

Programme: M. Sc.	Year: I	Semester: VIII
Subject: Physics		
Course Code: B010801T	Course Title: Quantum Mechanics II	
Course Outcomes (COs)		
After the completion of the course, students will (/be/able to)		
<ol style="list-style-type: none"> 1. understand the concept of perturbation and calculation for eigen value. 2. learn application of time – dependent perturbation theory for transition probability. 3. have basic understanding of non-relativistic quantum scattering. 4. be able to analyse the Klein-Gordon and explain problems arising while dealing with it. 5. be able to explain how Dirac addressed problems that occurred in the case of Klein Gordon equation. 6. be able to perform solutions of Klein-Gordan and Dirac equations for free particle. 		
Credit: 4		Core Compulsory
Max. Marks: 25+75		Min. Passing Marks:
Total No. of Lectures-Tutorials-Practical-Research (in hours per week): L-T-P-R: 3-1-0-0		
Unit	Topics	No. of Lectures
I	Time-Independent Perturbation Theory and Applications, Variational Method, WKB Method.	9
II	Time-Dependent Perturbation Theory, Constant and Harmonic Perturbation, Transition probabilities, Fermi's Golden Rule.	9
III	Elementary theory of Scattering: Phase shifts, Method of partial waves, Born approximation.	9
IV	Klein Gordon Equation and Free Particle, Solution, Dirac Equation, Dirac Matrices, Covariance of Dirac Equation & Bilinear Covariant.	9
V	Solution for a Free Particle, Negative Energy states and Hole Theory, Spin, Position Operator.	9
Suggested Readings		
<ol style="list-style-type: none"> 1. Introduction to Quantum Mechanics by D. J. Griffiths 2. Modern Quantum Mechanics by J. J. Sakurai 3. Quantum Mechanics: Concept and Applications by Nouredine Zettili 4. An Introduction to Relativistic Quantum Field Theory by S. S. Schweber 5. Quantum Mechanics, L. I. Schiff, Mc-Graw Hill 6. Relativistic Quantum Mechanics, James D. Bjorken and Sidney D. Drell (Tata McGraw Hill Education, 2013) 		
Suggested Digital Platforms/Web Links		
<ol style="list-style-type: none"> 1. Swayam – Government of India, https://swayam.gov.in/explorer?category=Physics 2. National Programme on Technology Enhanced Learning (NPTEL), https://nptel.ac.in/course.html 3. Uttar Pradesh Higher Education Digital Library, https://heecontent.upsdc.gov.in/SearchContent.aspx 4. MIT Open Learning – Massachusetts Institute of Technology, https://openlearning.mit.edu/ 		
Course Prerequisites		
Physics as a major subject in B. Sc.		