II

Note : Attempt any THREE questions.

5. (a) Derive an expression for the potential at a certain point in the field of a positive point charge. 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) What is transformer? Describe its principle, construction and working. 5

(b) A power line 10.0 m high carries a current 200 A. Find the magnetic field of the wire at the ground. 3

7. (a) Define modulation, electromagnetic waves and in a R-L series circuit. will the current lag or lead the voltage? Illustrate your answer by a vector diagram. 5

(b) The current flowing into the base of a transistor is 100 μA. Find the ratio I_C/I_E, if the value of current gain β is 100. 3

8. (a) Define stress and strain. What is strain energy? Calculate its value in terms of modulus of elasticity. 5

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

9. (a) What is meant by inner shell transition and characteristic X-rays? How X-rays are produced? Write down any two properties and uses of X-rays. 5

(b) A sheet of lead 5 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 to half of its initial value. 3