



THE AMERICAN COLLEGE, MADURAI
(An Autonomous Institution Affiliated to Madurai Kamaraj University)
Re-accredited (2nd Cycle) by NAAC with Grade “A”, CGPA – 3.46 on a 4-point scale
Backlog Arrear Examination, March 2021

PGP 5526 – Advanced Quantum Mechanics

Time: 3 hours

Marks: 75

Part-A

Answer any FIVE questions

(5 x 15 = 75)

1. Obtain the condition for the validity of Born approximation and hence determine the same for screened coulomb potential.
2. Using perturbation theory, obtain the expression for the ground state of two electron atom and hence determine the ionization potential.
3. Using variation method, determine the upper bound on the ground state energy of a quantum mechanical system.
4. Derive the joint eigenvectors and eigen value spectrum of the general angular momentum operators.
5. Describe the first-order transition probability and hence derive the Fermi's golden rule for the case of harmonic perturbation.
6. Describe the Einstein's theory of the process of interaction of radiation with matter.
7. Discuss the method of removing degeneracy using perturbation theory.
