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(Pages : 4)

Name.....

Reg. No.....

FIFTH SEMESTER B.Sc. DEGREE (SUPPLEMENTARY/IMPROVEMENT)
EXAMINATION, NOVEMBER 2016

(UG—CCSS)

Physics

PH 5B 09/AP 5B 11—ELECTRODYNAMICS—II

(2009-2012 Admissions)

Time : Three Hours

Maximum : 30 Weightage

Part A

Answer all questions.

Each question carries $\frac{1}{4}$ weightage.

- A loop is rotating about the y-axis in a magnetic field $B = B_0 \sin \omega t \hat{a}_x$ Wb/m². The voltage induced in the loop is due to :
 - Motional e.m.f.
 - Transformer e.m.f.
 - Combination of motional and transformer e.m.f.
 - None of these.
- One of the following is not a source of magnetostatic field :
 - Accelerated charge.
 - Permanent magnet.
 - D.C. current in a wire.
 - Charged disk rotating at uniform speed.
- In a good conductor _____ and _____ are in _____.
- AC measuring instrument measures _____ value.
- Power factor is given by the ratio of circuit resistance and :
 - Current.
 - Impedance.
 - Voltage.
 - Power.
- The selectivity of a series circuit can be increased by :
 - Increasing the Q-value.
 - Reducing the resonant frequency.
 - Increasing the resistance.
 - Increasing the bandwidth.

Turn over

19. Define virtual ampere and virtual volt.
20. What are the characteristics of an a.c. sine wave?
21. What is displacement current?

(9 × 1 = 9 weightage)

Part C

*Answer any five questions.
Each question carries 2 weightage.*

22. Obtain Maxwell's equations for static EM fields.
23. Obtain the Helmholtz equations or vector wave equations in the case of a lossy dielectric.
24. A condenser of capacity 0.5 MF is discharged through a resistance of 10 megohms. Find the time taken for half the charge on the condenser to escape.
25. A rectangular coil of area $5 \times 10^{-4} \text{ m}^2$ and 60 turns is pivoted about one of its vertical sides. The coil is in a radial horizontal field of 90 gauss. What is the torsional constant of the hair spring connected to the coil if a current of 0.2 Ma produces an angular deflection of 18 degrees (1 gauss = 10^{-4} T).
26. A solenoid of length 0.5 m. has four layers of winding 350 turns each. The radius of the lower layer is 1.4 cm. Calculate the magnitude of B (a) Near the centre of the solenoid, (b) Near the ends (c) outside the solenoid. When a current of 6.0 Amp flows? $\mu_0 = 4\pi \times 10^{-7}$.
27. The self inductance of a coil is 3.0 mH. A current of 5 A flows through it. The current is reduced to zero in 0.1s when switched off. Calculate the induced e.m.f.
28. Calculate the force of repulsion between a coil carrying a.c. and a neighbouring conductor.

(5 × 2 = 10 weightage)

Part D

*Answer any two questions.
Each question carries 4 weightage.*

29. Discuss the problem of the discharge of a condenser through R and L. Obtain the condition for oscillation.
30. Draw the circuit of an Anderson's AC bridge. Obtain the condition for the bridge to be balanced.

31. Derive expressions for the electric field component and magnetic field component for the reflection of a plane wave.
32. State and prove : (a) Norton's theorem ; (b) Maximum power transfer theorem.

(2 × 4 = 8 weightage)