

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2011

(CCSS)

Physics—Core Course

PH5B09—ELECTRODYNAMICS—II

Time : Three Hours

Maximum Weightage : 30

Section A

Answer all questions.

1. Express for Ohm's law is _____.
2. A changing electric field induces a _____.
3. The expression for continuity equation is _____.
4. The displacement current is given by _____.
5. The expression for classical wave equation is _____.
6. The wave number is related to the wavelength by the equation _____.
7. The expression for Ampere-Maxwell relation is _____.
8. The time constant of an L-R circuits is the time taken by the current to grow from 0 to _____ times the maximum of current.
 - (a) 0.5.
 - (b) 0.632.
 - (c) 2.
 - (d) 0.9.
9. The Superposition theorem is essentially based on the concept of :
 - (a) duality.
 - (b) linearity.
 - (c) reciprocity.
 - (d) non-linearity.
10. A half-cycle average voltage of 12 V is equal to what r.m.s. voltage ?
 - (a) 13.33 V.
 - (b) 8.48 V.
 - (c) 18.84 V.
 - (d) 7.64 V.
11. If the r.m.s. current through a 4.7 k resistor is 4 mA, the peak voltage drop across the resistor is :
 - (a) 4 V.
 - (b) 18.8 V.
 - (c) 26.6 V.
 - (d) 2.66 V.

Turn over

12. A sinusoidal current has an r.m.s. value of 14 mA. The peak-to-peak value is :
- (a) 45.12 mA. (b) 16 mA.
(c) 39.6 mA. (d) 22.6 mA.

(12 × ¼ = 3 wei

Section B

All questions are compulsory.

13. Explain motional e.m.f.
14. What are plane waves ?
15. What is the flux rule for motional e.m.f. ?
16. Derive the expression for instantaneous charge while charging a capacitor through R.
17. Distinguish between a constant current source and constant voltage source.
18. Obtain the differential form of Gauss law.
19. Obtain the wave equation for magnetic field.
20. What is resonance in an a.c. circuit ?
21. What is the principle behind a.c. bridges ?

(9 × 1 = 9 wei

Section C

Answer any five questions.

22. Two long cylinders (radii a and b) are separated by material of conductivity σ . If they are maintained at a potential difference V , what current flows from one to another in a length L ?
23. Derive an expression for refractive index in terms of dielectric constant.
24. A capacitor of capacitance $0.01 \mu\text{F}$ is first charged and then discharged through a resistor of 10 megaohm . Find the time the potential will take to fall half its original value.
25. State and explain superposition theorem.
26. Show that conductivity is proportional to density of moving charges and decreases with increase in temperature.
27. Compare series and parallel resonant circuits.
28. Obtain an expression for instantaneous current in an LCR a.c. circuit.

(5 × 2 = 10 wei

Section D

Answer any two questions.

1. Obtain Maxwell's equations in material medium.
2. Explain the theory of measurement of high resistance by the method of leakage.
3. State Thevenin and Norton's theorems. Explain the theorems using appropriate circuit diagram.
(2 × 4 = 8 weightage)