

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2022

(Supplementary – 2017 & 2018 Admissions)

PHYSICS

APHY5B06T: ELECTRODYNAMICS - II

Time: 3 Hours

Maximum Marks: 80

SECTION A: Answer all questions. Each carries 1 mark

1. What is back e.m.f?
2. Discuss wave equation in one dimension.
3. Give the theory of moving coil galvanometer
4. What is Q factor?
5. Write down how Maxwell modified ampere's circuital law?
6. Describe AC through a resistor circuit.
7. Write down Kirchhoff's current rule.
8. State faraday's law of electromagnetic induction.

(8 × 1 = 8 Marks)

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

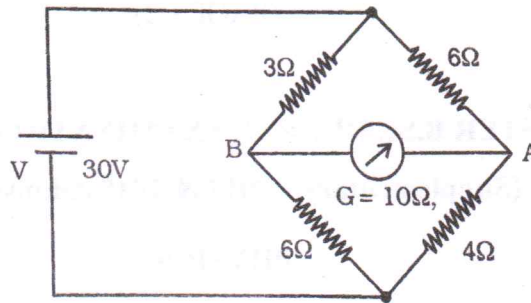
9. Discuss boundary conditions using Maxwell's equations.
10. Explain Faraday's experiment for the law of electromagnetic induction.
11. Discuss monochromatic plane waves.
12. Describe sinusoidal waves.
13. Explain growth of current through CR circuit.
14. Obtain torque on current loop in uniform magnetic field.
15. Describe Anderson method.
16. What is LCR series circuit? Describe current through LCR series circuit.
17. Derive the expression for mutual induction between two coils.

(6 × 4 = 24 Marks)

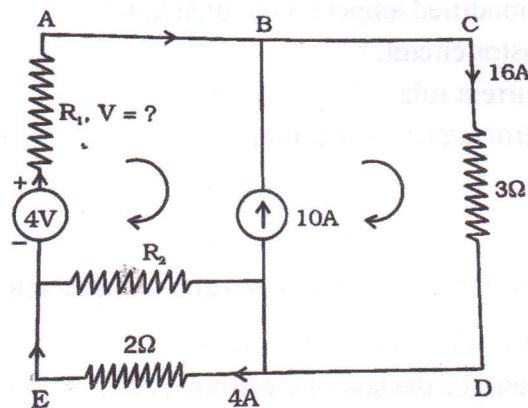
SECTION C: Answer any eight questions. Each carries 4 marks

18. Find the self-inductance of a toroidal coil with circular cross sector of radius 5cm and having 500 turns/cm and circumference 20cm.
19. The electric field vector of a plane electromagnetic wave oscillates sinusoidal at a frequency of 4.5×10^{12} Hz. What is the wavelength?
20. An air filled capacitor has plates of 1 pF capacitance. If the electric field in the air gap changes at a rate of 10^{12} V m⁻¹s⁻¹, what is displacement current?
21. Deduce the signs of e.m.f and voltage drops in the following circuit and find unknown potential.

(PTO)



22. An AC series circuit contains a 42 resistance and a 32 inductive reactance. What is the impedance of the circuit?
23. An electromagnetic wave is travelling in a medium at a speed of 2×10^8 m/s. If the relative permeability of the medium is one, find its relative permittivity.
24. An alternating e.m.f. of 10 V and 100 cycles per second is applied to a 5H choke having ohm resistance of 2000. Find the power factor of the coil
25. Using Thevenin's theorem find the current through the galvanometer in the following circuit.



26. An e.m.f. 10 volt is applied to a circuit having a resistance of 10 ohms and an inductance of 0.5 henry. Find the time required by the current to attain 63.2% of its final value. What is the time constant of the circuit
27. An inductance of 500 mH and a resistance of 5 ohms are connected in series with an e.m.f of 10 volts. Find the final current. If now the cell is removed and the two terminals are connected together, find the current after 0.05 sec.
28. A radio can tune itself to any station in 5 MHz to 15 MHz band. What is the corresponding wavelength band?
29. If the frequency of the electric field vector is 3.4×10^{10} hz in wave, what is its wavelength?

(8 × 4 = 32 Marks)

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

30. Describe energy in magnetic field in electrodynamics
31. Explain propagation of em waves in linear media.
32. Describe AC through a LR circuit.
33. Explain Norton's theorem with example.

(2 × 8 = 16 Marks)