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

(Academic Sessions 2019 – 2021 to 2021 – 2023)

PHYSICS 223-1st Annual-(INTER PART – II) Time Allowed : 20 Minutes

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

PAPER CODE = 8471 LHR-12-1-23

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	For which material medium, force between two charged particles is maximum :			
	(A) Ammonia	(B) Germanium	(C) Mica	(D) Teflon
2	The force between two similar unit charges separated one meter apart in air is :			
	(A) Zero	(B) One Newton	(C) $9\times10^{9}N$	(D) $9\times10^{-9}N$
3	Kirchhoff's 2nd rule is based on :			
	(A) Energy conservation	(B) Mass conservation		
	(C) Charge conservation	(D) Momentum conservation		
4	Which one has least resistance :			
	(A) Galvanometer	(B) Ammeter	(C) Voltmeter	(D) Ohm-meter
5	A voltmeter is always connected in :			
	(A) Parallel	(B) Series	(C) Perpendicular	(D) Oblique
6	If we make magnetic field stronger the value of induced current is :			
	(A) Decreased	(B) Increased	(C) Vanishes	(D) Constant
7	The device which consume electrical energy is called :			
	(A) Generator	(B) Motor	(C) Load	(D) Dissipaters
8	At high frequency the current through a capacitor of A.C. circuit will be :			
	(A) Small	(B) Infinite	(C) Zero	(D) Large
9	A.C. through inductor, the applied voltage :			
	(A) Leads the current $\frac{\pi}{2}$	(B) Lags the current $\frac{\pi}{2}$		
	(C) In phase	(D) Out of phase 180^{o}		
10	The crystalline structure of NaCℓ is :			
	(A) Trigonal	(B) Cubical	(C) Tetragonal	(D) Hexagonal
11	Minimum diode required for full wave rectifier are :			
	(A) 1	(B) 3	(C) 2	(D) 4
12	Photovoltaic cell formed from :			
	(A) Arsenic	(B) Carbon	(C) Germanium	(D) Silicon
13	Unit of Plank's constant is same as that of :			
	(A) Entropy	(B) Angular momentum	(C) Acceleration	(D) Force
14	Stefen Boltzmann Law is given by :			
	(A) $E=hf$	(B) $E=mc^{2}$	(C) $E=\sigma T^{4}$	(D) $\lambda\times T=$ constant
15	Radiation produced from TV picture tube is :			
	(A) Gamma rays	(B) X-rays	(C) Infrared light	(D) β-rays
16	What is difference in isotopes :			
	(A) Number of electron	(B) Number of proton		
	(C) Charge number	(D) Number of neutron		
17	A proton consists of quark which are :			
	(A) All up	(B) One up, two down	(C) Two up, one down	(D) All down

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

(Academic Sessions 2019 – 2021 to 2021 – 2023)

PHYSICS 223-1st Annual-(INTER PART – II) Time Allowed : 2.40 hours

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

SECTION – I C HR-12-1-23

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

(i) Give similarity and difference between Coulomb and Gravitational forces.

(ii) Summarize the properties of electric field lines.

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

(iv) Electric lines of force never cross. Why?

(v) What is the function of grid in cathode ray oscilloscope?

(vi) What should be the orientation of current carrying coil in a magnetic field so when the torque maximum acting upon the coil?

(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) Why are heavy nuclei unstable?

(x) What is the radioactive tracer? Describe one application each in medicine.

(xi) How can radioactivity help in treatment of cancer?

(xii) What is meant by absorber dose, also write down the unit of absorber dose?

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

(i) Explain why the terminal potential difference of a battery decreases when current drawn from it is increased?

(ii) What is wheatstone bridge? How can it be used to determine an unknown resistance?

(iii) What is a potentiometer, how can it be used to measure the emf of a battery?

(iv) How the reception of a particular radio station is selected on your radio set?

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

(vi) Write down the properties of parallel resonance circuit.

(vii) Distinguish between intrinsic and extrinsic semiconductors.

(viii) What information is obtained from the area of hysteresis loop?

