Code No. 8230/CORE

FACULTY OF SCIENCE

M. Sc. II – Semester Examination, May / June 2019

Subject : Physics & Applied Electronics

Paper – I : Electromagnetic Theory

Time : 3 Hours **Max. Marks: 80**

Note : Answer all questions from Part–A and Part–B. Each question carries 4 marks in Part–A and 12 marks in Part – B.

PART – A (8 x 4 = 32 Marks)
(Short Answer Type)

1 What is meant by Gauge transformation? Explain.
2 Explain briefly about scalar and vector magnetic potentials.
3 Write the electromagnetic wave equation for a homogenous isotropic dielectric medium.
4 What is meant by attenuation?
5 What is Brewster's angle? Explain in detail.
6 State and explain the importance of Fresnel's relations.
7 Differentiate between uniaxial crystal and biaxial crystal.
8 What is centre-fed linear antenna? Explain it.

PART – B (4 x 12 = 48 Marks)
(Essay Answer Type)

9 (a) Obtain the Maxwell's equations in integral form. Explain the physical significance of Maxwell's equations.

OR

(b) State and prove poynting's theorem relating to the flow of energy at a point in space in an electromagnetic field.

10 (a) Discuss the propagation of plane electromagnetic waves in an isotropic dielectric medium. Show that electric and magnetic field vectors ($\overline{E}$ and $\overline{H}$) are mutually perpendicular.

OR

(b) Explain the theory of propagation of electromagnetic waves in a conducting medium and explain which in high frequency circuit current flows only on surface of conductors.

11 (a) Obtain the boundary conditions satisfied by the electromagnetic field vectors E, D and H on the plane interface between two media.

OR

(b) Discuss metallic reflection and refraction. Find out an expression for the reflection power of a metallic surface.

12 (a) Obtain the expressions for Lienard Wiechert potentials of a moving point charge. Discuss what do you mean by the retarted time.

OR

(b) Derive expression for the inhomongeous wave equations of scalar and vector potentials.

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Code No. 8234/CORE/O

FACULTY OF SCIENCE

M. Sc. II – Semester Examination, May / June 2019

Subject : Physics & Applied Electronics

Paper – II : Statistical Mechanics

Time : 3 Hours **Max. Marks: 80**

Note : Answer all questions from Part–A and Part–B. Each question carries 4 marks in Part–A and 12 marks in Part – B.

PART – A (8 x 4 = 32 Marks)
(Short Answer Type)

1 Define phase space and give importance.
2 Explain the postulates of classical statistical mechanics.
3 Define partition function in canonical ensemble.
4 What are the postulates of quantum statistical mechanics?
5 Explain about phonons.
6 Explain about the super fluid phase of ^3He.
7 Explain about thermionic emission.
8 What is Brownian motion? Explain.

PART – B (4 x 12 = 48 Marks)
(Essay Answer Type)

9 (a) Define an ensemble. Distinguish between three ensembles, namely microcanonical, canonical and grad canonical ensembles.

OR

(b) Obtain an expression for statistical entropy of classical ideal gas on the basis of microcanonical ensemble.

10 (a) Obtain an expression for Bose-Einstein distribution law.
(b) Explain equipartition energy.

OR

(c) Obtain rotational partition function for a gas of N diatomic molecules.
(d) Find its contribution to mean energy, entropy and specific heat.

11 (a) Explain the phenomenon of Bose-Einstein condensation. Show that the specific heat of Bose gas in the condensed phase is proportional to $T^{2/3}$.

OR

(b) Obtain the condition for the star to become a white dwarf.

12 (a) What do you phase transition? Explain about the phase transitions of first and second kind.

OR

(b) Explain how Bragg-William's approximation can be applied for ferromagnetic system.

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