FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2023

(Supplementary – 2018 Admission)

PHYSICS

APHY5B06T: ELECTRODYNAMICS-II

Time: 3 Hours   **Maximum Marks: 80**

SECTION A: Short Answer: Answer *all* questions. Each carries 1 mark.

1. What is lens's law in electromagnetism?
2. Give the theory of Ballistic Galvanometer.
3. What is Q factor?
4. Explain superposition theorem for circuit.
5. What is displacement current?
6. Give the torque on a current loop in uniform magnetic field.
7. State maximum powertransfer theorem.
8. Give the wave equation for E and B.

(8 x 1 = 8 Marks)

SECTION B: Paragraph questions: Answer any *six* questions. Each carries 4 marks.

9. Explain mutual induction.
10. Describe polarization of em waves.
11. Explain growth of current through LR circuit.
12. Describe AC through a resistor circuit.
13. Explain energy in magnetic field.
14. Describe reflection and transmission of em waves at normal incidence.
15. Discuss measurement of high resistance by leakage.
16. Describe J operator in AC.
17. How did Maxwell modify Ampere's circuital law?

(6 x 4 = 24 Marks)

SECTION C: Problems: Answer any *eight* questions. Each carries 4 marks.

18. A capacitor is charged by DC supply through a resistance of 2 mega ohms. If it takes 0.5 seconds for the charge to reach three quarters of its final value, what is the capacitance of the capacitor?

19. In an oscillatory circuit L = 0.5 H and C = 0.002 microfarad. What is the maximum value of resistance for the circuit to be oscillatory?

20. A capacitor of capacitance 0.02 microfarad is discharged through an inductance of 8 mH and resistance 1000 ohms. Calculate the frequency of oscillation. What is the additional resistance required so that oscillations are just stopped?

(PTO)

21. How the phase angle in the above problem can be reduced to zero without altering the current when the relay is operated from the same source?

22. An alternating voltage of 100 V at a frequency of 25 Hz is applied to a circuit having a resistance 1.50 ohm and an inductance of 0.01 Henry in series. Find the current flowing.

23. An A.C circuit has R = 42 Ω and inductive reactance 32. Find the impedance of the circuit when R and I are in series.

24. Find the self-inductance of a toroidal coil with circular cross sector of radius 5cm and having 600 turns/cm and circumference 30cm.

25. A parallel plate air capacitor has circular plates of radius 5 cm. It is being charged so that the electric field varies at a rate of 10^{12} V/m/sec. Find the displacement current in it.

26. The electric field vector of a plane electromagnetic wave oscillates sinusoidally at a frequency of 4.5×10^{10} Hz. What is the wavelength?

27. An electromagnetic wave is travelling in a medium at a speed of 2×10^9 m/s. If the relative permeability of the medium is one, find its relative permittivity.

28. Find the Thevenin's equivalent circuit of the network shown.
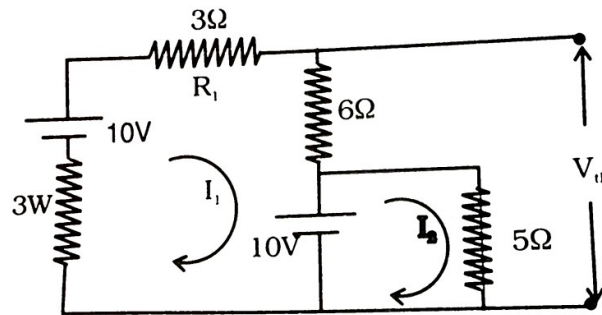
29. A radio can tune itself to any station in 6 MHz to 18 MHz band. What is the corresponding wavelength band?

(8 x 4 = 32 Marks)

SECTION D: Long answer: Answer any *two* questions. Each carries 8 marks.

30. State and explain Faraday's law of electromagnetic induction. Explain Faraday's experiment for the law of electromagnetic induction.
31. Discuss Monochromatic energy and momentum in electromagnetic waves.
32. What is LCR series circuit? Describe current through LCR series circuit. What is resonance of LCR series circuit?
33. Explain Thevenin's theorem. How do you Thevenize a circuit.

(2 x 8 = 16 Marks)