(ix) Explain energy band theory.

(x) Draw diagram, write equation and give truth table of exclusive OR-gate.

(xi) What is meant by op. amp. as a comparator?

(xii) What is principle of virtual ground? Apply it to find the gain of an inverting amplifier.

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

(i) Differentiate between mutual induction and mutual inductance.

(ii) 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?

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

(iv) Describe briefly black body radiations.

(v) Find the mass of a moving object with speed 0.8 c.

 CHP-12-1-23

4. (vi) Does the dilation means that time really passes more slowly in moving system or that it only seems to pass more slowly?

(vii) Is it possible to create a single electron from energy? Explain.

(viii) How hydrogen spectrum is obtained?

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

SECTION – II

Note : Attempt any THREE questions.

5. (a) Define electric intensity and electric potential. Derive a relation between them. 5

(b) A rectangular bar of iron is 2 cm by 2 cm in cross-section and 40 cm long. Calculate its resistance if resistivity is $5.2\times10^{-8}\Omega m$. 3

6. (a) Determine the e/m of electron. How the path of electrons is made visible? 5

(b) A circular coil has 15 turns of radius 2 cm each. The plane of the coil lies at 40° to the uniform magnetic field of 0.2 T. If the field is increased by 0.5 T in 0.2 s, find the magnitude of the induced emf. 3

7. (a) What is meant by rectification? Explain half wave and how full wave rectifiers attain by using bridge rectifier. 5

(b) A 10 mH, 20Ω coil is connected across 240 V and 180 / π Hz source. How much power does it dissipate? 3

8. (a) What is hysteresis loop? Describe the different features of hysteresis loop for a ferromagnetic material. 1,4

(b) An electron is accelerated through a potential difference of 50 V. Calculate its de-Broglie wavelength. 3

9. (a) State three postulates of Bohr's model of the hydrogen atom. And describe mathematically the de-Broglie interpretation of Bohr's orbits. 5

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

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

(Academic Sessions 2019 – 2021 to 2021 – 2023)

PHYSICS 223-1st Annual-(INTER PART – II) Time Allowed : 20 Minute.

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

PAPER CODE = 8478 CHR-12-2-23

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	Wave behaviour of matter is prominent at --- level :			
	(A) Macroscopic	(B) Mega structure	(C) Microscopic	(D) Any object size
2	The points where AC crosses the time axis corresponds to phase :			
	(A) $\frac{\pi}{2}$ or $3\frac{\pi}{2}$	(B) 0 or π	(C) $\frac{\pi}{4}$ or $3\frac{\pi}{4}$	(D) 0 or $\frac{\pi}{2}$
3	A galvanometer coil of resistance Rg gives full scale deflection with current Ig. What is required shunt resistance Rs. = ---- if range of ammeter is I = 2Ig :			
	(A) Rg	(B) 2 Rg	(C) Rg / 2	(D) 4 Rg
4	A combination of two back to back PN junctions is --- :			
	(A) Operational amplifier	(B) Digital gate	(C) Transistor	(D) Photo diode
5	The --- work on the principle of beats :			
	(A) DC motors	(B) Metal detectors	(C) Choke coils	(D) AC generators
6	1 J = --- eV :			
	(A) 1.6×10^{-19}	(B) 6.25×10^{18}	(C) 9.6×10^{-18}	(D) 9×10^{9}
7	Faraday and Maxwell unified electric and --- force :			
	(A) Weak nuclear	(B) Strong nuclear	(C) Gravitational	(D) Magnetic
8	Which is not true for ideal step up transformer :			
	(A) $I_s < I_p$	(B) $P_{out} = P_{in}$	(C) $V_s > V_p$	(D) $N_s = N_p$
9	A rod of length ℓ_o in a stationary frame is accelerated at speed of light. Its length measured perpendicular to its direction of motion is :			
	(A) $\frac{\ell_o}{2}$	(B) Zero	(C) ℓ_o	(D) $2\ell_o$
10	The slope of graph between charge and time for capacitor charging is large initially when the product RC is :			
	(A) Small	(B) Large	(C) Intermediate	(D) Infinite
11	A ductile wire is stretched to double of its original length, %age elongation is --- :			
	(A) 200%	(B) 50%	(C) 100%	(D) 400%
12	The fractional change in resistance is minimum for --- if temperature change is same for all :			
	(A) Platinum	(B) Nichrome	(C) Copper	(D) Constanton
13	If ionization energy of hydrogen atom is E_o, the energy required to remove electron from hydrogen in state n = 4 is :			
	(A) $\frac{E_o}{4}$	(B) $4E_o$	(C) $\frac{E_o}{16}$	(D) Zero
14	The value of voltage gain of a transistor amplifier (common emitter) is of the order of :			
	(A) Thousands	(B) Millions	(C) Fraction	(D) Hundreds
15	Energy required to remove all nucleons from nuclide of --- is maximum :			
	(A) Fe^{58}	(B) U^{235}	(C) Ba^{141}	(D) H^2
16	In alternating current, --- behave like resistors :			
	(A) Inductors	(B) Capacitors	(C) Transformers	(D) Generators
17	The potential of --- is least in CRO :			
	(A) Anode	(B) Screen	(C) Cathode	(D) Grid

