Physics	(A)	L.K.No. 1308	Paper Code No. 8472
Paper II	(Objective Type)	Inter – A – 2022	(Group 2nd)
Time : 20 Minutes		Inter (Part - II)	BOP-G2-22
Marks : 17		Session (2018 – 20) to (2020 – 22)	

Note : Four possible choices A, B, C, D to each question are given. Which choice is correct fill that circle in front of that Question No. Use Marker or Pen to fill the circles. Cutting or filling two or more circles will result in Zero Mark in that Question.

Q.No.1

(1) The absolute potential at a point distant 20 cm from a charge of $2\,\mu C$ is :
(A) 9×10^2 V (B) 9×10^3 V (C) 9×10^4 V (D) 9×10^5 V

(2) $\dfrac{v}{m}$ is unit of :
(A) Magnetic Field Intensity (B) Electric Field Intensity
(C) Electric Force (D) Gravitational Force

(3) Three Resistors of Resistance $2\,\Omega$, $3\,\Omega$ and $6\,\Omega$ are connected in series. Their Equivalent Resistance is :
(A) $10\,\Omega$ (B) $11\,\Omega$ (C) $\dfrac{1}{10}\,\Omega$ (D) $\dfrac{1}{11}\,\Omega$

(4) Which of the following Apparatus is used to measure Current, Voltage and Resistance :
(A) Ammeter (B) Voltmeter (C) Avometer (D) Galvanometer

(5) To convert a Galvanometer into a Voltmeter, a high resistance connected in series with Galvanometer is given by :
(A) $R_h = \dfrac{V}{R_g} - I_g$ (B) $\dfrac{V}{R_g} + I_g = R_h$ (C) $R_h = \dfrac{V}{I_g} - R_g$ (D) $\dfrac{V}{I_g} + R_g = R_h$

(6) The direction of the Induced Current is always so as to oppose the change which causes the current :
(A) Faraday's Law (B) Lenz's Law (C) Ohm's Law (D) Kirchhoff's Ist Rule

(7) In D.C. Generator, Split Rings act as : (A) Capacitor (B) Commutator (C) Inductor (D) Resistor

(8) The basic circuit element in a D.C. Circuit which controlled the current and voltage is :
(A) Transformer (B) Resistor (C) Inductor (D) Transistor

(9) The device which allows only the flow of D.C. is
(A) Generator (B) Transformer (C) Inductor (D) Capacitor

(10) A Semi Conductor will behave as an Insulator at temperature :
(A) 0 K (B) 0°C (C) 10 K (D) 10°C

(11) Which Diode works at Reverse Biasing :
(A) LED (B) Photo – Voltaic Cell (C) Photodiode (D) Silicon Diode

(12) The Voltage Gain of an Amplifier having $r_{ie} = 1\,\Omega$, $\beta = 100$, $R_e = 20\,\Omega$ is :
(A) 1000 (B) 2000 (C) 500 (D) 5000

(13) The Materialization of Energy take place in the process of :
(A) Photoelectric Effect (B) Compton Effect (C) Pair Production (D) Annihilation of Matter

(14) The factor $\dfrac{h}{m_o c}$ has the unit of :
(A) Kilogram (B) Second (C) Meter (D) Joule

(15) The equation of Rydberg's Constant is :
(A) $R_H = \dfrac{hc}{m_o}$ (B) $R_H = \dfrac{E_o}{hc}$ (C) $R_H = \dfrac{E_o}{\lambda}$ (D) $R_H = \dfrac{1}{hc}$

(16) Binding Energy for deuteron nucleus is given by :
(A) 2.8 MeV (B) 2.23 MeV (C) 2.28 MeV (D) 2.25 MeV

(17) Electrons are : (A) Hadrons (B) Leptons (C) Quarks (D) Baryons

Note : It is compulsory to attempt any (8 – 8) Parts each from Q.No. 2 and Q.No.3 and attempt any (6) Parts from Q.No.4. Attempt any (3) Questions from Part – II .Write same Question No. and its Part No. as given in the Question Paper.

