Sankalchand Patel University

Faculty of Science

B.Sc. Physics (SEM-VI)

In Effect from Academic Year 2018-19

Subject Code:1SC1050601	**Subject Title: Physics-601**

COURSE OBJECTIVE:

Physics is a science to understand the nature. This course is designed to get basic understanding of the physical world.

Teaching scheme (hours) per week		**Credit**		**Theory Marks**		**Practical Marks**		**Total**
Theory	**Practical**	**Theory**	**Practical**	**University Assessment**	**Cont. Assessment**	**University Assessment**	**Cont. Assessment**	
3	**--**	**3**	**--**	**70**	**30**	**--**	**--**	**100**

Unit	Content	Lectures	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** **Variational Principle: Lagrange's and Hamilton's Equations** Configuration space, Some techniques of calculus of variation, Applications of the Variational principle, Hamilton's principle. Equivalence of Lagrange's and Newton's equations, Advantages of the Lagrangian formulation-Electromechanical analogies, Lagrange's undetermined multipliers, Lagrange's equation for non- holononiic system, Application of the Lagrangian method of undetermined multipliers, Hamilton's equations of motion, Some applications of the Hamiltonian formulation, Phase space, Comments on the Hamiltonian 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%

LEARNING OUTCOMES:

- Develop an actual understanding of the Mathematical Physics.
- To know the basic concept of quantum mechanics.
- Understand the concept of classical mechanics.

Basic 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.

Other Reference books:

1. Quantum Mechanics by Ghatak and Loknathan, the Macmillan Company of India Limited.
2. Quantum Mechanics by Fschwabi, Narosa Publishing House, New Delhi.
3. Quantum Mechanics by John, L. Powell and B. Crasemann.
4. Quantum Mechanics by Schiff.