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

(Academic Sessions 2019 – 2021 to 2021 – 2023)

PHYSICS 223-1st Annual-(INTER PART – II) Time Allowed : 2,40 hours

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

SECTION – I LHR-12-2-23

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

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

(ii) If the distance between two point charges is halved, what will happen to the force between them?

(iii) What are the factors upon which the electric flux depend?

(iv) Why does capacitance of a parallel plate capacitor increase in the presence of a dielectric?

(v) At a given instant, a proton moves in the positive x-direction in a region where there is a magnetic field in the negative z-direction. What is the direction of the magnetic force and direction of motion of proton?

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

(vii) What is the importance of hair spring used in a Weston galvanometer? Explain.

(viii) Describe the working of an electron gun in CRO.

(ix) What is radiation tracer? Explain.

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

(xi) How quenching is done in GM-tube?

(xii) How the scientists dispose off the radioactive waste safely?

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

(i) Why does the resistance of conductor rise with temperature?

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

(iii) What is meant by strain energy?

(iv) What is principle of virtual ground?

(v) Do bends in a wire affects its electrical resistance? Explain.

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

(vii) Define superconductor. Give example.

(viii) Why is the base current in a transistor is very small?

(ix) How rheo-state is used as potential divider?

(x) What is impedance? Give unit.

(xi) What is elastic limit of material in stress strain curve?

(xii) Give the application of gates in control system.

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

(i) Can a D.C motor be turned into DC generator? What changes are required be done?

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

(iii) What is meant by armature?

(Turn Over)

4. (iv) Can pair production take place in vacuum? Explain.

(v) Will bright light eject more electrons from a metal surface dimmer light of same colour?

(vi) Is it possible to create a single electron from energy? Explain.

(vii) What are black body radiations? How can you get a black body?

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

(ix) Is energy conserved when an atom emits photon of light?

SECTION – II

Note : Attempt any THREE questions.

5. (a) Describe Millikan's oil drop experiment to determine charge on electron. 5

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

6. (a) Derive the relation of e/m of an electron. 5

(b) An ideal step down transformer is connected to main supply of 240 V. It is desired to operate a 12 V, 30 W lamp. Find the current in the primary and the transformation ratio. 3

7. (a) What is RLC series circuit? Find out an expression for resonance frequency. Also write down its properties. 5

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

8. (a) What is hysteresis loop? Explain different terms, saturation, remanence and coercivity. 5

(b) An electron is accelerated through a potential difference of 50 V. Calculate its de-Broglie wavelength. 3

9. (a) What is nuclear fission? Describe uncontrolled and controlled chain reaction. 5

(b) Compute the shortest wavelength radiation in the Balmer Series. What value of n must be used? 3

