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No.:

G.T.N. ARTS COLLEGE (AUTONOMOUS)
(Affiliated to Madurai Kamaraj University || Accredited with 'B' Grade by NAAC)
END SEMESTER EXAMINATION - NOVEMBER - 2021

(UNDER OUTCOME BASED EDUCATION (OBE) PATTERN)

Programme : M.Sc. Physics

Course Code : 20PPHC32

Course Title : Quantum Mechanics - II

Date : 04.02.2022

Time : 10:00 AM - 1:00 PM

Max. Marks : 60

Q. No.	SECTION - A (10 * 1 = 10 Marks) Answer ALL Questions	CO(s)	K - Level
1.	The method of partial wave is an elegant procedure for the analysis of _____ scattering. 1.partial 2.null 3.elastic 4.inelastic	CO1	K2
2.	In bound states, the energy eigen values are _____. 1.positive 2.negative 3.neutral 4.complex	CO1	K1
3.	The transition probability denoted by the letter _____. 1.T 2.P 3. ω 4. \hbar	CO2	K2
4.	Which quantity is said to be degenerate when $H\Psi_n = E_n\Psi_n$? 1.Eigen Vectors 2.Eigen Values 3.Eigen Functions 4.Operators	CO2	K1
5.	Quantum mechanics claims, if two wave functions are the same, the total wave function becomes zero, this is _____. 1.Leibnizsprinciples 2.Uncertainty principle 3.Pauli principle 4.Archimedes principle	CO3	K2
6.	Particles that are described by antisymmetric wave functions are said to obey Fermi-Dirac statistics and are called _____. 1.symmetric 2.degeneracy. 3.fermions 4.bosons	CO3	K1
7.	The orbital angular momentum $L = \underline{\hspace{2cm}}$ is a constant motion in such a central field. 1. $r \times p$ 2. $r \times s$ 3. $r \cdot p$ 4. $r \cdot l$	CO4	K2
8.	In hydrogen atom classification of energy levels, the $F(\rho) = \underline{\hspace{2cm}}$. 1. $f(\rho) e^{-\rho}$ 2. $-f(\rho) e^{-\rho}$ 3. $f(\rho) e^{\rho}$ 4. $f(\rho) e^{-i}$	CO4	K1

9. Eigen values of a self-adjoint operator is _____. CO5 K2
 1.always 0 2.imaginary
 3.infinite 4.real
10. No distinction can be made between and and both are referred to as _____. CO5 K1
 1. ψ 2.H
 3.L 4. π

Q. No. SECTION - B (5 * 4 = 20 Marks) CO(s) K - Level
Answer ALL Questions

11. (a) Explain the representations of quantum system. CO1 K2
 [OR]
 (b) Explain partial wave analysis. CO1 K2
12. (a) Outline the time dependent perturbation theory. CO2 K2
 [OR]
 (b) Classify the physical significance of transition probability. CO2 K2
13. (a) Show the Pauli exclusion principle. CO3 K2
 [OR]
 (b) Derive the expression for Pauli spin matrices for an electron. CO3 K2
14. (a) State and explain the free particles solution. CO4 K3
 [OR]
 (b) Explain the separation of the equation. CO4 K3
15. (a) Derive the expression for time derivation. CO5 K3
 [OR]
 (b) Define the classical Lagrangian non relativistic equation. CO5 K3

Q. No. SECTION - C (3 * 10 = 30 Marks) CO(s) K - Level
Answer any of 3

16. Explain the theory of Born approximation. CO1 K2
17. Explain the first order perturbation and harmonic perturbation. CO2 K2
18. Give a brief explanation about identical particles. CO3 K3
19. Examine the particle in a coulomb field. CO4 K4
20. Examine briefly the 'N' representation. CO5 K4
