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**Reg. No.....**

**Name.....**

**B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MAY 2024**

**Fourth Semester**

Core Course—ELECTRICITY AND ELECTRO DYNAMICS

(Common for B.Sc. Physics Model I, B.Sc. Physics Model II, B.Sc. Physics EEM, B.Sc. Physics—Instrumentation)

[2013—2016 Admissions]

Time : Three Hours Maximum Marks : 60

**Part A**

*Answer* **all** *questions.*
*Each question carries* 1 *mark.*

Fill up the blanks :

1. The smaller is the ———— constant the quicker is the discharge of the capacitor.
2. A voltage source with a series resistance is equivalent to a current source with same resistance in ————.
3. The ———— used in BG should have a large time period.
4. An ideal constant current source is expected to have infinite ———— resistance.
5. A practical constant voltage source is a voltage source with negligible ———— resistance.
6. Power ———— is the measure of energy to be spent in an ac circuit.
7. Magnetic ———— potential and magnetic flux density are having similar divergence and curl reactions.
8. Maxwell's equations predict the propagation of EM waves through free space with the velocity of ————.

(8 × 1 = 8)

**Part B**

*Answer any* **six** *questions.*
*Each question carries* 2 *marks.*

9. State the conditions for a MCG to be dead beat.
10. Draw the circuit diagram for the determination of a high resistance by leakage method.
11. What is meant by mean value of alternating EMF ?

**Turn over**

12. List the characteristics of LR series ac circuits.
13. Distinguish between pure inductive circuit and pure capacative circuit.
14. Write down the expression for the natural frequency of a LCR circuit.
15. State Norton's theorem.
16. Obtain the integral form of Poisson's equation.
17. Define the direction of a magnetic field.
18. Calculate the energy per unit volume stored in an electromagnetic field.

(6 × 2 = 12)

## Part C

*Answer any* **four** *questions.*
*Each question carries* 4 *marks.*

19. An inductance of 500 mH and resistance of 5 ohm are connected in series with an emf of 20 V. Find the steady value of the current. If the cell is removed and the terminals are connected together, find the current after 0.3 seconds.
20. The successive throws on the same side of the mean position, for an oscillating coil are 15, 14.9 and 14.8. Calculate the logarithmic decrement.
21. Prove that when maximum power is transferred impedance of the network viewed with respect to output terminals equals the load impedance.
22. Two identical drops are charged to the same potential V. Find the new potential if the two drops coalesce into one drop.
23. Derive the expression for energy stored in a parallel plate capacitor.
24. Prove that for glass-air interface for normal incidence, the reflection and transmission coefficients are 0.04 and 0.96 respectively.

(4 × 4 = 16)

## Part D

*Answer any* **two** *questions.*
*Each question carries* 12 *marks.*

25. Discuss the theory of BG. Give experimental support for the measurement of K.
26. Show that electric field is the negative gradient of electric potential and obtain Poisson's and Laplace's equation.
27. State and prove pointing theorem.
28. Obtain expressions for the average energy and momentum of an EM wave. What is intensity of the wave ?

(2 × 12 = 24)