

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2017**Fourth Semester****Core Course—ELECTRICITY AND ELECTRODYNAMICS**

(For the programme : B.Sc. Physics—Model I, B.Sc. Physics—Model II, B.Sc. Physics—EEM, B.Sc. Physics—Instrumentation)

(2013 Admission onwards)

Time : Three Hours

Maximum Marks : 60

Part A

Answer all questions.

1 mark each.

1. Average power taken by a pure capacitor is _____.
2. Form factor is equal to peak factor in case of _____.
3. Under resonance condition the phase angle between voltage and current phases is _____.
4. For ideal tank circuit, the value of dynamic admittance is _____.
5. Time constant of LR series circuit is _____.
6. Poynting vector has the dimension _____.
7. Skin depth is proportional to _____ of σ .
8. In a delta network, each element has value R . The value of each element in an equivalent star network will be _____.

(8 × 1 = 8)

Part B

Answer any six questions.

2 marks each.

9. Obtain the RMS value of alternating current.
10. State and explain Thevenin's theorem.
11. What is the average current during one positive (or negative) half cycle of sinusoidal AC?
12. What is power factor?
13. Define the intensity of an electric field.

Turn over

14. What do you understand by surface charge of a conductor ?
15. What is the time constant of a series RC circuit ?
16. State the boundary conditions for the components of magnetic field.
17. What is Maxwell's modification of Ampere's circuital law ?
18. Discuss the merits of ballistic galvanometer.

(6 × 2 = 12)

Part C

*Answer any four questions.
4 marks each.*

19. If a battery of emf 100V is connected in series with an inductor of inductance 10mH, a capacitor of capacitance 0.005 μ F and a resistor of resistance 100 Ω , find the frequency of the oscillatory current and the final capacitor charge.
20. A coil of inductance 2 mH and resistance 15 Ω is connected in parallel with a capacitor of capacitance 0.001 μ F, find the frequency at which the current from an AC supply source to this circuit is minimum.
21. Differentiate star and delta connections.
22. The successive deflections to the right and left of the mean position in the case of a BG are 25.0, 24.9 and 24.8 respectively. Calculate the logarithmic decrement.
23. What is the capacitance required to produce a resonant frequency of 1MHz in a series LCR circuit containing an inductor of inductance 10mH and a resistor of resistance 10 Ω ?
24. An LR circuit consists of $L = 20$ mH and $R = 10\Omega$. Find the time taken to decrease the current to half of the maximum value.

(4 × 4 = 16)

Part D

*Answer any four questions.
12 marks each.*

25. Discuss the theory of LR circuit when alternating voltage is applied to it. Obtain expressions for the current and impedance of the circuit.
26. Write an essay on Ballistic Galvanometer.
27. Define scalar and vector potentials. Show that Maxwell's equations can be expressed as two coupled second order differential equations in terms of scalar and vector potentials.
28. Explain the propagation of monochromatic plane waves in vacuum.

(2 × 12 = 24)