Faculty of Science and Humanities
B.Sc. (Physics) (Semester - 6)
In Effect from Academic Year 2023-24

Branch Name:	Physics
Program Code:	SC105
Course Name:	Physics 601
Course Code:	**2SC1050601**
Pre-requisite Course:	Basic knowledge of Quantum, Classical and Mathematical Physics.

Course Objectives:

1. To develop an actual understanding of the Mathematical Physics.
2. To know the basic concept of quantum mechanics.
3. To understand about various function of classical mechanics.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
				Theory (Marks)		Practical (Marks)		
Lecture (L)	Tutorial (T)	Practical (P)	Credit	University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	Total (Marks)
3	--	--	3	70	30	--	--	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	**MATHEMATICAL PHYSICS** **(a) Curvilinear Coordinates** General Curvilinear coordinates, Vector operators in orthogonal Curvilinear Coordinates, Note: The expressions for Divergence and curl are not to be derive but directly expressions are to be given. **(B) Special Functions** Legendre differential equation, Generating Function of Legendre Polynomial, Rodriguez's formula for Legendre Polynomial, Orthogonal properties of Legendre Polynomial, Hermite differential equation and Hermite Polynomial, Generating function of Hermite Polynomial, Recurrence formula for Hermite Polynomial, Rodriguez's formula for Hermite Polynomial.	15	33
2	**CLASSICAL MECHANICS** A brief review of Lagrange's & Hamilton's formalism-conservation theorem, Noether's theorem and symmetry properties, Lagrangian and Hamiltonian formulation of relativistic mechanics, Canonical transformations, Equations of Canonical transformations, Canonical transformations for the Harmonic Oscillator, Poisson brackets and canonical invariants, equations of motion, Infinitesimal CT and conservation theorems in the Poisson bracket formulation.	15	33
3	**QUANTUM MECHANICS** **(a) Exactly Soluble Eigen Value Problems : The simple harmonic Oscillator** The Schrödinger equation and energy eigen values, The energy eigen functions, Properties of Stationary States, The abstract operator method, Coherent States. **(b) Angular Momentum and Parity** The Angular momentum operators, The eigen value equation for L: Separation of variables, Admissibility conditions on solutions: eigen values, The eigen functions: Spherical harmonics, physical interpretation, Parity.	15	34

Reference Books:

1. Mathematical Methods in Physical Sciences 2nd Edition by M.L. Boas. John Wiley & Sons.
2. Quantum Mechanics by Satya Prakash, Pragati Prakashan (Reprint-2008)
3. Introduction to classical mechanics by Takawale and Puranic. THM Publication.
4. A text book of Quantum Mechanics by P.M. Methews and K. Venkateshan, THM.
5. Quantum Mechanics by Ghatak and Loknathan, the Macmillan Company of India Limited.
6. Quantum Mechanics by Fschwabi, Narosa Publishing House, New Delhi.
7. Quantum Mechanics by John, L. Powell and B. Crasemann.
8. Quantum Mechanics by Schiff.

List of Open Source Software/learning website:

1. https://www.youtube.com/watch?v=sB4KS4rpccE
2. https://www.youtube.com/watch?v=fY6TrK24ZK0&list=PLNU8gQTpgTRN9SK2aG4wFSDpGi_f7MdJ3

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe the some General Curvilinear coordinates	1 Remembering
CLO2	Discuss the Special Functions.	2 Understanding
CLO3	Solve the Legendre Polynomial.	3 Applying
CLO4	Explain General formalism of Lagrange's & Hamilton's.	4 Analyzing
CLO5	Evaluate the problems related to Angular Momentum and Parity	5 Evaluating
CLO6	Create some numerical problems regarding Eigen Value Problems.	6 creating

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Programme Outcomes (POs)									Programme Specific Outcome (PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CLO1		M									
CLO2				L						M	
CLO3						H				H	
CLO4								H			
CLO5			H							H	
CLO6									L		

H: High, M: Medium, L: Low