



ST. FRANCIS DE SALES COLLEGE

A FRANSALIAN INSTITUTE OF HIGHER EDUCATION **AUTONOMOUS**

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END SEMESTER EXAMINATION – NOV/DEC 2025

PHYSICS - III SEMESTER BSC

25BSC34B: ELECTRICITY AND MAGNETISM

Time: 3 Hours

Max. Marks: 80

Instruction: Answer should be written completely in English.

SECTION-A

Answer any **TEN** questions. Each question carries **TWO** marks.

(10X2=20)

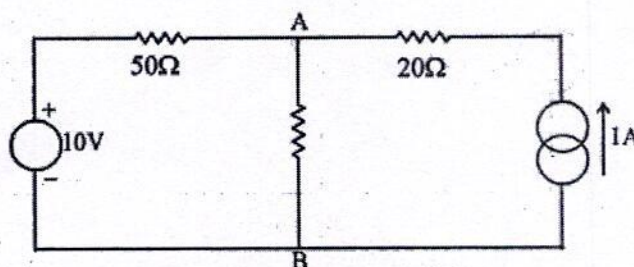
1. State Kirchhoff's current law.
2. State Norton's theorem
3. The discharge of capacitor through an inductor is oscillatory. Justify.
4. What is a current element? Write its significance.
5. Does Lenz's law in accordance with law of conservation of energy? Explain
6. Two parallel wires carrying current attract each other but two electron beams moving in the same direction repel each other. Why?
7. What is meant by scalar field & vector field?
8. When is the vector function irrotational?
9. Define skin depth.
10. Can thermoelectric currents cause trouble in circuits used for precise measurements?
11. Define RMS value of alternating current.
12. If the resistance of a series LCR circuit is doubled, what is the effect on the Q factor and bandwidth?

SECTION-B

Answer any **FOUR** questions. Each question carries **FIVE** marks.

(4X5=20)

13. Determine the voltage across the resistor between A and B in circuit by Norton's theorem.



14. A coil of self-inductance 10H is in series with a resistance of 100ohm connected 100V d.c supply. Calculate the time constant and instantaneous current after time interval of 0.1Sec.
15. A particle carrying a charge equal to 100 times the charge on an electron rotating per second in a circular path of radius 0.8 m. Calculate the value of the magnetic field.
16. A plane wave travelling in free space has an average poynting vector with a magnitude of $3 \text{ J/m}^2\text{s}$. Find the average density of the wave.
17. Calculate the displacement current between the square plates 1.0cm on a side of a capacitor if electric field between the plates is changing at the rate of $3 \times 10^6 \text{ Vm/s}$.
18. An alternating potential of 110 V, 50 Hz is applied to a resistance of 200 ohm, an inductance of 5 H and a capacitance of 2 micro farad connected in series. Calculate the impedance and the current in the circuit.

SECTION-C

Answer any **FOUR** questions. Each question carries **TEN** marks.

(4X10=40)

19. State and explain Thevenin's theorem.
20. State Biot-Savart's law. Derive an expression for magnetic field due to a straight current carrying conductor.
21. State and explain in detail Ampere's circuital Law. Explain briefly applications of ampere's law.
22. What is meant by volume integral? Explain curl of a vector field?
23. Derive Maxwell's first law and state the significance.
24. Define Peltier effect and explain with a neat diagram demonstration of Peltier effect.