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 : (A) Zero (B) Positive (C) Negative (D) Maximum
2	The most common source of alternating voltage is : (A) Motor (B) Cell (C) Generator (D) Thermocouple
3	Compton effect is associated with : (A) Gamma rays (B) Beta rays (C) X-rays (D) Positive rays
4	Alpha particle carries a charge of : (A) $+2e$ (B) $-2e$ (C) $+e$ (D) Zero
5	The difference of potential energy between two points per unit charge is : (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 : (A) Filters (B) Sensors (C) Rectifiers (D) Amplifiers
7	The current flowing through each resistor of equal resistances in parallel combination is : (A) Different (B) Zero (C) Same (D) Infinite
8	The Boolean expression of NAND gate is : (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 : (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 : (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 : (A) Increased by a factor ' k ' (B) Increased by a factor ' k^2 ' (C) Decreased by factor ' k ' (D) Remains unchanged
12	The mean value of A.C. in one complete cycle is : (A) 1 (B) Zero (C) I_o (D) $\frac{I_o}{\sqrt{2}}$
13	Unit of self inductance is : (A) Weber (B) Henry (C) Tesla (D) Farad
14	The number of crystal systems are : (A) Three (B) Five (C) Fourteen (D) Seven
15	Beam of electron is also called : (A) X-rays (B) Alpha rays (C) Gamma rays (D) Cathode rays
16	Light emitting diodes (LEDs) are made from semiconductors : (A) Silicon (B) Germanium (C) Gallium arsenide (D) Carbon
17	In electronic transition, atom cannot emit : (A) Infrared radiations (B) Visible radiations (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

LHR-G1-22

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?

LHR-G1-22

4. (iii) Show that ε 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

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

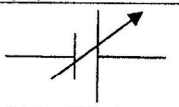
(Academic Sessions 2018 – 2020 to 2020 – 2022)

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

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

PAPER CODE = 8474 LHR-G2-22

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	$\frac{E}{B}$ has the unit of : (A) meter (B) ms^{-1} (C) ms^{-2} (D) s^{-2}
2	If V_o is peak value of A.C. voltage then mean square value of voltage is : (A) $\frac{V_o}{\sqrt{2}}$ (B) V_o^2 (C) $\frac{1}{2}V_o^2$ (D) V
3	A black body is both an ideal absorber and an ideal : (A) Reflector (B) Radiator (C) Conductor (D) Insulator
4	Energy given out per nucleon per fission of heavy element like uranium is : (A) 200 MeV (B) 208 MeV (C) 5 MeV (D) 0.9 MeV
5	Electric flux through a closed surface enclosing a charge depends on : (A) Medium (B) Size (C) Shape (D) Location of charge
6	 is symbol of : (A) High tension battery (B) Low tension battery (C) Variable voltage battery (D) Zero resistance battery
7	Thermo-couples produce electric energy by : (A) Heat (B) Chemical energy (C) Sunlight (D) Mechanical energy
8	When PN junction is conducting then its resistance is of the order of : (A) Mega Ohm (B) Kilo Ohm (C) 100 Ohm (D) Few Ohms
9	Two quark combination forms : (A) Mesons (B) Baryons (C) Leptons (D) No Composite particle
10	Lenz's law is also a statement of law of conservation of : (A) Linear momentum (B) Angular momentum (C) Energy (D) Charge
11	Unit of electric intensity is same as : (A) Force (B) Potential gradient (C) Viscosity (D) Magnetic field
12	If the frequency of A.C is 40 Hz then current passing through filament bulb get brilliance : (A) 100 times (B) 80 times (C) 40 times (D) 50 times
13	A metal meter rod is moving at the speed of 0.5 ms^{-1} in the direction parallel to a 0.5 T magnetic field, emf will be : (A) 0.25 V (B) 0.5 V (C) Zero (D) 0.125 V
14	In cubical crystal, all the sides meet at : (A) Acute angle (B) Abtuse angle (C) Right angle (D) 45°
15	Work done by a magnetic force of 5 N when a q charge is displaced 2 m is : (A) Non-zero (B) Zero (C) 10 J (D) 5 J
16	The observations on objects moving very fast, approaching the speed of light, are well explained by : (A) Quantum theory (B) Newton's law (C) Special theory of relativity (D) Kepler's law
17	Plank's constant has the unit of : (A) Linear momentum (B) Angular momentum (C) Torque (D) Force

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

(Academic Sessions 2018 – 2020 to 2020 – 2022)

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

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

SECTION – I

LHR-G2-22

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

(i) What is meant by electric polarization?

