(Pages : 2) **M – 7118**

Reg. No. : .....

Name : .....

Third Semester M.Sc. Degree Examination, March 2022.

Physics

PH 231 ADVANCED QUANTUM MECHANICS

(2020 Admission)

Time : 3 Hours Max. Marks : 75

PART – A

Answer **any five** questions. Each question carries **3** marks

1. Explain variational principle.
2. Explain the emission of alpha particle by nucleus.
3. Explain Fermi Golden rule.
4. Prove that the conservation of total angular momentum is a consequence of the rotational invariance of the system.
5. Explain partial wave analysis
6. Discuss pauli exclusion principle.
7. What do you meant by Clebsh-Gorden coefficient?
8. Discuss the covariant form of Dirac equation.

(5 × 3 = 15 Marks)

P.T.O.

PART – B

Answer **all** questions. Each question carries **15** marks

9. Explain WKB approximation and discuss barrier penetration by particle using WKB method.

OR

10. Discuss the effect of electric field on the ground state and first excited state of hydrogen

11. Discuss scattering amplitude and scattering cross section of scattering by a central potential using partial wave analysis.

OR

12. What do you mean by central field approximation and discuss Thomas Fermi model of the atom.

13. Discuss intrinsic magnetic moment of spin of an electron.

OR

14. Obtain eigen values of J^2 and J_z.

(3 × 15 = 45 Marks)

PART – C

Answer **any three** of the following questions. Each question carries **5** marks

15. Obtain the energy values of harmonic oscillator using WKB method.

16. Prove that in harmonic perturbation, the transition probability oscillates sinusoidally as a function of time.

17. Establish the expansion of plane wave in terms of an infinite number of spherical waves.

18. Prove that momentum is the generator of infinitesimal translation in space.

19. Evaluate the Clebsh – Gorden coefficients for $J_1=1$ and $J_2=1$

20. Prove that dirac equation gives positive and negative energy solutions as in the klein Gordon equation.

(3 × 5 = 15 Marks)

———————