

2000-2001  
MSc Phys 1, MSc Genl Elect, MSc  
Mechanics & Sci, and MSc Plasma Phys

ANDHRA UNIVERSITY

~~M.Sc. ELECTRONICS~~

I SEMESTER.

P.103 - QUANTUM MECHANICS - I.

UNIT - I

3/10/20

SSP-S103

1. The conceptual aspect (Thankappan Sec.1.1), Wave particle duality, Complementarity principle, Bohr's Correspondence principle, wave function and its interpretation. (Merzbacher Sec. 1.1, 1.2, 1.3) --- 4 Hrs.
2. Principle of superposition, wave packets and uncertainty relation, Schrodinger wave equation, conservation of probability, expectation values and operators, Ehrenfest's theorem, stationary states, harmonic oscillator. (Merzbacher Sec.2.1, 2.2, 3.2, 4.1, 4.2, 4.3, 4.4, 4.5, 5.1, 5.2, part of 5.3) --- 5 Hrs.
3. Properties of Dirac delta function, delta function normalization, potential step, potential well for  $E < 0$  and  $E > 0$ . (Merzbacher Sec.6.1, 6.2, part of 6.3, 6.4, 6.8), --- 7 Hrs.
4. Postulates of quantum mechanics, coordinate and momentum representations, Hermitian operators, their eigen values and eigen functions, superposition of eigenstates, continuous spectrum, simultaneous measurement and commuting operators, Heisenberg uncertainty relation, constants of motion, commutator algebra. (Merzbacher Sec.8.1, 8.2, 8.3, 8.4, 8.5, 8.6, parts of 8.7 and 8.8) --- 8 Hrs.

#### UNIT - II.

5. Orbital angular momentum, reduction of central force problem, eigen values of  $L^2$ ,  $L_z$ , effect of  $L_+$  and  $L_-$ , rigid rotator, central force problem with Coulomb potential parity of the levels of hydrogen. (Merzbacher Sec.9.1, 9.2, 9.3, 9.4, 9.5, part of 9.6 and 9.7, 10.5, 10.6, part of 10.7) --- 6 Hrs.
6. Introduction to intrinsic angular momentum, spin and rotations, determination of magnetic moment and spin operators. (Merzbacher Sec.12.1, 12.2, 12.3, 12.4, 12.5, 12.6, 12.7) --- 6 Hrs.
7. Time independent perturbation theory for non-degenerate and degenerate systems, application to atoms - linear Stark effect in hydrogen, spin orbit interaction and fine structure, Lande's interval rule, variational method, application to helium atom, WKB approximation. (Merzbacher Sec.17.1, 17.2, parts of 17.3 and 17.4, 17.5, 17.6, 17.8, 17.9, 7.1, 7.2, 7.3) --- 10 Hrs.

TEXT : Quantum Mechanics by E. Merzbacher (2nd Edition), John Wiley & Sons.

REFERENCE: Quantum Mechanics by V K Thankappan, Wiley Eastern Ltd.,

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