19. (a) Write about reflections in the presence of capacitance terminations.

Or

(b) Describe electromagnetic interference in detail.

20. (a) Write a note on pacemakers.

Or

(b) Brief about electromagnetic hazards.

PART C — (3 × 10 = 30)

Answer any THREE questions.

21. Obtain the Laplace equation with detail description.

22. Derive the equation of continuity for time.

23. Explain in detail about the TEM waves between parallel panes and its impossibility in rectangular guides.

24. Discuss the distributed systems in detail and also compare it with Lumped circuits.

25. (a) What is electric eel? Describe the electric field of eel.

(b) Write a note on Axon.

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S.No. 6402 **P 22 ELCC 12**

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Electronics

ELECTROMAGNETIC THEORY

Time : Three hours Maximum : 75 marks

PART A — (20 Marks)

Answer ALL the questions.

I. (A) Choose the correct answer (5 × 1 = 5)

1. A capacitor is charged by a battery. The battery is removed and another identical uncharged capacitor is connected in parallel. The total electrostatic energy of the resulting system
   (a) increases by a factor of 4
   (b) decreases by a factor of 2
   (c) remains the same
   (d) increases by a factor of 2

2. If a coil placed in a uniform magnetic field then
   (a) an emf is induced in the coil
   (b) an induced current flows in the coil
   (c) no emf induced in the coil
   (d) Continuity equation

3. The cutoff wavelength in the TEM wave will be

(a) zero (b) negative

(c) positive (d) infinity

4. The key difference between circuit theory and transmission line theory is

(a) circuit elements (b) electrical size

(c) voltage (d) current

5. The shielding part of an axon in nervous system is

(a) Cytoplasm (b) rodes of Ranvier

(c) axon hillock (d) myelin sheath

(B) Fill in the blanks (5 × 1 = 5)

6. In free space, the Poisson's equation becomes_____ equation.

7. Whenever a conductor is placed in a varying magnetic field, an electromotive force is induced. It is stated by _____ law.

8. EM waves are generated by _____

9. Electrical circuits composed of lengths of transmission lines is called _____ circuits.

10. A device that send an electric pulse or shock to the heart to restore a normal heart beat in _____

II. Answer the following (5 × 2 = 10)

11. What is capacitance?

12. Write the Maxwell's equations.

13. What are transmission lines?

14. Define Knee frequency.

15. What are retinal optic fibers?

PART B — (5 × 5 = 25)

Answer ALL questions, Choosing either (a) or (b).

16. (a) Derive the divergence Theorem.

Or

(b) Discuss the electrostatic uniqueness theorem.

17. (a) Describe the Ampere's law and Ampere's force law.

Or

(b) Describe the analogies between electric and magnetic field.

18. (a) Analyse the wave equations for a conducting medium.

Or

(b) Write the theory on TE and TM waves.