CODE: **196209**   TIME: 3Hrs
NOVEMBER 2020   MAX. MARKS : 50

PART A   *(10 x 2=20)*
*Answer any **TEN** questions*

1. **Define total scattering cross section.**
2. **Give uses of scattering theory.**
3. **What do you mean by dipole radiation?**
4. **Define magnetic resonance of an electron.**
5. **Write interpretation of negative energy states.**
6. **Give the uses of relativistic quantum mechanics.**
7. **Write a note on traces.**
8. **Mention the uses of Dirac equation.**
9. **Write note on creation operator.**
10. **What is meant by second quantization?**
11. **What do you mean by Coulomb potential?**
12. **Give uses of adiabatic approximation.**

PART B   *(2 x5=10)*
*Answer any **TWO** questions*

13. **Outline the partial wave analysis.**
14. **Give semi-classical treatment of an atom with electromagnetic radiation**
15. **Define and explain: (i) Spin of electron, and (ii) Antiparticles.**
16. **Write a note on Feynman's theory of positron.**
17. **Discuss in brief on second quantization of Klein-Gordon field.**
18. **Explain sudden approximation.**
19. **Write a note on Klein-Gordon equation.**
20. **Explain constant and harmonic perturbation.**

PART C   *(2x10=20)*
*Answer any **TWO** questions*

21. **(i)Discuss the Born approximation and its validity. (ii) Write a note on scattering length and effective range.**
22. **Explain the first order and second order harmonic perturbation theory.**
23. **Elaborate magnetic moment of an electron due to spin energy values in a Coulomb potential.**
24. **(i)Discuss the covariant form of Dirac equation. (ii) Give properties of gamma matrices**
25. **Write a note on: (i) Quantization of electromagnetic field, and (ii) Annihilation operator and Commutation relations.**