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Name.................................

Reg. No.................................

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2014

(UG–CCSS)

Core Course

Physics/Applied Physics

PH 5B 09/AP 5B 11—ELECTRODYNAMICS II

Time : Three Hours

Maximum : 30 Weightage

Part A

*Answer **all** questions.*
Each question carries ¼ weightage.

1. The law of electromagnetic induction has been used in the construction of :

    (a) Electro generator.　　　　　(b) Galvanometer.

    (c) Ammeter.　　　　　　　　　(d) Electric motor.

2. An inductor may store energy in :

    (a) Electric field　　　　　　　(b) Its coils.

    (c) magnetic field　　　　　　　(d) Both electric and magnetic fields

3. The displacement current is related to the —————.

4. $1/\sqrt{\mu E}$ has the dimensions of————

5. Inductive reactance $L\omega$ of a coil is expressed as —————.

    (a) Ampere.　　　　　　　　　(b) Ohm.

    (c) mho.　　　　　　　　　　　(d) Heber.

6. In an LCR circuit the inductance and capacitance are doubled, then the resonant frequency of the circuit :

    (a) Decreases to half.　　　　　(b) Is doubled.

    (c) Increases 4 fold.　　　　　　(d) Increases 8 fold.

7. The displacement current flows in the dielectric of a capacitor when the p.d across the plates :

    (a) Increases with time.　　　　(b) Decreases with time.

    (c) Neither increases nor decreases.　　(d) Increases and decreases with time.

8. Electromagnetic waves :

    (a) are polarized.　　　　　　　(b) are not polarized.

    (c) are longitudinal.　　　　　　(d) longitudinal and non polarized.

Turn over

9. The current through a coil of wire when connected to a 200V, 50HZ supply is 2A. If the po[w]
    consumed is 200W/ the power factor is

    (a)   2.   (b)   1.

    (c)   0.5.   (d)   zero.

10. The self inductance of a coil is measured using :

    (a)   Wheatstone's bridge.   (b)   Anderson bridge.

    (c)   Metre bridge.   (d)   Potentiometer.

11. While applying Kirchoff's laws/the assumed direction of current flow is :

    (a)   clockwise.   (b)   anti-clockwise.

    (c)   either clockwise *or* left to right.   (d)   None of the above.

12. Superposition theorem can be applied only to circuit having ————— elements.

    (a)   Linear bilateral.   (b)   Non linear.

    (c)   Passive.   (d)   Resistive.

                                                            $(12 \times \frac{1}{4} = 3$ weightag[e]

Part B

Answer all questions.
Each question carries 1 weightage.

13. State Faraday's law of electromagnetic induction.

14. Give Maxwell's modification of ampere's law.

15. Give Maxwell's equation for a region of finite conductivity.

16. What is Phase velocity of an electromagnetic wave ?

17. Define inductive reactance and capacitance reactance.

18. What is a BG ? How are eddy currents reduced in BG ?

19. What are the characteristics of an AC sine wave?

20. State and explain Kirchoff's current law.

21. What is an ideal constant current source ?

                                                            $(9 \times 1 = 9$ weightag[e]

Part C

Answer any five questions.
Each question carries 2 weightage.

22. Derive an expression for the energy stored in an inductance. Calculate the energy of an induct[or]
    having an inductance of 60 mH when a current of 2A flows through it.

23. In a plane electromagnetic wave the electric field oscillates sinusoidally at a frequency of 20m[h]
    and amplitude 48V/m. What is the wavelength of the wave ? What is the amplitude of the oscillati[ng]
    magnetic field ?

24. State and prove Poynting's theorem.

25. An alternating current is represented by I = 141.4 sin 628t. Calculate : (a) its frequency ; (b) rms value ; (c) average value.

26. A sinusoidal voltage V(t) = 200 sin 1000t is applied across a pure inductance of 0.02H. Determine : (a) the current $i(t)$; (b) Instant power ; (c) average power consumed.

27. An electric lamp marked 100 volts DC consumes a current of 10 amps. It is connected to a 200 Volt 50 cycles 1 sec AC mains. Calculate the inductance of the choke.

28. State and prove the maximum power transfer theorem.

(5 × 2 = 10 weightage)

Part D

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

29. Derive Maxwell's equations in an isotropic dielectric medium.

30. Describe the experimental method to determine the change sensitiveness of BG using a standard condenser and Hibbert's magnetic standard.

31. Derive an expression for the e.m.f. and impedance of an AC series resonant circuit.

(2 × 4 = 8 weightage)