18U506 (Pages: 2) Name: ……..

Reg. No…….

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2020

(CUCBCSS-UG)

(Regular/Supplementary/Improvement)

CC15U PH5 B06 - ELECTRODYNAMICS - II

(Physics- Core Course)

(2015 Admission onwards)

Time: Three Hours Maximum: 80 Marks

Section A

Answer ***all*** questions. Each question carries 1 mark.

1. The relation between magnetization and bound current is _____.
2. Magnetic monopoles do not exist. (True/False)
3. The relation between the vectors magnetic field intensity **H**, magnetic flux density **B** and magnetization **M** is _____.
4. The expression for classical wave equation is _____.
5. The time constant of an L-R circuits is the time taken by the current to grow from zero to _____ times the maximum of current.
6. The moment of inertia of moving system of a B.G. should be _____.
7. A parallel resonant circuit is also known as _____.
8. A capacitor blocks direct current since its _____ is zero.
9. An ideal constant current source has zero resistance. (True/False)
10. A source transfers the maximum power to a load when _____.

(10 x 1 = 10 Marks)

Section B

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

11. State Faraday's law of electromagnetic induction.
12. Give Maxwell's modification of ampere's law.
13. Obtain the wave equation for magnetic field.
14. Define the terms phase and phase constant of a sinusoidal wave.
15. Write down the expression for the instantaneous charge while charging a capacitor C through a resistor R using a voltage source V_o.
16. What is resonance in an a.c. circuit?
17. What is an ideal constant current source?

(7 x 2 = 14 Marks)

Section C

Answer any ***five*** questions. Each question carries 4 marks.

18. Comment on the symmetry of Maxwell's equations in free space.
19. Obtain Neumann formula for mutual induction. Discuss its importance.

20. Derive the expression for energy density and momentum density of an electromagnetic wave.
21. State and prove Poynting's theorem.
22. Obtain an expression for the growth of current through a circuit containing a resistor and an inductor when a DC source is applied.
23. Derive an expression for instantaneous current in an LCR a.c. circuit.
24. State and prove the maximum power transfer theorem.

(5 x 4 = 20 Marks)

Section D

Problems. Write all relevant formulas, all important steps carry separate marks.

Answer any ***four*** questions. Each question carries 4 marks.

25. Find the displacement current in a parallel plate air capacitor which has circular plates of radius 4 cm and it is being charged so that the electric field varies at a rate of 1012 V/ms.
26. Obtain the expression for the self inductance of a toroidal coil of circular cross section.
27. Earth receives about 1500 W/m^2 radiant energy from the sun. Assuming the radiation to be plane polarized, compute the magnitude of E and B vectors.
28. A capacitor of capacity 0.6 μF is discharged through a resistance of 12 MΩ. Find the time taken for half the charge on the capacitor to escape.
29. An electric apparatus marked 50 V DC consumes a current of 5 A. It is connected to a 230 Volt, 50 Hz AC mains. Calculate the inductance of the choke.
30. Find out the reflection and transmission coefficients for glass-air interface (n_1 = 1.5 and n_2 = 1) for normal incidence.
31. A linear active network has a voltage source of 12V and internal resistance of 2Ω. Find out (a) the value of the load for maximum power transfer (b) maximum useful current and (c) maximum power transferred.

(4 x 4 = 16 Marks)

Section E

Answer any ***two*** questions. Each question carries l0 marks.

32. Derive the boundary conditions for **E**, **B**, **D** and **H** at a surface which carries charge density 'σ' and current density **K**, which separates two media.
33. Explain the reflection and transmission at normal incidence for electromagnetic waves.
34. Explain the theory of measurement of high resistance by the method of leakage.
35. Discuss the measurement of self inductance of a coil using Anderson Bridge.

(2 x 10 = 20 Marks)

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