Code No.17287/CORE

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 Guage transformation? Explain Coulombs guage.
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 Liouvilles 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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FACULTY OF SCIENCE

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

Subject: Physics and Applied Electronics / Astrophysics
Paper – III : Quantum Mechanics – II

Time: 2 Hours **Max. Marks: 80**

PART – A

Note: Answer any five questions. **(5 x 7 = 35 Marks)**

1 Obtain a relation between Phase shift and potential in a scattering process.
2 Explain the kinematics of scattering process.
3 Describe the perturbation for stark effect in a hydrogen atom for n = 2 level.
4 Distinguish between degenerate and non-degenerate states.
5 Explain in detail about harmonic perturbation theory.
6 What are Einstein's coefficients? Explain in detail.
7 What are negative energy states? Explain.
8 Explain the properties of gamma matrices.

PART – B

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

9 Obtain the expression for scattering amplitude by Green's method and explain the limitation of it.

10 Obtain optical theorem using partial wave analysis and explain it's significance.

11 Find the energy of the ground state of the atom corrected to first order. Comment on the improvement in the calculation.

12 Explain the method of WKB approximation. Use it to explain the alpha decay.

13 Deduce Transition probability to closely spaced energy levels and obtain Fermi's Golden rule.

14 Using time dependent perturbation theory, derive an expression for the rate of transition to continuum states.

15 Write Dirac's relativistic equation and obtain solutions to it.

16 Obtain the equation of continuity from Klein-Gordon equation and explain the problems arising out of it.

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Code No.17290/CORE

FACULTY OF SCIENCE

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

Subject: PHYSICS/Applied. Electronics/Astrophysics

Paper IV: Electronics

Time: 2 Hours **Max. Marks: 80**

PART – A

Note: Answer any five questions. **(5 x 7 = 35 Marks)**

1. Explain IC 7805 as voltage regulator with suitable diagram.
2. Explain in detail about Darlington pair.
3. Draw the circuit diagram of emitter coupled differential op-amplifier and explain briefly.
4. Write a short note on Logarithmic operational amplifier.
5. What is meant by sum of products? Explain in detail.
6. Explain briefly the construction and working of RS flip flop with truth-table.
7. Discuss about FLAG registers in 8085 μp.
8. Enumerate the addressing modes in 8085 μp.

PART – B

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

9. Explain in detail about regulator power supply with suitable block diagram.
10. Explain the concept of feedback and obtain the expressions for positive and negative feedback gain.
11. Explain the construction and working of non-inverting Op-Amp and obtain the expression for the voltage gain.
12. Write the ideal characteristics of an operational amplifier. Explain it's working as an integrator and derive an expression for the output voltage.
13. Reduce the function with the help of Karnaugh map $F=\Sigma(m_0,m_2,m_3,m_4,m_8,m_{10},m_{12})$.
14. Explain the working of Decade counter using IC 7493.
15. Draw the architecture block diagram of 8085 μp and explain about each block.
16. Explain the arithmetic and logic instructions of 8085 μp with suitable examples.

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