Make Diagram where necessary. | **Part - I** | 22 x 2 = 44

Q.No.2	(i)	How can you identify that which plate of a capacitor is positively charged ?
	(ii)	Electric Lines of Force never cross , why ?
	(iii)	Define Electron Volt . Give its numerical value in Joule.
	(iv)	Show that $1\,\dfrac{v}{m} = 1\,\dfrac{N}{C}$
	(v)	What is meant by Sensitivity of Galvanometer ? How can a Galvanometer be made more sensitive ?
	(vi)	What is the function of Grid in C.R.O. ?
	(vii)	How can you use a Magnetic Field to separate Isotopes of Chemical Element ?
	(viii)	Why does the picture of a T.V. Screen become distorted when a magnet is brought near the screen ?
	(ix)	Why are heavy nuclei unstable ?
	(x)	What do you understand by " Background Radiation " ? State two sources of this radiation.
	(xi)	What is the Mass Defect ?
	(xii)	Define the term Binding Energy.
Q.No.3	(i)	Is the filament resistance lower or higher in a 500 W , 220 V light bulb than in a 100 W , 220 V bulb ?
	(ii)	Distinguish between Resistivity and Conductivity.
	(iii)	What is the difference between emf and Terminal Potential Difference ?
	(iv)	What is meant by A.M. and F.M. ?
	(v)	When 10 V are applied to A.C. Circuit , the current flowing in it is 100 mA. Find its impedance.
	(vi)	What is Resonance Condition in R – L – C Series Circuit ?
	(vii)	Distinguish between Amorphous and Polymeric Solids.
	(viii)	Define Critical Temperature and Curie Temperature.
	(ix)	What is meant by Hysteresis Loss ? Explain.
	(x)	Why Ordinary Silicon Diodes do not emit light ?
	(xi)	What is the principle of Virtual Ground ? Apply it to find the gain of an inverting amplifier.
	(xii)	Write the basic characteristics of Operational Amplifier.
Q.No.4	(i)	A metal rod of 0.25 m is moving at a speed of $0.5\,\text{ms}^{-1}$ in a direction perpendicular to a 0.25 T magnetic field. Find emf produced in the rod.
	(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)	A suspended magnet is oscillating freely in a horizontal plane. The oscillations are strongly damped when a metal plate is placed under the magnet . Explain why does this occur ?
	(iv)	Can a step – up transformer increase the power level ? Explain with equation.
	(v)	Rest and Motion are not absolute but relative. Explain this statement with example.
	(vi)	If an object moves with speed of light , then what will be its mass ? Explain with equation.
	(vii)	Which photon , red , green or blue carries the most : (a) Energy and (b) Momentum
	(viii)	Differentiate between Normal Population and Population Inversion of Atomic Energy. State with figures.
	(ix)	Can X – ray photon be reflected , refracted , diffracted and polarized just like any other wave ? Explain.

		Part - II LMR-G2-22	
Q.No.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 particle carrying a charge of **2e** falls through a potential difference of **3 . 0 V** , calculate the energy acquired by it.	(3)
Q.No.6	(a)	Derive an expression for energy stored in an inductor.	(5)
	(b)	A coil of **0 . 1 m x 0 . 1 m** and of 200 turns carrying a current of **1 . 0 mA** is placed in a uniform magnetic field of **0 . 1 T** , calculate the maximum torque that acts on the coil.	(3)
Q.No.7	(a)	How can we use a Transistor as an Amplifier ?	(5)
	(b)	A 10 mH , 20 Ω coil is connected across 240 V and $180/\pi$ Hz source. How much power does it dissipate ?	(3)
Q.No.8	(a)	What is Energy Band Theory? Distinguish Conductors , Insulators and Semi Conductors on the basis of Band Theory.	(5)
	(b)	X – rays of Wavelength 22 pm are scattered from a Carbon Target. The scattered radiation being viewed at 85° to incident beam. What is Compton Shift ?	(3)
Q.No.9	(a)	State Bohr's Model of the Hydrogen Atom. Give de – Broglie interpretation of Bohr's Orbit. Also derive a relation for emission spectrum of Hydrogen.	(5)
	(b)	If $^{233}_{92}U$ decays twice by α - emission, what is the resulting isotope ?	(3)