(ii) Prove that electric intensity in side a hollow charged sphere is zero.

(iii) Electric lines of force never cross each other . Why?

(iv) How can you identify that which plate of the capacitor is positively charged? Explain it.

(v) Write down any four uses of CRO.

(vi) What is Lorentz force? Write down its formula.

(vii) Why does the picture on the TV screen is distorted when a magnet is brought near its screen?

(viii) How a galvanometer can be made sensitive?

(ix) What is the binding energy? Write down the name of element which has highest value.

(x) Heavy nuclei are unstable. Why?

(xi) What do you mean by dead time in Geiger-Muller Counter?

(xii) What factors make a fusion reaction difficult to achieve?

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

(i) Write down four sources of current.

(ii) Do bends in a wire affect its electrical resistance? Explain.

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

(iv) Define the terms peak value and peak to peak value.

(v) Discuss two uses of three phase A.C. supply.

(vi) How the reception of a particular radio station is selected on your radio set?

(vii) Explain ductile substances and brittle substances.

(viii) What is meant by hysteresis loss?

(ix) Show that units of modulus of elasticity and stress are the same.

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

(xi) What is the principle of virtual ground?

(xii) Calculate the gain of a non-inverting amplifier. When R_1 = infinity and R_2 = zero

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

(i) Can a step-up transformer increase the power level? Explain.

(ii) How would you position a flat loop of a wire in changing magnetic field, so that there is no emf induced in the loop?

(iii) Write down the factors upon which the mutual inductance depend.

(iv) Distinguish between A.C. generator and transformer.

(Turn Over)

4. (v) Will higher frequency light eject greater number of electrons than low frequency light?

(vi) When does light behave as a wave? When does it behave as particle?

(vii) State Stefen's Boltzman law. Also write the value of Stefen's constant.

(viii) Find the shortest wavelength of radiation in the Balmer series.

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

SECTION – II

Note : Attempt any THREE questions.

5. (a) State and explain Gauss's law, also calculate the electric intensity due to an infinite sheet of 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) State Ampere's law and apply it to find magnetic field due to a current carrying solenoid. 5

(b) A solenoid has 250 turns and its self inductance is 2.4 mH. What is the flux through each turn when current is 2 A? What is the induced emf when current changes at 20 As^{-1}? 3

7. (a) Write a note on transistor as an amplifier. 5

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

8. (a) Define photoelectric effect. Give its explanation on the basis of Quantum theory. 5

(b) A wire 2.5 m long and cross-section area $10^{-5}m^{2}$ is stretched 1.5 mm by a force of 100 N in the elastic region. Calculate Young's modulus. 3

9. (a) What is laser? Write down its properties and also explain laser action in detail. 5

(b) Find the mass defect and binding energy of the deuteron nucleus. The experimental mass of deuteron is $3.3435\times10^{-27}kg$. 3

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

(Academic Sessions 2017 – 2019 to 2019 – 2021)

