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 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°
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

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

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

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

SECTION – I   CHR-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.

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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, 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

(Academic Sessions 2019 – 2021 to 2021 – 2023)

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

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

PAPER CODE = 8478 LHR–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	

(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

<h2 style="text-align:center">SECTION – I</h2>

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?

<div style="text-align:right">(Turn Over)</div>

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 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

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