K25U 0173

Reg. No. : .....

Name : .....

Sixth Semester B.Sc. Degree (C.B.C.S.S.-OBE – Regular/Supplementary/ Improvement) Examination, April 2025
(2019 to 2022 Admissions)
CORE COURSE IN PHYSICS
6B13PHY : Electrodynamics and Circuit Theory

Time : 3 Hours Max. Marks : 40

SECTION – A

Short answer six questions. Answer **all** questions. **Each** carry **1** mark.

1. The direction in which electromagnetic waves propagate is given by _____
2. The SI Unit of self inductance is _____
3. Write Ampere's Law with Maxwell's correction.
4. In electromagnetic waves the phase difference between electric field vector and magnetic field vector is _____
5. An ideal current source has _____ resistance.
6. The ratio of L/R in the series LR circuit is called _____ **(6×1=6)**

SECTION – B

Short answer eight questions. Answer **any six**. **Each** carry **2** marks.

7. Explain flux rule for motional emf.
8. Does the "magnetic charge" exist ? Explain.
9. What do you understand by Gauge transformations ?

P.T.O.

10. Write down the general wave equation and its solution.

11. What is a polarisation vector ? Explain its significance.

12. Explain intensity of an electromagnetic wave. Give an expression for intensity in terms of Poynting vector.

13. Write Kirchhoff's Laws in network theory.

14. Give the applications of maximum power transfer theorem. **(6×2=12)**

SECTION – C

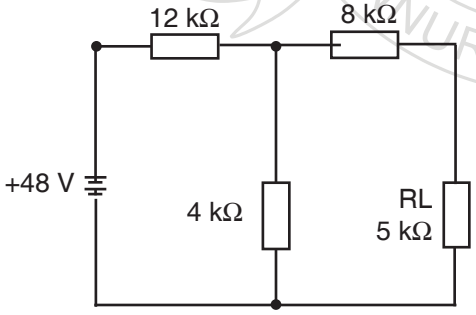
Problem six questions. Answer **any four**. **Each** carry **3** marks.

15. A wire cuts across a flux of 0.2×10^{-2} weber in 0.12 second. What is the emf induced in the wire ?

16. A coil of resistance 10 Ω and 1000 turns have the magnetic flux line of 5.5×10^{-4} weber. If the magnetic flux changed to 5×10^{-4} weber in 0.1 second, then calculate the induced charge in coil.

17. An electromagnetic wave propagate in space along the x-direction, the magnetic field oscillates at a frequency of 10^{10} Hz and has an amplitude of 10^{-5} T, acting along the y-direction. Compute the wavelength of the wave. Also write down the expression for electric field in this case.

18. Find V_{TH}, R_{TH} and the load current I_L flowing through and load voltage across the load resistor in the circuit below using Thevenin's Theorem.



19. A capacitor is charged by a DC supply through a resistance of 2 MΩ. If it takes 0.5 s to reach half of its final value, what is the capacitance of the capacitor ?

20. A transmitter consists of LC circuit with an inductance of 1 μH and a capacitance of 1 μF. What is the wavelength of the electromagnetic waves it emits ? **(4×3=12)**

SECTION – D

Long essay four questions. Answer **any two**. **Each** carry **5** marks.

21. a) Obtain Maxwell's equations in matter.

    b) Discuss Electromagnetic boundary conditions.

22. Establish a relation between reflection and transmission coefficients if an electromagnetic plane wave (of frequency ω, travelling in z-direction and polarized along x-direction) is incident perpendicular on the boundary of a linear media.

23. State and prove reciprocity theorem. Explain with an example.

24. Derive an expression for instantaneous current in a series LCR circuit and explain the terms : (a) resonance and (b) quality factor. **(2×5=10)**

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