45071

M.Sc. DEGREE EXAMINATION, APRIL 2015.

FOURTH SEMESTER

Physics

Paper I — QUANTUM MECHANICS – II

Time : Three hours Maximum : 75 marks

(No additional sheet will be supplied)

PART A — (5 × 3 = 15 marks)

Answer any FIVE questions.

Each question carries 3 marks.

Each answer should not exceed 1 page.

1. Describe the Schrodinger picture in quantum mechanics.

2. Deduce the equation of motion in the interaction picture.

3. Discuss Pauli exclusion principle basing on these wave functions.

4. Construct symmetric and antisymmetric wave functions to two particle system.

5. Write about negative energy states and spin of electron

6. Describe charge conjugation.

7. Describe the method of canonical quantization.

8. Write about creation and destruction operators.

PART B — (4 × 15 = 60 marks)

Answer ALL questions.

Each question carries 15 marks.

Each answer should not exceed 6 pages.

9. (a) Describe the Heisenberg picture of quantum mechanics.

(b) Write the properties of commutator and Poisson bracket.

Or

10. Obtain eigen values and eigen function to simple harmonic oscillator by matrix method.

11. (a) Describe symmetric and anti symmetric wave functions.

(b) Discuss indistinguishability of identical particles.

Or

12. (a) Construct symmetric and anti symmetric wave functions to Hydrogen molecule basing on spin of the particle.

(b) Write about ortho and para hydrogen.

13. (a) Obtain Klein-Gorden equation.

(b) Write the inadequacy of Klein Gorden equation.

Or

14. (a) Obtain plane wave solution to Dirac's linear equation.

(b) Write about probability density.

15. (a) Write about quantization of non relativistic Schrodinger equation.

(b) Discuss the second quantization of field equation.

Or

16. (a) Obtain commutation and anticommutation relations.

(b) What are Bosons and Fermions? Explain with examples.

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