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QP CODE: 25003389



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# B.Sc DEGREE (CBCS) SPECIAL REAPPEARANCE EXAMINATIONS, FEBRUARY 2025

**Fifth Semester** 

# **CORE COURSE - PH5CRT05 - ELECTRICITY AND ELECTRODYNAMICS**

Common for B.Sc Physics Model I, B.Sc Physics Model II Applied Electronics, B.Sc Physics Model II Computer Applications & B.Sc Physics Model III Electronic Equipment Maintenance

2022 Admission Only

CE21C9F3

Time: 3 Hours

Max. Marks : 60

## Part A

Answer any **ten** questions. Each question carries **1** mark.

- 1. Why it is dangerous to connect a coil of inductance to DC source?
- 2. State and explain Kirchoff's laws.
- 3. What do you mean by a varying current?
- 4. Explain Gradient of a scalar field.
- 5. State and explain Stokes theorem.
- 6. Distinguish between Scalar and vector fields.
- 7. Give Gauss's law in differential form.
- 8. Prove that the tangential component of the electric field is continous across a boundary.
- 9. Show that work done by magnetic field is zero.
- 10. Distinguish between scalar and vector potentials.
- 11. State Faraday's Law of Electromagnetic Induction.
- 12. What are the essential properties of electromagnetic waves?

(10×1=10)

### Part B

Answer any **six** questions. Each question carries **5** marks.



- 13. Derive the phase relationship between voltage and current in an AC circuit containing C and R.
- <sup>14.</sup> A series LCR circuit with L= 25mH and C= 75 $\mu$ F has a lagging phase angle of 25<sup>0</sup> at  $\omega$ = 200rads<sup>-1</sup>. At what frequency will the phase angle be 25<sup>0</sup> leading? Find also  $\omega_0$
- 15. A 60V, 10W lamp is to be run on 100V, 60 cycles main. Calculate the inductance of the choke coil required in the circuit. How much pure resistance is required would be required to achieve the same result?
- 16. Thermo emf in a circuit in which the cold junction is at  $0^{0}$ C and the hot junction at  $t^{0}$ C is found to be  $3.5\mu$ V at  $100^{0}$ C and  $9\mu$ V at  $200^{0}$ C. Assuming the thermo emf to be governed by the equation E = at + bt<sup>2</sup>, find the constants a and b?
- 17. The distance between the electron and proton in the hydrogen atom is 5.35 x 10<sup>-9</sup> cm. Compare the magnitude of the Electrical and Gravitational Forces between these particles?
- 18. If a charge is allowed to move in the direction in the vicinity of a current carrying rod such that current flows in same direction as the outside charge is moving. Find the work done by the magnetic field.
- 19. State and explain Ampere's Circuital Law.
- 20. State Lenz's law and Flemming's right hand rule. Distinguish between lenz's law and Fleming's right hand rule.
- 21. Explain the terms reflection and transmission in electrodynamics.

(6×5=30)

### Part C

Answer any **two** questions.

Each question carries **10** marks.

- 22. Develop the phase relation between voltage and current in a circuit which contain inductor only, capacitor only and resistor only.
- 23. A charged condenser discharges through an inductance and a resistance. Discuss the nature of the discharge with special reference to oscillatory discharge.
- 24. What is electric potential energy? Obtain an expression for the potential energy of a group of point charge distribution.
- 25. State and explain Poynting's theorem. Explain its significance in electrodynamics.

(2×10=20)

