STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

Course Schedule: June - October 2023

Department : PHYSICS

Name of the Faculty : Dr. ASISI JANIFER. M

Course Title : QUANTUM MECHANICS I

Course Code : 19PH/PC/QM34

Shift : II

Week & No. of hours	Units & Topics	Teaching Methodology	Text & References	Method of Evaluation
Jun 19 – 23, 2023 (Day Order 1 to 5)	**Unit 1 - General Formalism** Linear vector space – linear operators – postulates – uncertainty principle – Dirac's notation – equations of motion – momentum representation	Lecture	G Aruldhas, *Quantum Mechanics* and Mathews, K. Venkatesan, *A text book of Quantum Mechanics*	Verbal assessment
Jun26– 30, 2023 (Day Order 6 to 3)	Free particle – finite potential well- Potential barrier – linear harmonic oscillator (operator method alone) – Hydrogen atom.	Lecture	G Aruldhas, *Quantum Mechanics* and Mathews, K. Venkatesan, *A text book of Quantum Mechanics*	Verbal assessment
Jun 31– Jul 07, 2023 (Day Order 1 to 3)	**Unit 2 Matrix Formalism (Representation theory)** Matrix representation of state vectors– operators.	Lecture	G Aruldhas, *Quantum Mechanics* and Mathews, K. Venkatesan, *A text book of Quantum Mechanics*	Verbal assessment

Jul 10 – Jul 14, 2023 (Day Order 4 to 2)	continuous case – change of representation– eigen value problems - different representations –unitary transformations involving time	Lecture	G Aruldhas, *Quantum Mechanics* and Mathews, K. Venkatesan, *A text book of Quantum Mechanics*	Verbal assessment
Jul 17 – Jul 21, 2023 (Day Order 3 to 1)	Heisenberg method – Harmonic oscillator – matrix representation of spin	Lecture	G Aruldhas, *Quantum Mechanics* and Mathews, K. Venkatesan, *A text book of Quantum Mechanics*	Questioning And problem solving
Jul 24 – Jul 28, 2023 (Day Order 2 to 6)	spinors- expectation values – magnetic moment of an electron –precision of electron in magnetic field.	Lecture and presentation of subject oriented videos	G Aruldhas, *Quantum Mechanics* and Mathews, K. Venkatesan, *A text book of Quantum Mechanics*	**THIRD COMPONENT I**
Aug 1 – 3,2023 (Day Order 2 to 4)	**Unit 3 Approximation methods** Time independent perturbation theory and Revision	Lecture	G Aruldhas, *Quantum Mechanics* and Mathews, K. Venkatesan, *A text book of Quantum Mechanics*	**THIRD COMPONENT II**
Aug 04 – Aug 09, 2023	**C.A. Test – I**			
Aug 10 – Aug 18, 2023 (Day Order 5 to 4)	non-degenerate energy levels– anharmonic oscillator – ground state of Helium	Lecture	G Aruldhas, *Quantum Mechanics* and Mathews, K. Venkatesan, *A text book of Quantum Mechanics*	Verbal assessment

Aug 21 – Aug 25, 2023 (Day Order 5 to 3)	degenerate levels– Stark effect – spin-orbit interaction – variational method – Hydrogen molecule.	Lecture	G Aruldhas, *Quantum Mechanics* and Mathews, K. Venkatesan, *A text book of Quantum Mechanics*	Verbal assessment
Aug 28 – Sept 01, 2023 (Day Order 4 to 1)	**Unit 4 - Angular momentum** Angular momentum operator – commutation relation	Lecture	G Aruldhas, *Quantum Mechanics* and Mathews, K. Venkatesan, *A text book of Quantum Mechanics*	Questioning And problem solving
Sept 04 – Oct 08, 2023 (Day Order 2 to 5)	eigen values and eigen functions of L^2 and L_z	Lecture	G Aruldhas, *Quantum Mechanics* and Mathews, K. Venkatesan, *A text book of Quantum Mechanics*	**THIRD COMPONENT III**
Sept 11 – Sept 15, 2023 (Day Order 6 to 4)	general angular momentum – eigen states and eigen values of J^2 and Jz - angular momentum matrices	Lecture	G Aruldhas, *Quantum Mechanics* and Mathews, K. Venkatesan, *A text book of Quantum Mechanics*	Verbal assessment
Sept 18 - Sept 23, 2023 (Day Order 5 to 3)	spin angular momentum – spin - ½ systems – addition of angular momentum.	Lecture and presentation of subject oriented videos	G Aruldhas, *Quantum Mechanics* and Mathews, K. Venkatesan, *A text book of Quantum Mechanics*	Questioning And problem solving
Sept 25 – Oct 3, 2023 (Day Order 4 to 2)	**Unit 5 - Scattering theory and applications** Scattering cross section and Revision	Lecture and presentation of subject oriented videos	G Aruldhas, *Quantum Mechanics* and Mathews, K. Venkatesan, *A text book of Quantum Mechanics*	Questioning And problem solving

Oct 4 to 9, 2023	**C.A. Test – II**			
Oct 10 – Oct 13, 2023 (Day Order 4 to 1)	scattering amplitude – partial waves – scattering by a central potential – partial wave analysis	Lecture	G Aruldhas, *Quantum Mechanics* and Mathews, K. Venkatesan, *A text book of Quantum Mechanics*	Questioning And problem solving
Oct 16 – Oct 20, 2023 (Day Order 2 to 6)	scattering by a square well potential – phase shifts – Born approximation – scattering by screened Coulomb potential	Lecture	G Aruldhas, *Quantum Mechanics* and Mathews, K. Venkatesan, *A text book of Quantum Mechanics*	Verbal assessment
Oct 25 – Oct 27, 2023 (Day Order 1 to 3)	validity of Born approximation – laboratory and centre of mass coordinate systems and Revision	Lecture and presentation of subject oriented videos	G Aruldhas, *Quantum Mechanics* and Mathews, K. Venkatesan, *A text book of Quantum Mechanics*	Verbal assessment
Oct 28, 2023	**REVISION HOLIDAY BEGINS**			