

SARASWATI MAHILA MAHAVIDHYALAYA, PALWAL

LESSON-PLAN

Class: M.Sc-Physics-Ist year

Semester: ODD/EVEN ✓

Subject: Quantum Mechanics-I

Session: 2020-21

Lecture Number	Topic
1.	<u>Unit-I</u> : Introduction of QM; History of QM; Evaluation of QM Important aspects of this field.
2.	State and operators; Types of operators used in QM
3.	Representation of states and dynamical variables; Explanation of linear vector space.
4.	Bra-ket notations; their rules and numericals
5.	Linear operators; Ortho normal set of vectors
6.	Completeness relation
7.	Hermitian operator and its theorems.
8.	Defining Eigen value and Eigenvectors; Commutation relations
9.	Commutation relations Rules and numericals.
10.	The uncertainty relation using Commutation relations
11.	Proof of Simultaneous eigenstates of Commuting operators.
12.	Unitary transformation & numericals.
13.	Dirac-Delta function & its properties & numericals
14.	Relation between Bra & ket wavefunction & their matrix representations
15.	Matrix representation of operators
16.	Harmonic oscillator introduction.
17.	Derivation of Solution of harmonic oscillator problem by operator methods

Nisha Dagen
Signature:

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18	Revision of Unit-I; Assignment; Numericals.
19	Numerical Revision of Unit-I.
20	Unit-II :- Introduction to Angular momentum operator & formulas; Introduction of Spherical polar coordinates
21	Representation of angular momentum's spherical polar coordinates of L_x, L_y
22	Representation of angular momentum L_x, L_y in spherical polar coordinates.
23	Eigen value & Eigen vectors of L^2
24	Commutation relations of L_x, L_y, L_z
25	Commutation relation of L_+, L_-, L^2
26	Rotational Symmetry and Conservation of angular momentum.
27	Eigenvalue of J^2 and matrix representation.
28	Eigen value of J_z and matrix representation.
29	Pauli spin matrices & their matrix representation.
30	Numericals of above portion.
31	addition of angular momentum.
32	Revision of Unit-2; Assignment; Discussion.
33	Explanation of 3D Schrodinger eq ⁿ in Cartesian & polar coordinates.
34	3D. Harmonic oscillator in Cartesian coordinates eigenvalue, Eigenfunction

Mishra Pooja
Signature:

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Lecture Number	Topic
35	3D-Harmonic Oscillator in Spherical polar Co-ordinates Eigenvalue & Eigenfunction
36	Degeneracy of the states.
37	Derivation of Schrodinger wave eq ⁿ of Hydrogen atom.
38	Eigenvalue, Eigenfunction & degeneracy of Hydrogen atom
39	Numericals of to find expectation value of various r .
40	Revision of Unit-III ; Assignment ; Discussion.
41	<u>Unit-IV</u> Introduction to approximation methods and their importance
42	Derivation of Timeindependent perturbation theory for Non degenerate case.
43	First order Perturbation.
44	Second order perturbation.
45	Anharmonic perturbation of form λx^3
46	An harmonic perturbation of form λx^4 .
47	Degenerate perturbation theory
48	Stark effect.
49	Numericals of Perturbation
50	Revision of Unit-IV ; Discussion
51	Revision of Unit-IV ; Discussion of Q/A.

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