

5	Two metallic spheres of radii 1cm and 3cm are given charges of -1×10^{-2} C and 5×10^{-2} C respectively. If these are connected by a conducting wire, the final charge on the bigger sphere is a) 1×10^{-2} C b) 3×10^{-2} C c) 2×10^{-2} C d) 4×10^{-2} C	1
6	Which of the following is an electromagnetic wave? a) β - rays b) γ - rays c) α - rays d) All of the above	1
7	An air bubble in glass slab of refractive index 1.5 (near normal incidence) is 5 cm deep when viewed from one surface and 3cm deep when viewed from the opposite face. The thickness of the slab is a) 12 cm b) 8 cm c) 16 cm d) 10 cm	1
8	In India electricity is supplied for domestic use at 220 V. It is supplied at 110 V in USA. If the resistance of a 60 W bulb for use in India is R, the resistance of a 60 W bulb for use a) R/4 b) R c) R/2 d) 2R	1
9	A wire of length l carrying a current I along the Y direction is kept in a magnetic field given by $\vec{B} = \frac{\beta}{\sqrt{3}} (\hat{i} + \hat{j} + \hat{k})T$. The magnitude of Lorentz force acting on the wire is: a) $\sqrt{2} \beta Il$ b) $\sqrt{\frac{2}{3}} \beta Il$ c) $\sqrt{\frac{1}{2}} \beta Il$ d) $\sqrt{\frac{1}{3}} \beta Il$	1
10	Emission of electron by the absorption of heat energy is called _____ emission a) Thermionic b) Photo electric c) Secondary d) Field	1
11	If a current of 7.5 A is maintained in a wire for 45 seconds then the charge flowing through the wire is a) 6C b) 365.5 C c) 3C d) 337.5 C	1
12	The charge of cathode ray is a) Neutral b) Positive c) Not defined d) Negative	1
13	A step-down transformer reduces the supply voltage from 220 V to 11 V and increases the current from 6 A to 100 A. Then its efficiency is: a) 0.12 b) 1.2 c) 0.9 d) 0.83	1

14	The electric potential of an electron is given by $V = V_0 \ln \left(\frac{r}{r_0} \right)$, Where r_0 is a constant. If Bohr atom model is valid, then variation of radius of n^{th} orbit r_n with the principal quantum number n is a) $r_n \propto \frac{1}{n^2}$ b) $r_n \propto \frac{1}{n}$ c) $r_n \propto n^2$ d) $r_n \propto n$	1
15	Transverse nature of light is shown in a) Scattering b) Interference c) Polarisation d) Diffraction	1

PART - II

Answer any six questions. Question No. 24 is Compulsory.

6×2=12

16	What is corona discharge?	2
17	How will you increase the current sensitivity of a galvanometer	2
18	Define work function of a metal. Mention its unit	2
19	Calculate the radius of ${}^{197}_{79}\text{Au}$ nucleus	2
20	State Fleming's right hand rule.	2
21	What do you mean by doping ?	2
22	What is displacement current?	2
23	Define electrical resistivity	2
24	The angle of minimum deviation for the equilateral prism is 40° . Find the refractive index of the material of the prism.	2

PART - III

Answer any six questions. Question No. 33 is compulsory.

6×3=18

25	Derive the relation between f and R for a spherical mirror.	3
26	Obtain a relation between current and drift velocity	3
27	List out the laws of Photo electric effect.	3
28	Draw the circuit diagram of NPN transistor in Common Emitter Configuration.	3
29	Give the uses of Polaroids.	3

30	Derive the expression for resultant capacitance	3
31	Find the : i] Angular momentum ii] Velocity of the electron revolving in the 5 th orbit of hydrogen atom. [$h = 6.6 \times 10^{-34}$ Js; $m = 9.1 \times 10^{-31}$ kg]	3
32	List out salient features of magnetic Lorentz force.	3
33	Find the impedance of a series RLC circuit, if the inductive reactance, capacitive reactance and resistance are 184Ω , 144Ω and 30Ω respectively. Also calculate the phase angle between voltage and current.	3

PART - IV

Answer all the following questions.

5×5=25

34	a) Explain the construction and working of full wave rectifier (OR) b) Explain the construction and working of transformer.	5
35	a) Derive an expression for electrostatic potential due to an electric dipole. (OR) b) Obtain the equation for bandwidth in Young's Double Slit Experiment.	5
36	a) Using Bio-Savart law deduce the relation for the magnetic field at a point due to an infinitely long straight conductor carrying current. (OR) b) Discuss the spectral series of hydrogen atom	5
37	a) i) How do we obtain characteristic X – ray spectra? ii) Calculate the cut-off wavelength and cut-off frequency of X-rays from an X – ray tube of accelerating potential 20,000 V. (OR) b) What is spectrum? Explain the types of emission spectrum.	5
38	a) Obtain Lens maker's formula (OR) b) Explain the determination of the internal resistance of cell using voltmeter.	5