

For Candidates Admitted From 2018

18 MPH 21C

REG.NO.....

M.Sc. DEGREE EXAMINATIONS, APRIL 2019

PHYSICS SEMESTER : II

QUANTUM MECHANICS - II

Time : 3 HRS.

Max.Marks: 75

PART -A (10 X 2 =20)

ANSWER ALL THE QUESTIONS

1. Write the expression for the constants in second order time dependent perturbation.
2. State Fermi Golden rule.
3. Mention the asymptotic region of Partial wave
4. Define Phase shifts.
5. Write a note on Einstein's co- efficiencies.
6. Give any two limitations of density matrix.
7. Negative energy states – Define.
8. State the Dirac matrix for α_z
9. Briefly explain wavefield.
10. Write a note on number operator.

PART -B (5 X 5 =25)

ANSWER ALL THE QUESTIONS

11. a. Describe Harmonic perturbation.
(or)
b. Explain Sudden Approximation.
12. a. Obtain the expression for Born- Approximation
(or)
b. Explain the concept of Partial wave analysis.
13. a. Explain density matrix.
(or)
b. Describe emission and adsorption rates.

14. a. Deduce Klein- Gordon equation.

(or)

- b. Obtain the Dirac relativistic equation for a free particle.

15. a. Obtain classical lagrangian equation for a system of particles.

(or)

- b. Deduce the expression for Hamiltonian equation.

PART -C (3 X 10 =30)

ANSWER ANY THREE QUESTIONS

16. Develop the time dependent perturbation theory. Deduce the expression for first order perturbation.
17. Obtain the expression for scattering amplitude of a free particle in terms of Green's functions.
18. Explain the spontaneous and induced emission of radiation using semi- classical theory.
19. Deduce Dirac equation in Electromagnetic field.
20. Describe the field quantization of the non- relativistic Schrodinger equation.

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M.Sc. DEGREE EXAMINATIONS, APRIL 2019

PHYSICS SEMESTER : II

SOLID STATE PHYSICS

Time : 3 HRS.

Max.Marks: 75

PART –A (10 X 2 =20)

ANSWER ALL THE QUESTIONS

1. Unit cell – Define
2. State Bragg's Law
3. What are called Point defects?
4. Mention any two differences between Edge dislocation and Screw dislocation.
5. Give the assumptions of Einstein's theory.
6. Write the limitations of Debye approximation.
7. Define Drude Lorentz theory.
8. State Wiedmann Franz ratio.
9. What is meant by Bloch theorem?
10. Name the types of traps.

PART –B (5 X 5 =25)

ANSWER ALL THE QUESTIONS

11. a. Write a note on i) Electron diffraction ii) Neutron diffraction.
(or)
b. Describe the powder photographic method to determine the unit cell dimensions of a given crystal.
12. a. Obtain the expression for the number of vacancies in Frenkel defect at a given temperature.
(or)
b. Evaluate madelung constant. Deduce madelung constant for NaCl
13. a. Explain group velocity and phase velocity.
(or)

- b. Describe normal modes of vibration in a finite layer of lattice.
14. a. Deduce the expression for electrical conductivity.
(or)
b. Explain schottky effect.
15. a. Based on band theory of solids differentiate metals, Semiconductors and insulators.
(or)
b. Explain Brillouin zones in two dimensional square lattice.

PART –C (3 X 10 =30)

ANSWER ANY THREE QUESTIONS

16. Explain Reciprocal lattice. Obtain Reciprocal lattice for simple cubic and fcc lattice.
17. Determine Repulsive exponent 'n' value.
18. Deduce Debye's formula.
19. Describe Energy levels, density of states and Fermi energy.
20. Explain Kronig – Penny model.
