

(041140102/446111B)

M.Sc. DEGREE EXAMINATION, APRIL 2018.

FOURTH SEMESTER

Branch - Physics

Paper I — QUANTUM MECHANICS-II

Time : 3 Hours

Max. Marks : 70

PART—A

Answer any FOUR questions. Each question carries 5 Marks.

Each Answer should not exceed 250 words

(Marks : 4×5 marks = 20 marks)

1. State and explain the interaction picture in quantum dynamics.
2. What are Poisson brackets? Mention their properties.
3. What are the characteristics of identical particles?
4. Explain the effect of spin on statistics.
5. Write a note on Dirac's Matrices.
6. Explain the failures of KG equation.
7. What is meant by N —representation?
8. Explain the creation and destruction operators.

PART—B

Answer ALL questions. Each question carries 12.5 Marks.

((Marks : 4×12.5 marks = 50 marks)

9. (a) Derive the equations of motion under Schrodinger and Heisenberg pictures.

Or

- (b) Obtain the eigen functions and eigen values of a harmonic oscillator by matrix method

[P.T.O]

10. (a) Discuss about the Heitler —London theory of Hydrogen molecule.

Or

(b) Write about the Pauli's exclusion principle. Discuss about indistinguishability of identical particles.

11. (a) Explain how Klein-Gordon equation leads to positive and negative probability density values.

Or

(b) Derive Dirac's equation for a relativistic particle and explain the concept of negative energy states.

12. (a) Discuss the methods of both canonical quantization and second quantization.

Or

(b) Derive the field equation and discuss the quantization of Schrodinger equation.