

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 *CH2-12-1-23*

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) $9 \times 10^9 N$ (D) $9 \times 10^{-9} N$
3	Kirchhoff's 2 nd 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°
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) $\lambda \times T = \text{constant}$
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

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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 $0.8c$.

(Turn Over)

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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 $5.2 \times 10^{-8} \Omega m$. 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, 20 Ω 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

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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 R_g gives full scale deflection with current I_g . What is required shunt resistance R_s . = ---- if range of ammeter is $I = 2I_g$: (A) R_g (B) $2 R_g$ (C) $R_g / 2$ (D) $4 R_g$
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	$1 \text{ J} = \text{--- eV}$: (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) Constantan
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

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PAPER – II (Essay Type)

GROUP – II

Maximum Marks : 68

SECTION – I

LHPD-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)

(2) LHR-12-2-23

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 $11 \times 10^{-8} \Omega m$. 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 $100 \mu A$. 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