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

LHR

(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 = 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 half life of Radon is : (A) 23.5 minutes (B) 3.8 days (C) 1620 years (D) 4.5×10^9 years
2	Very weak magnetic field produced by brain can be detected by : (A) Compass (B) Metallic needle (C) Squids (D) Liquids
3	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) $F_1 = 4F_2$
4	The longest wavelength of Paschen series is : (A) 656 nm (B) 1094 nm (C) 1875 nm (D) 2000 nm
5	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
6	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
7	Lenz's law deals with : (A) Induced emf (B) Induced current (C) Power (D) Electrical energy
8	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
9	The mass spectrum of naturally occurring neon shows the most abundant isotope has atomic mass : (A) 19 (B) 20 (C) 21 (D) 22
10	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
11	The factor $h / m_o C$ in Compton equation has the dimensions of : (A) Pressure (B) Length (C) Momentum (D) Plank constant
12	mho m^{-1} is the SI unit of : (A) Conductance (B) Conductivity (C) Resistance (D) Resistivity
13	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
14	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
15	The unit of $\sqrt{LC}$ is : (A) Second (B) Ampere (C) Hertz (D) Farad
16	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
17	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

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

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

(Academic Sessions 2015 – 2017 & 2016 – 2018)

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

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

SECTION – I

LHR

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?

(Turn Over)

of lead sheet which will reduce the intensity to half of its initial value.

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

(Academic Sessions 2015 – 2017 & 2016 – 2018)

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

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

PAPER CODE = 8478

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 dimension of Planck's constant is same as that of : (A) Energy (B) Power (C) Acceleration (D) Angular momentum
2	High frequency radio wave is called as : (A) Fluctuate wave (B) Carrier wave (C) Matter wave (D) Mechanical wave
3	The value of e/m is smallest for : (A) Proton (B) Electron (C) β-particle (D) Positron
4	The Boolean expression of NAND gate is : (A) $X = A.B$ (B) $X = \overline{A}$ (C) $X = \overline{A.B}$ (D) $X = A + B$
5	The impedance Z can be expressed as : (A) $Z = \frac{V_{rms}}{I_{rms}}$ (B) $Z = \frac{I_{rms}}{V_{rms}}$ (C) $Z = I + V$ (D) $Z = I - V$
6	The unit of electric intensity other than NC^{-1} is : (A) V/A (B) V/m (C) V/C (D) N/V
7	The most useful tracer isotopes for the treatment of thyroid glands is : (A) Cobalt-60 (B) Carbon-14 (C) Iodine-131 (D) Strontium-90
8	When motor is just started, back emf is almost : (A) Maximum (B) Zero (C) Minimum (D) Infinite
9	The photon with energy greater than 1.02 Mev can interact with matter as : (A) Photoelectric effect (B) Compton effect (C) Pair production (D) Annihilation of matter
10	The electric field created by positive point charge is : (A) Radially inward (B) Zero (C) Circular (D) Radially outward
11	Substances which break just after the elastic limit is reached is called as : (A) Ductile substances (B) Hard substances (C) Brittle substances (D) Soft substances
12	Resistance tolerance for gold colour is : (A) 50% (B) 30% (C) 20% (D) 5%
13	In electron transition from power to higher orbit atom can not emit : (A) γ-rays (B) Ultraviolet rays (C) Visible light (D) Infrared
14	Automatic functioning of street light can be done by the use of : (A) Inductor (B) Capacitor (C) Comparator (D) Thermistor
15	Nuclear fission chain reaction is controlled by using : (A) Steel rods (B) Graphite rods (C) Cadmium rods (D) Platinum rods
16	Henry is S.I. unit of : (A) Current (B) Resistance (C) Flux (D) Self induction
17	The S.I. unit of magnetic induction is : (A) Weber (B) Tesla (C) Gauss (D) Newton

(B) ... of lead sheet which will reduce the intensity to half of its initial value.

LHR

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

(Academic Sessions 2015 – 2017 & 2016 – 2018)

PHYSICS 218-(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 meant by EEG and ERG?

(ii) Write any two characteristics of electric field lines.

(iii) The potential is constant throughout a given region of space. Is the electric field zero or non-zero in this region? Explain.

