



**III Semester B.Sc. Degree Examination,
November/December 2019**

PHYSICS

**Paper III – Electricity, Vector Analysis and Electromagnetic
Theory
(CBCS)**

Time : 3 Hours

Max. Marks : 70

Instructions :

- 1) Answer **all** questions from Section A **any five** from Section B and **any three** from Section C.
- 2) Write answers to Section A questions in first two pages only.

SECTION – A

I. Answer the following :

(15 × 1 = 15)

1. Define the term RMS value of a.c.
2. Define Wattless current.
3. What is a 'CHOKE'?
4. Write the equation related to power rating in a resistor.
5. State Kirchoff's voltage law.
6. Mention the physical significance of gradient of a vector.
7. Define dipole moment associated with an electric dipole.
8. State Lenz's law.
9. Evaluate $\text{div}(2x^2 \hat{i} - xyz \hat{j} - 3yz^2 \hat{k})$.
10. Write Poisson's equation.
11. What is meant by displacement current?
12. State Stoke's theorem.



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13. Write one application of Ballistic galvanometer.
14. State Gauss law in electrostatics.
15. What is the velocity of Electromagnetic waves in vacuum?

SECTION - B

- II. Answer **any five** of the following : (5 × 5 = 25)
16. Derive an expression for current and impedance for a.c. containing LCR series circuit using j notation.
 17. Define resistance and impedance. Give any three comparison between inductive reactance and capacitive reactance.
 18. State and prove Maximum power transfer theorem.
 19. Give the theory of moving coil galvanometer.
 20. Show that $\text{curl}(\text{grad } \phi) = 0$.
 21. Explain the procedure for finding Norton's equivalent circuit.
 22. Describe Hertz experiment to produce electromagnetic waves.

SECTION - C

- III. Answer **any three** of the following : (3 × 10 = 30)
23. (a) Explain with necessary theory for the determination of self inductance of a coil using Anderson's bridge.
(b) An inductance of 10 mH and resistance of 100 Ω are connected in series to a 220 V - 50 Hz a.c. mains calculate the value and phase of the current. (5 + 5)
 24. (a) Explain the working of a R-C low pass filter. Derive an expression for cut off frequency. Mention any one use of low pass filter.
(b) In an R-C low pass filter circuit, capacitance of capacitor 0.04 μF and resistance 1 k Ω are used. Calculate the cut off frequency. (7 + 3)
 25. (a) Explain the construction and working of a CRO.
(b) How voltage and current frequency are measured using CRO? (7 + 3)



26. (a) State and explain Ampere's circuital law.
- (b) A Helmholtz galvanometer has coils of circumference 0.49 m each and number of turns 50 calculate the current through the coils which produces a deflection of 45° . (5 + 5)
27. (a) Write Maxwell's equations in differential form in free space.
- (b) Explain physical significance of Maxwell's equations.
- (c) Write a note on Poynting vector. (2 + 4 + 4)
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