

FACULTY OF SCIENCE

M.Sc. II – Semester (CBCS) Examination, December 2021

Subject: PHYSICS / Applied Electronics / Astrophysics

Paper – I : Electro Magnetic Theory

Time: 2 Hours

Max. Marks: 80

PART – A

Note: Answer any five questions.

(5 x 7 = 35 Marks)

1. Obtain Maxwell's equation in Differential form.
2. What is Gauge transformation? Explain Coulombs gauge.
3. Explain polarization of EM waves.
4. What is free space Impedance. Obtain its value.
5. Mention few applications of Metallic reflection.
6. Write Fresnel's relations and explain.
7. Obtain Inhomogeneous wave equation for potentials.
8. Describe centre-fed linear antenna with neat diagram.

PART – B

Note: Answer any three questions.

(3x15 = 45 Marks)

9. What are scalar and vector magnetic potentials? Derive the Maxwell's equations in terms of these potentials.
10. State Poisson's and Laplace's equations. Obtain Laplace's equation for electrostatic potential in Cartesian coordinates.
11. Discuss the propagation of EM waves in homogenous isotropic dielectric medium.
12. Describe the propagation of EM waves in conducting medium.
13. What is dispersion? Explain normal and anomalous dispersion in non-conductors.
14. Obtain Reflection and Transmission coefficients for propagation of electromagnetic waves in bounded media.
15. Discuss about the oscillating magnetic dipole radiation.
16. What are Lienard -Wiechart potentials? Derive an expression for the electromagnetic fields due to the uniformly moving charges.

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**FACULTY OF SCIENCE****M.Sc. (CBCS) II- Semester Examination, December 2021****Subject: Physics / Applied Electronics / Astrophysics****Paper II: Statistical Mechanics****Time: 2 Hours****Max. Marks: 80****PART – A****Note: Answer any five questions.****(5 x 7 = 35 Marks)**

1. Write the quantum statistical postulates.
2. Define phase space, microstate and macro-states of system.
3. Distinguish between Bose-Einstein and Fermi-Dirac distribution laws.
4. How do you explain equi-partition theorem?
5. Explain the concept of protons and phonons contribution in Landau spectrum.
6. Deduce ideal Bose-Einstein gas equation.
7. Define mean square deviation and standard deviation.
8. How phase transitions are explained?

**PART – B****Note: Answer any three questions.****(3 x 15 = 45 Marks)**

9. State and explain Liouville's theorem.
10. What do you mean statistical equilibrium? Deduce the relations for thermal, mechanical and quasi static equilibrium conditions.
11. Derive Maxwell-Boltzmann distribution law and explain it.
12. Distinguish between rotational, vibrational and translational partition functions.
13. State and explain Tisza's two-fluid model.
14. Discuss Bose-Einstein condensation phenomenon in detail.
15. How Einstein correlated diffusion coefficient (D) to fluctuation with the help of Brownian motion?
16. Discuss one dimensional Ising model in detail.

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