(iv) Is it true that Gauss's law states that the total number of lines of force crossing any closed surface in the outward direction is proportional to the net positive charge enclosed within surface? Explain.

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

(vi) Why does the picture on a T.V. screen become distort when a magnet is brought near the screen?

(vii) Is it possible to obtain an isolated north pole? Give reasons.

(viii) Draw saw tooth voltage waveform and explain it.

(ix) Is it possible to change both the area of the loop and magnetic field passing through the loop and still not have an induced emf in the loop?

(x) When an electric motor such as an electric drill, is being used, does it also act as a generator? If so what is the consequence of this?

(xi) What is back motor effect in generators? Explain.

(xii) Why transformers are used in A.C. supply network?

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

(i) What is meant by tolerance? Find the resistance of a resistor with red, green, orange and gold respective bands.

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

(iii) Distinguish between resistivity and conductivity.

(iv) How does doubling the frequency affect the reactance of an inductor?

(v) In R-C series circuit, will the current lag or lead the voltage. Illustrate your answer by a vector diagram.

(vi) Name the device that will permit flow of direct current but oppose the flow of alternating current.

(vii) Define A.C. current. Make its waveform.

(viii) Distinguish between p-type semiconductor and n-type semiconductor.

(ix) What are hard and soft magnetic materials? Give example of each.

(x) What is the net charge on a n-type and a p-type substance?

(xi) How the current flows in forward and reverse biased diode?

(xii) The input of a gate are 1 and 0 identify the gate if its output is : (a) 0 (b) 1

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

(i) If the speed of light were infinite, what would the equations of special theory of relativity reduce to?

(Turn Over)

... of lead sheet which will reduce the intensity to half of its initial value.

4. (ii) State Heisenberg uncertainty principle. Give its two mathematical forms.

(iii) Which photon red, or blue carries the most (a) Energy (b) Momentum

(iv) Is energy conserved when an atom emits a photon of light? Explain.

(v) What is population inversion?

(vi) What is radioactive tracer? Describe one application each in medicine and agriculture.

(vii) Which radiation dose would deposit more energy to your body :
(a) 10 mGy to hand or (b) 1 mGy to your entire body.

(viii) Write the name of basic forces of nature.

(ix) What is the function of control rods in nuclear reactor?

SECTION – II

Note : Attempt any THREE questions.

5. (a) State Ohm's law and derive its expression. Discuss why filament of a lighted bulb is non-ohmic by graph. Also give any two examples of non-ohmic devices. 5

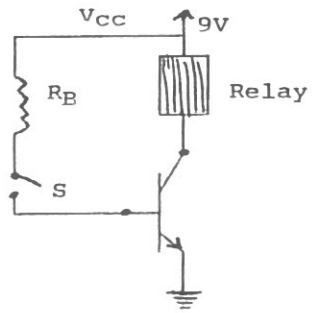
(b) A proton is placed in a uniform electric field of 5000 N/C directed to right is allowed to go to a distance of 10.0 cm from point A to the point B. Calculate :
(i) Work done by the field. (ii) Its velocity. 1 ½

6. (a) What is inductor? Also derive a formula for energy stored in an inductor. 1,4

(b) A solenoid 15.0 cm long has 300 turns of wire. A current of 5.0 A flows through it. What is the magnitude of magnetic field inside the solenoid? 3

7. (a) Define impedance. Derive an expression for impedance and phase angle in R-C and R-L series circuit excited by A.C. voltage. 1,2,2

(b) Fig. shows a transistor which operates a relay as the switch s is closed. The relay is energized by a current of 10 mA. Calculate the value R_B which will just make the relay operate. The current gain β of the transistor is 200. When the transistor conducts, its V_{BE} can be assumed to be 0.6 V. 3



8. (a) What is photoelectric effect? How its different results were successfully explained on the basis of quantum theory? 1,4

(b) The length of a steel bar is 1.0 m and its cross-sectional area is $0.03 \times 10^{-4} m$. Calculate the work done in stretching the wire when a force of 100 N is applied within the elastic region. Young's modulus of steel is $3.0 \times 10^{11} Nm^{-2}$. 3

9. (a) What is inner shell transitions? Explain the production of X-rays. 1,4

(b) Find the mass defect and binding energy for tritium, if the atomic mass of tritium is 3.016049u. 3