**22U403** (Pages: 2) Name: .....

Reg.No: .....

**FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2024**

(CBCSS - UG)

(Regular/Supplementary/Improvement)

**CC19U PHY4 B04 / CC20U PHY4 B04 - ELECTRODYNAMICS - II**

(Physics - Core Course)

(2019 Admission onwards)

Time : 2.00 Hours Maximum : 60 Marks

Credit : 3

**Part A** (Short answer questions)

Answer ***all*** questions. Each question carries 2 marks.

1. What is meant by electromotive force?
2. State Faraday's law of electromagnetic induction.
3. Write down the wave equations of electromagnetic waves in a free space and explain symbols.
4. What is meant by polarisation of a wave?
5. Discuss the energy carried by an electromagnetic wave.
6. Write a short note on potential formulation in electrodynamics.
7. Set up the differential equation for an L-R circuit when the battery is switched on.
8. Explain the term sharpness of resonance. How does it depend on the resistance of the circuit?
9. Give an expression for time average power in AC circuits.
10. State Superposition theorem in network analysis.
11. State Thevanin's theorem.
12. State maximum power transfer theorem.

**(Ceiling: 20 Marks)**

**Part B** (Short essay questions - Paragraph)

Answer ***all*** questions. Each question carries 5 marks.

13. Derive the Maxwell's equation inside a polarised matter.
14. Derive boundary condition for tangential component of electric field at a boundary separating two media.

15. A plane wave $(E = 100sin(\omega t - 10x))$ V/m in a loss-less medium with $(\mu = 4\mu_0)$, $(\epsilon = 4\epsilon_0)$strikes another medium having $(\mu = 9\mu_0)$, $(\epsilon = \epsilon_0)$with a normal incidence. Find the reflection coefficient.

16. In an LCR circuit C = 0.2$\mu$ F, L = 0.05H and R = 100$\Omega$. Check whether it is oscillatory or not. Calculate the frequency of the circuit.

17. What is a ballistic galvanometer? With the help of a schematic diagram, explain the capability of the instrument for detecting a current flow.

18. Derive an expression for effective admittance in parallel LCR combination.

19. Illustrate with an example how Kirchoff's laws are used to analyse electrical circuits?

**(Ceiling: 30 Marks)**

**Part C** (Essay questions)

Answer any ***one*** question. The question carries 10 marks.

20. Write down the Maxwell's equation both in the differential and intergral form. Explain the significance of each equation.

21. Derive the expresions for reflection and transmission coefficients at normal incidence.

**(1 × 10 = 10 Marks)**

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