Course Title	**Introductory Quantum Science for engineers**	Course Code	PHY508			
Dept./ Specialization	SH (Physics)	Structure (LTPC)	3	1	0	4
To be offered for	UG/PG	Status	Core ☐		Elective ▬	
Faculty Proposing the course	Tapas Sil	Type	New ▭		Modification ▬	
Recommendation from the DAC		Date of DAC				
External Expert(s)						
Pre-requisite		Submitted for approval				
Learning Objectives	• To develop in the student, an awareness of situations in engineering, which need ideas of quantum mechanics. • The course emphasizes conceptual understanding essential mathematics is for understanding and using quantum mechanics. • To enable the student with those aspects of quantum mechanics, which are necessary to begin to deal with microscopic systems.					
Learning Outcomes	Students will be able to • Understand the fundamental concepts and quantum mechanical processes in the nature. • Apply principles of quantum mechanics to calculate observables on known wave functions or potentials. • Pursue more advanced courses such as quantum communications, quantum computation, quantum optics, nanophotonic devices etc.					
Contents of the course *(With approximate break-up of hours for L/T/P)*	**Introduction:** The bizarre aspects and continuing evolution of quantum mechanics, and how we need it for engineering modern technology. Blackbody radiation, The photo-electric effect, Atomic spectra, The Frank-Hertz experiment, Compton effect, Wave-Particle duality, Wavefunctions, Expectation values, Uncertainty principle. [L12+T3] **Schrodinger's wave equation:** Getting to Schrodinger's wave equation. Solution of stationary-state Schrodinger equation for one dimensional bound state problems. Potential barrier and tunneling and applications such as, Esaki diode, scanning tunneling microscope, etc.; Particle in 3D box and related examples (quantum dot, quantum wire etc); Quantum mechanical measurements and wavefunction collapse [L12+T3] **Aspects of angular momentum and spin:** Angular momentum operators. Stern-Gerlach experiment—spin. Solution of hydrogen atom problem. [L10+T4] **Introduction to Quantum information :** Quantum cryptography, Entanglement, Quantum computing, EPR paradox, Bells inequality [L8+T2]					
Text Book	1. Devid J. Griffiths and Darrell F.Schroeter," Introduction to quantum mechanics", (Cambridge University Press, 3rd edition, 2019) 2. P A M Dirac, "The Principles of Quantum Mechanics", (WWW.Snowballpublishing.com, 2013)					
Reference Books	1. Asher Peres, ``Quantum Theory: Concepts and Methods", (Kluwer Academic Publishers, 1993) 2. D. A. B. Miller, "Quantum Mechanics for Scientists and Engineers," (Cambridge University Press, 2008)"					