M.Sc DEGREE EXAMINATION,APRIL 2019
I Year II Semester
Quantum Mechanics - II

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Define differential cross section.
2. What are elastic and inelastic scattering?
3. What are called selection rules?
4. What is harmonic perturbation?
5. Define spin of an electron.
6. What is an antiparticle?
7. Write the Dirac equation for a free particle.
8. What is meant by relativistic quantum mechanics?
9. What do you mean by quantization?
10. What do you understand by Klein- Garden Field?
11. What is called semi classical theory of radiation?
12. Give any two properties of Gamma matrices.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Obtain the relation between angles in L-system and C-system.
14. Explain the time dependent perturbation theory for constant perturbation acting for short interval of time.
15. Using Dirac's equation, show that the electron is endowed with a spin $1/2$.
16. Show that Dirac matrices must be even dimensional.
17. Explain second quantization.
18. Give an account of sudden approximation.
19. Explain creation and annihilation operators.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Obtain an expression for the scattering cross section using born approximation and discuss the condition for the validity of it.
21. Discuss the first order time dependent perturbation theory.
22. Explain how you will obtain the magnetic moment of the electron in Dirac's relativistic theory.
23. Derive the covariant form of Dirac equation.
24. Explain second quantization of electromagnetic field.

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