PHYSICS 221-(INTER PART – II) Time Allowed : 20 Minutes

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

PAPER CODE = 8471

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 quantity $-\frac{\Delta V}{\Delta r}$ is called : (A) Electric potential (B) Electric energy (C) Potential energy (D) Potential gradient
2	If the potential difference across two plates of capacitor is doubled, the energy in it will be : (A) Two times (B) Eight times (C) Four times (D) Remains same
3	Kirchhoff's second rule is a way of stating conservation of : (A) Mass (B) Charge (C) Energy (D) Momentum
4	The brightness of spot on CRO screen is controlled by : (A) Plates (B) Cathode (C) Anode (D) Grid
5	The e/m of neutron is : (A) Less than electron (B) Zero (C) Greater than electron (D) The same as electron
6	The energy stored in inductor is : (A) $\frac{1}{2}LI^2$ (B) $\frac{1}{2}LI$ (C) $\frac{1}{2}L^2I$ (D) $\frac{1}{2}L^2I^2$
7	The unit of self inductance is : (A) Weber (B) Tesla (C) Henry (D) Farad
8	At high frequency the value of reactance of capacitor will be : (A) Small (B) Zero (C) Large (D) Infinite
9	When 10 V are applied to an A.C. circuit, the current flowing in it 100 mA, its impedance is : (A) 10 Ohm (B) 100 Ohm (C) 1000 Ohm (D) 1 Ohm
10	The critical temperature of mercury is : (A) 1.18 K (B) 4.2 K (C) 3.72 K (D) 7.2 K
11	The current gain β of the transistor is given by : (A) $\beta = \frac{I_B}{I_C}$ (B) $\beta = I_B + I_C$ (C) $\beta = I_B - I_C$ (D) $\beta = \frac{I_C}{I_B}$
12	The input resistance of an operational amplifier is : (A) Zero (B) Low (C) High (D) Equal to output resistance
13	The value of Plank's constant h is : (A) $6.63\times10^{-34} Js$ (B) $6.63\times10^{-34} J/s$ (C) $6.63\times10^{-34} Js^2$ (D) $6.63\times10^{-34} J/s^2$
14	Albert Einstein was awarded Noble Prize in Physics in : (A) 1905 (B) 1911 (C) 1918 (D) 1921
15	Radius of first Bohr orbit of hydrogen atom is : (A) 0.053 nm (B) 0.053 mm (C) 0.053 μm (D) 0.053 m
16	Gamma rays emitted from radioactive element have speed : (A) $1\times10^{7} ms^{-1}$ (B) $1\times10^{8} ms^{-1}$ (C) $3\times10^{8} ms^{-1}$ (D) $4\times10^{19} ms^{-1}$
17	The dead time of G.M. counter is : (A) $10^{-3} s$ (B) $10^{-4} s$ (C) $10^{-6} s$ (D) $10^{-8} s$

LHR-I-21

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

(Academic Sessions 2017 – 2019 to 2019 – 2021)

PHYSICS 221-(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) If point charge q of mass m is released in a non uniform electric field with field lines pointing in the same direction, will it make a rectilinear motion?

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

(iii) Electric field lines provide information about the strength of the electric field. Describe electric field intensity in terms of field lines.

(iv) Define and write relation for dielectric constant in terms of capacitances of a capacitor.

(v) Explain the principle of extension of right hand rule.

(vi) How does the graph pattern appear stationary on the screen of CRO? Explain the condition.

(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) If a charged particle moves in a straight line through some region of space, can you say that the magnetic field in the region is zero?

(ix) What is the importance of minus sign in the expression $\left(\varepsilon = -N\frac{\Delta\phi}{\Delta t}\right)$ for Faraday's law of electromagnetic induction?

(x) Why self induced emf is also called as back emf ?

(xi) Does the induced emf always act to decrease the magnetic flux through a circuit?

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

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

(i) What is Wheatstone bridge? How can it be used to determine an unknown resistance?

(ii) Differentiate between resistance and resistivity.

(iii) Explain why the terminal potential difference of a battery decreases when the current drawn from it is increased?

(iv) How does doubling the frequency affect the reactance of : (a) An inductor (b) A capacitor

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

(vi) Explain the power dissipation in an inductor.

(vii) What is meant by para, dia and ferromagnetic substances? Give examples of each.

(viii) What is meant by hysteresis loss? How is it used in the construction of a transformer?

(ix) Differentiate between young modulus Y and bulk modulus K.

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

(xi) What is the principle of virtual ground? Apply it to find the gain of an inverting amplifier.

(xii) What is the potential barrier of silicon and germanium?

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

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

(ii) Why don't we observe Compton effect with visible light?

