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21551 (Pages : 3) Name.....

Reg. No.....

FOURTH SEMESTER (CBCSS—UG) DEGREE EXAMINATION APRIL 2022

Physics/Applied Physics

PHY4B04/APH4B04—ELECTRODYNAMICS—II

(2019 Admission onwards)

ime : Two Hours Maximum : 60 Marks

Section A

Answer at least **eight** *questions.*

Each question carries 3 *marks.*

All questions can be attended.

Overall Ceiling 24.

1. Explain Ohm's law. Discuss the terms involved.
2. What do you mean by the term displacement current ? Give an expression for the same.
3. Illustrate the symmetry of Maxwell's equations for E and B in the absence of the charge and current density terms.
4. What is Poynting vector ? Give an expression for the same.
5. Give the wave equation for the magnetic field vector B in free space and explain the terms involved. Write down the expression for the speed of the wave.
6. What do you mean by a monochromatic plane wave ? Give its general form.
7. Write down the boundary conditions for the magnetic field vector B at an interface separating two linear media of permittivities ε_1 and ε_2 and permeabilities μ_1 and μ_2.
8. Distinguish between initiation and transition transient currents.
9. What do you mean by wattles current ?
10. Give Kirchhof's mesh law.
11. What are the features of an ideal constant voltage source ?
12. What is reciprocity theorem ?

(8 × 3 = 24 marks)

Turn over

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Section B

Answer at least **five** *questions.*

Each question carries 5 marks.

All questions can be attended.

Overall Ceiling 25.

13. Obtain an expression for the energy stored in a magnetic field due to a current.

14. Write down the integral forms of Maxwell's equations and explain the terms involved.

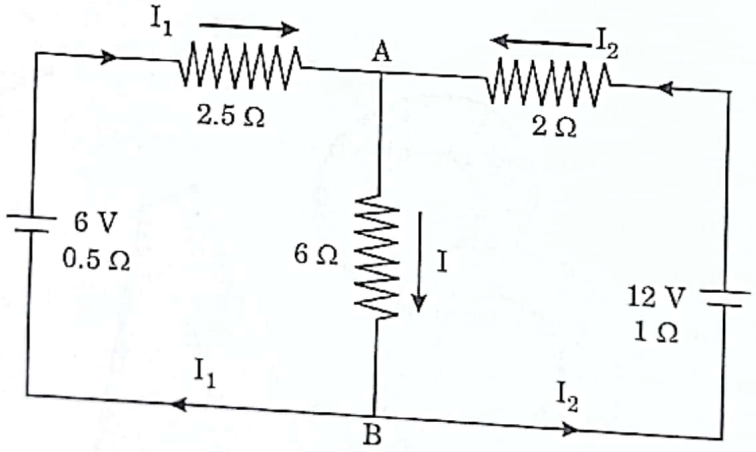
15. Prove that for a plane monochromatic wave, the Poynting vector is the energy density velocity of the wave.

16. Give the fundamental laws of geometrical optics considering the reflection and transr electromagnetic waves at a boundary separating two linear media.

17. A circuit consists of a non-inductive resistance of 50 Ω, an inductance of 0.3 H and a resi 2 Ω and a capacitor of 40 μF in series and is supplied with 200 V at 50 Hz. Find the imp the circuit.

18. An alternating voltage of 10 V at 100 Hz is applied to a choke of inductance 5 H and r 200 Ω. Determine the power factor of the coil.

19. For the circuit shown below, find the currents flowing in all branches and the voltage a 6 Q resistor using superposition theorem.



(5 × 5 = 25

Section C

Answer any **one** *question.*

The question carries 11 *marks.*

20. Obtain the wave equation for the E and B vectors in free space. Using a plane wave solution show that the electromagnetic waves are transverse in nature and the E and B vectors are in phase and mutually perpendicular.

21. Explain the construction and working principle of a ballistic galvanometer. Obtain the relation connecting the charge flowing and the ballistic throw of the galvanometer.

(1 × 11 = 11 marks)