D 50729

Name..

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

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2013

(UG–CCSS)

Physics—Core Course

PH 5B 09/AP 5B 11—ELECTRODYNAMICS–II

(Common for Applied Physics)

Time : Three Hours

Maximum : 30 Weightage

Section A

Answer all questions.

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

1. The magnetic flux density at the end of a one meter long solenoid carrying current I amp and having N turn will be :

    (a) P.NI.

    (b) $\dfrac{P.NI}{\sqrt{4R^2 + I^2}}$.

    (c) $\dfrac{P.NI}{2}$.

    (d) $\dfrac{P.NI}{\sqrt{R^2 + I^2}}$.

2. The ratio of the intensity of magnetic field at the centre of a very long solenoid to that at the extreme ends is :

    (a) 2.

    (b) $\frac{1}{2}$.

    (c) 4.

    (d) $\frac{1}{4}$.

3. Which of the following is correct ?

    (a) $D = \Sigma \bar{E}$.

    (b) $\nabla \dot{V} = -\vec{E}$.

    (c) $\vec{J} = \sigma \vec{E}$.

    (d) All are correct.

4. The direction of propagation of electromagnetic wave is given by :

    (a) Vector E.

    (b) Vector M.

    (c) Vector (E × B).

    (d) None.

Turn over

5. At frequence above resonance, impedance is :

   (a) Inductive.
   (b) Capacitive.
   (c) Resistive.
   (d) None of these.

6. Quality factor Q of a coil is :

   (a) $Q = \dfrac{WL}{R}$.
   (b) $Q = \dfrac{R}{WL}$.
   (c) $Q = WLR$.
   (d) $Q = \dfrac{1}{WLR}$.

7. Thevenin's and Norten's theorems can be applied to networks with :

   (a) DC source only.
   (b) AC source only.
   (c) Both DC and AC.
   (d) None of these.

8. Local current can be found by applying to the Nortonised circuit :

   (a) Krichhoff's voltage law.
   (b) Node analysis technique.
   (c) Superposition theorem.
   (d) None of these.

9. The law of electromagnetic induction was given by :

   (a) Faraday.
   (b) Lenz.
   (c) Fleming.
   (d) Nouman.

10. A coil does not consume any power it, should be :

    (a) Resistive.
    (b) Inductive.
    (c) Capacitive.
    (d) None of the above.

11. In LCR circuit if $\dfrac{1}{LC} < \dfrac{R^2}{4L^2}$, the circuit will be :

    (a) Oscillating.
    (b) Dead beat.
    (c) Critically damped.
    (d) None of the above.

12. State True/False :

    "Retarded potential is due to the fact that the war propagation is not an instance phenomenon".

    $(12 \times \frac{1}{4} = 3 \text{ weightage})$

Section B

*Answer **all** questions.*

Each question carries 1 weightage.

13. Discuss Faraday's laws of electromagnetic induction.

14. State and explain Ampere's law.

15. Write down an expression for waves in one dimension.

16. Show that curl of electric field is zero.

17. Explain the statement 'Magnetic force does no work'.

18. What is meant by electromotive force ?

19. Define polarising vector.

20. How to thevenize a given circuit ?

21. State and explain Kirchhoff's laws.

(9 × 1 = 9 weightage)

Section C

*Answer any **five** questions.*

Each question carries 2 weightage.

22. Find the self-inductance of a toroidal coil with rectangular cross-section carries a total of N turns.

23. Give a brief account of magnetic charge.

24. Show that the energy flux density transported by the fields is given by $\dfrac{1}{P_0}(E \times B)$.

25. A LCR circuit is critically damped with L = 0.2 H and R = 100 Ω. What is the value of C ?

26. A steady e.m.f. of 20 V applied to a series circuit containing 5 Ω resistance and 1 H inductance. Calculate the current after 0.2 s.

27. Discuss the use of J operation study of A.C. circuits.

28. With suitable example, explain the solution of simultaneous equations using determinants.

(5 × 2 = 10 weightage)

Turn over

Section D

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

29. Explain the method of solving alternating current problems with the aid of complex quantities. Apply the same to a resonant circuit consisting of a capacitance C in parallel with a coil of inductance L and resistance **R**.

30. With necessary theory, describe an experiment to determine charge sensitiveness of BG using a standard condenser and HMS.

31. Describe with relevant theory Anderson bridge for determination of self inductance.

$(2 \times 4 = 8 \text{ weightage})$