(Turn Over)

4. (iii) What advantages an electron microscope has over an optical microscope?

(iv) What are the advantages of laser over ordinary light?

(v) What is Helium-Neon Laser?

(vi) Why are heavy nuclei unstable?

(vii) What factors make a fusion reaction difficult to achieve?

(viii) Define mass defect and binding energy.

(ix) What are hadrons? Give examples.

SECTION – II

Note : Attempt any THREE questions.

5. (a) State Gauss's law. Find out the electric intensity due to an infinite sheet of charge. 5

(b) 0.75 A current flows through an iron wire when a battery of 1.5 V is connected across its ends. The length of the wire is 5 m and its cross-sectional area is $2.5\times10^{-7} m^2$. Compute the resistivity of iron. 3

6. (a) Derive the expression for force on moving charge in a uniform magnetic field. 5

(b) An alternating current generator operating at 50 Hz has a coil of 200 turns. The coil has an area of 120 cm^2. What should be the magnetic field in which the coil rotates in order to produce an emf of maximum value of 240 volts? 3

7. (a) How OP amplifier can be made as inverting amplifier? Explain your answer by circuit diagram. 5

(b) Find the value of the current and inductive reactance when A.C. voltage of 220 V at 50 Hz is passed through an inductor of 10 H. 3

8. (a) Explain the principle, construction and working of Geiger Mullar Counter. 5

(b) A 1.25 cm diameter cylinder is subjected to a load of 2500 kg. Calculate the stress on the bar in mega pascals. 3

9. (a) State postulates of Bohr's model of the hydrogen atom and then show that hydrogen atom have quantized radii? 5

(b) An electron is accelerated through a potential difference of 50 V. Calculate its de Broglie wavelength. 3

LHR-II-21

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

(Academic Sessions 2017 – 2019 to 2019 – 2021)

PHYSICS 221-(INTER PART – II) Time Allowed : 20 Minutes

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

PAPER CODE = 8472

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	When some dielectric is inserted between the plates of a capacitor then capacitance :			
	(A) Increased	(B) Decreased	(C) Zero	(D) Infinity
2	Coulomb per volt is called :			
	(A) Ampere	(B) Joule	(C) Henry	(D) Farad
3	Kirchhoff's first rule is a manifestation of law of conservation of :			
	(A) Mass	(B) Energy	(C) Charge	(D) Kinetic energy
4	Work done on a charged particle moving in uniform magnetic field is :			
	(A) Maximum	(B) Zero	(C) Minimum	(D) Negative
5	Output wave form of sweep or time base generator is :			
	(A) Saw tooth wave	(B) Digital wave	(C) Sinusoidal wave	(D) Square wave
6	Energy stored in the inductor is in the form of :			
	(A) Electrical energy	(B) Magnetic energy		
	(C) Kinetic energy	(D) Chemical energy		
7	The principle of an electric generator is based upon :			
	(A) Ampere's law	(B) Faraday's law	(C) Coulomb's law	(D) Kirchhoff's law
8	The device which allows only flow of A.C. through it is :			
	(A) Capacitor	(B) Inductor	(C) Battery	(D) Thermistor
9	S.I unit of impedance is :			
	(A) Henry	(B) Hertz	(C) Ampere	(D) Ohm
10	Very weak magnetic field produced by brain can be detected by :			
	(A) Compass	(B) Metallic needle	(C) Squid	(D) Liquid
11	If $R_1 = 10K\Omega$ and $R_2 = 100K\Omega$ then gain of inverting amplifier is :			
	(A) – 11	(B) – 10	(C) 10	(D) 11
12	Automatic functioning of street light can be done by the use of :			
	(A) Inductor	(B) Capacitor	(C) Comparator	(D) Thermistor
13	When platinum wire is heated. It changes to cherry red at temperature :			
	(A) 500 °C	(B) 900 °C	(C) 1100 °C	(D) 1300 °C
14	The rest mass energy of an electron positron pair is :			
	(A) 0.51 Mev	(B) 1.02 Mev	(C) 1.2 Mev	(D) 1.00 Mev
15	The value of Rydberg constant is :			
	(A) $1.0974\times10^{7}m^{-1}$	(B) $6.02\times10^{-34}m^{-1}$	(C) $3\times10^{8}m^{-1}$	(D) $1.6\times10^{19}m^{-1}$
16	The half life of uranium -239 is :			
	(A) 1620 years	(B) 3.8 days	(C) 2.5 days	(D) 23.5 minutes
17	Binding energy per nucleon is maximum for :			
	(A) Helium	(B) Iron	(C) Radium	(D) Polonium

