

**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034****B.Sc. DEGREE EXAMINATION – PHYSICS****FIFTH SEMESTER – APRIL 2023****PH 5512 – ELECTRICITY AND MAGNETISM**

Date: 03-05-2023

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

PART – A

Q. No.	Answer ALL the questions	(10 x 2 = 20 Marks)
1	What is electric potential? Give its unit.	
2	Define electric flux.	
3	State Ohm's law.	
4	What are the uses of potentiometer?	
5	State Peltier's effect.	
6	Define Ampere.	
7	Calculate the induced emf in a coil of inductance 10 H in which the current changes from 8 A to 3 A in 0.2 s.	
8	An electron moving with velocity 5×10^7 m/s enters a magnetic field of 1 T at an angle of 90° to the magnetic field. Estimate the magnetic force acting on the electron.	
9	Show that EM waves travel at the speed of light.	
10	Define RMS current.	

PART – B**(4 x 7.5 = 30 Marks)****Answer any FOUR questions**

11	What is electric displacement vector? Derive the relation between D, E & P.	
12	Three capacitors each of capacitance 9 pF are connected in series (i) What is the capacitance of the combination? (ii) What is the potential difference across each capacitor, if the combination is connected to 120 V supply? (4+3.5)	
13	Explain the construction of Helmholtz galvanometer with its theory.	
14	What is meant by self-induction? Derive an expression for the self-inductance of a long solenoid.	
15	Compare the properties of dia, para and ferro magnetic materials.	
16	Deduce the equation for the propagation of the plane electromagnetic waves in free space.	

PART – C**(4 x 12.5 = 50 Marks)****Answer any FOUR questions**

17	Derive electric field and potential due to an electric dipole at a point \vec{r} . Also discuss the special cases.	
18	What is electronic polarization? Derive an expression for electronic polarizability of an atom. (2.5+10)	
19	State Biot-Savart's law. Derive an expression for the magnetic field at any point due to current carrying long straight conductor. (2.5+10)	
20	Describe the construction and working of a transformer.	
21	Explain the domain theory of ferromagnetism.	
22	Derive the four Maxwell's equations.	

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