

Faculty of Science
B.Sc (Physics) II-Year, CBCS –III Semester
Backlog Examinations, June/July-2022
PAPER: Electromagnetic Theory

Time: 3 Hours

Max Marks: 80

Section-A

- I. Answer any *eight* of the following questions (8x4=32 Marks)
1. Discuss the conservative nature of electrostatic field.
 2. Write Short notes on Differential & integral form of Gauss's law
 3. What is electric flux? Explain.
 4. Calculate the magnetic field induction due to a solenoid.
 5. Calculate the energy stored in the magnetic field of a solenoid of inductance 5mh, when a maximum current of 3 amp flows through it.
 6. State and prove Ampere's law.
 7. State Faraday's law of electromagnetic induction.
 8. Derive the modified Ampere's law.
 9. State Maxwell's equations in Integral and differential forms.
 10. In a series RLC circuit, $R = 100 \text{ ohm}$, $L = 0.5 \text{ H}$ and $C = 40 \text{ }\mu\text{F}$. Calculate the resonant frequency and Q factor.
 11. What are the difference between active elements and passive elements?
 12. Explain about maximum power transfer theorem.

Section-B

- II. Answer the following questions (4x12=48 Marks)
- 13.(a) Derive an expression for electric field intensity due to a charged sphere at a point inside, on and outside the sphere.
(OR)
(b) Define electric potential. Calculate the electric potential from electric field for a spherical charge distribution.
- 14.(a) State and explain Biot-Savart law. Calculate magnetic field 'B' due to a long straight wire by using it.
(OR)
(b) Explain the principle, construction and working of Ballistic Galvanometer.
- 15.(a) What is self inductance? Define coefficient of self-induction and obtain an expression for self-inductance of a solenoid.
(OR)
(b) Derive Maxwell's equation in dielectric medium. Show that EM wave velocity is equal to the velocity of light.
- 16.(a) Explain the theory of series LCR circuit. Obtain its power factor.
(OR)
(b) State and prove Norton's theorem.

Faculty of Science

B.Sc (Physics) II-Year, CBCS –III Semester Regular Examinations –Jan, 2023

PAPER: Electromagnetic Theory

Time: 3 Hours

Max Marks: 80

Section-A

- I. Answer any *eight* of the following questions (8x4=32 Marks)
1. Explain about electric lines of force.
 2. A cylinder of large length carries a charge $2 \times 10^{-8} \text{ C m}^{-1}$. Find the electric field at a distance of 0.2m from it.
 3. Define electric field and potential, obtain the relation between electric potential and electric field intensity.
 4. State and explain Ampere's law.
 5. Calculate the magnetic field due to long straight conductor carrying current.
 6. Derive an expression for Torque on a rectangular current loop placed in a uniform magnetic field.
 7. State and explain Lenz's law.
 8. Define the equation of a plane uniform wave.
 9. Write a note on Poynting Vector.
 10. Draw and explain series resonance circuit.
 11. What are passive and active elements of an electric network? Give suitable examples.
 12. Define and discuss Maximum power transfer theorem.

Section-B

- II. Answer the following questions (4x12=48 Marks)
13. (a) State and prove Gauss's law in electrostatics and derive an expression for electric field due to a uniformly charged sphere.
(OR)
(b) Define energy density in electric field and derive an expression for energy density in electric field.
A charged conductor is placed in air has an electric field of 10^6 NC^{-1} . Find the energy density.
 14. (a) State and explain Biot-Savart law. Calculate B inside a long solenoid carrying a current. Show that field at the ends of such a solenoid is half in the middle.
(OR)
(b) Describe the construction, principle and working of a moving coil ballistic galvanometer.
 15. (a) State and explain equation of continuity.
(OR)
(b) Derive Maxwell's equations in dielectric medium and obtain wave velocity of an electromagnetic waves.
Find the velocity of electromagnetic in a medium for which $\mu=2.5$ and $\epsilon=1.6$.
 16. (a) Draw parallel LCR circuit and explain its function. Obtain an equation for frequency of LCR parallel circuit.
(OR)
(b) Define Thevenin's theorem . Illustrate the procedure in Thevenizing a circuit.

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B.Sc (Physics) II-Year, CBCS –III Semester Backlog Examinations –June, 2023
PAPER: Electromagnetic Theory

Time: 3 Hours

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Section-A

I. Answer any *eight* of the following questions (8x4=32 Marks)

1. What is electric flux? Explain.
2. Explain the conservative nature of electric field.
3. A spherical drop of water carrying a charge of 3×10^{-6} C has a potential of 500 V at its surface, what is the radius of the drop?
4. Explain the motion of a charged particle in magnetic field.
5. Calculate the magnetic field induction due to a solenoid.
6. State and prove Ampere's law.
7. State Faraday's law of electromagnetic induction.
8. Explain Lenz's law
9. State Maxwell's equations in integral and differential forms.
10. Explain LCR parallel resonance circuit
11. Write short notes on single phase and three phase.
12. Explain about maximum power transfer theorem.

Section-B

II. Answer the following questions (4x12=48 Marks)

- 13.(a) Derive an expression for electric field intensity due to a charged sphere at a point inside, on and outside the sphere.
(OR)
(b) What is electric field intensity and electric potential? Derive the relation between them.
- 14.(a) Using Biot Savart's law, derive an expression for the magnetic induction at a point due to an infinite thin long straight conductor carrying current.
(OR)
(b) Explain the principle construction and working of Ballistic Galvanometer.
- 15.(a) What is Self induction? Define coefficient of self induction and obtain an expression for the self inductance of a solenoid.
(OR)
(b) Derive the modified form of Ampere's law and explain displacement current.
- 16.(a) Discuss the growth of charge in a circuit containing resistance, inductance and capacitance when direct emf is applied.
(OR)
(b) State and prove Thevenin's theorem.
