

Wave quantum mechanics

Academic Year: (2023 / 2024)

Review date: 20-04-2023

Department assigned to the subject: Physics Department

Coordinating teacher: SANCHEZ FERNANDEZ, LUIS RAUL

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Fundamentals of Algebra, Differential Equations and Mechanics.

DESCRIPTION OF CONTENTS: PROGRAMME

Postulates of quantum mechanics.-

1. Wave function. Probabilistic interpretation.
2. Operators and physical magnitudes. Eigenvalues and eigenstates. Space of states.
3. Time evolution of the quantum state. Schrödinger equation.
4. Measurement processes in quantum mechanics.
5. Relation to matrix formulation of QM.

Schrödinger equation.-

6. Problems independent of time. Bound and scattering states. Free particles.
7. One-dimensional systems: harmonic oscillator; barrier and wells; quantum tunnelling.
8. Periodic potentials. Bloch theorem.

Applications: band theory in solids

9. Kronig-Penney model. Electrons and holes. Metals and insulators. Semiconductors. Superconductivity.

ASSESSMENT SYSTEM

Final Exam: collection of questions and problems. Duration: about 2:30 hours. Provides 60% of total grade.

Continuous assessment

Test 1: short question or problem solved during class hours. Duration: 30 - 45 mins. Provides 15% of total grade.

Test 2: short question or problem. solved during class hours Duration: 30 - 45 mins. Provides 25% of total grade.

% end-of-term-examination:	60
% of continuous assessment (assignments, laboratory, practicals...):	40

BASIC BIBLIOGRAPHY

- David J Griffiths Introduction to Quantum Mechanics, Prentice Hall, 1998

ADDITIONAL BIBLIOGRAPHY

- C. Cohen-Tannoudji et al Quantum Mechanics, Wiley, 1977