LHR- II - 21

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

(Academic Sessions 2017 – 2019 to 2019 – 2021)

PHYSICS 221-(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) Is E necessarily zero inside a charged rubber balloon if balloon is spherical? Assume that charge is distributed uniformly over the surface.

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

(iii) How a sensitive electric apparatus is shielded from electric fields?

(iv) Give a comparison of electric and gravitational forces.

(v) Describe the right hand rule to find the direction of magnetic field inside a current carrying solenoid.

(vi) Electric force does work, while no work is done by the magnetic force. Why?

(vii) A plane conducting loop is located in a uniform magnetic field that is directed along the x-axis. For what orientation of the loop is the flux a maximum? For what orientation is the flux a minimum?

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

(ix) How an emf is induced in a coil of wire using a bar magnet?

(x) Why the self induced emf is sometimes called as back emf ?

(xi) Does the induced emf always act to decrease the magnetic flux through a circuit?

(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) Does bends in a wire affect its electrical resistance? Explain.

(ii) Why does the resistance of a conductor rise with temperature?

(iii) What is temperature co-efficient of resistance?

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

(v) How many times per second will an incandescent lamp reach maximum brilliance when connected to a 50 Hz source?

(vi) What are the electromagnetic waves?

(vii) Write a note on superconductors.

(viii) What is meant by hysteresis loss? How is it used in the construction of a transformer?

(ix) Differentiate between N-type and P-type substances.

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

(xi) Why a photodiode is operated in reverse biased state?

(xii) What is the working principle of a light emitting diode?

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

(i) If an electron and proton have the same de Broglie wavelength, which particle has greater speed?

(ii) Which photon red, green or blue carries the most energy and momentum?

(Turn Over)

4. (iii) What are black body radiations?

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

(v) Is energy conserved when an atom emits a photon of light?

(vi) Describe a brief account of interaction of various types of radiations with matter.

(vii) Why are heavy nuclei unstable?

(viii) What do we mean by term critical mass?

(ix) Differentiate between Baryons and Mesons.

SECTION – II

Note : Attempt any THREE questions.

5. (a) Define capacitance. Derive an expression for the capacitance of a parallel plate capacitor when dielectric is inserted between the plates. 5

(b) A rectangular bar of iron is 2 cm by 2 cm in cross-sectional area and 40 cm long. Calculate its resistance if the resistivity is $11\times10^{-8}\Omega m$. 3

6. (a) Discuss the principle, construction and working of alternating current generator. Also find expression for induced emf and current. 5

(b) Find the radius of an orbit of an electron moving at a rate of $2.0\times10^{7} ms^{-1}$ in a uniform magnetic field of $2.0\times10^{-3}T$. 3

7. (a) What is the behaviour of A.C. current and voltage in inductor? Discuss power loss through an inductor over a period. 5

(b) The current flowing into the base of a transistor is 100 μA. Find its collector current I_C, its emitter current I_E and the ratio $\frac{I_C}{I_E}$. If the value of current gain β is 100. 3

8. (a) Describe the principle, construction and working of a Wilson Cloud Chamber. 5

(b) What stress should cause a wire to increase in length by 0.01%, if the Young's modulus of the wire is $12\times10^{10} P.a$? What force would produce this stress if the diameter of the wire is 0.56 mm? 3

9. (a) What is wave nature of particles? How Davisson and Germer experiment confirmed it? 5

(b) Find the speed of the electron in the first Bohr orbit. 3