C. U. SHAH UNIVERSITY, WADHWAN CITY.

Faculty of: **Science & Life Sciences**
Course: **Bachelor of Science (Physics)**
Semester**: I**
Subject Code**: PHM201-1C**
Subject Name: **Mechanics-I**

Sr. No	Category	Subject Code	Subject Name	Teaching hours/ Week			Credit hours	Credit Points	Evaluation Scheme/ Semester								
									Theory				Tutorial / Practical				Total
									Continuous and Comprehensive Evaluation		End Semester Exams		Internal Assessment		End Semester Exams		
				Th	Tu	Pr			Marks		Marks	Duration	Marks	Duration	Marks	Duration	
1	MAJOR-1	PHM201-1C	Mechanics - I	3	-	2	5	4	10 10 05	Assignment MCQ Attendance	50	2	25	1	-	-	100

AIM :

- Aware students of the history of physics and its scope.
- Acquaint the basic concept of Physics as a subject.
- Basic concepts related to Classical Mechanics.
- Learn laboratory skills for handling instruments.

COURSE CONTENTS

Course Outline for Theory

UNIT	COURSE CONTENT	TEACHING HOURS
I	**Fundamentals of Dynamics** Reference frames. Inertial frames; Galilean transformations; Galilean invariance. Review of Newton's Laws of Motion. Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse. Momentum of variable-mass system: motion of rocket. **Work and Energy** Work and Kinetic Energy Theorem. Conservative and non conservative forces. Potential Energy. Energy diagram. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy.	**15**
II	**Elasticity** Hooke's law, Stress-strain diagram, Elastic moduli-relation between elastic constants, Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants, Work done in stretching and work done in twisting a wire, Twisting	**15**

	couple on a cylinder, Determination of Rigidity modulus by static torsion, Torsional pendulum, Determination of Rigidity modulus and moment of inertia, q, η and σ by Searle's method. **Rotational Dynamics** Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation.	
III	**Gravitation and Central Force Motion** Law of gravitation. Gravitational potentialenergy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS). Physiological effects on astronauts.	**15**

Course Outline for Practical

Sr. No.	Course Contents
1	Measurement of length (or diameter) using Vernier caliper, screw gauge and travelling microscope.
2	To determine 'g' by bar pendulum.
3	To determine the moment of inertia of a flywheel.
4	To determine the elastic constants of a wire by Searl's method.
5	To study the motion of a spring and calculate (a) spring constant (b) value of 'g'.
6	To determine the height of a building using a sextant.
7	Determine of 'g' by simple pendulum.
8	To determine moment of inertia of disc and modulus of rigidity by torsion pendulum.
9	To determine the Young's Modulus of a Wire by Optical Lever Method.
10	To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
	Total Hours - 30

TEACHING METHODOLOGY:

- Conventional method (classroom blackboard teaching)
- ICT Techniques
- Teaching through the classroom, laboratory work
- Variety of learning styles and tools (PowerPoint presentations, audio-visual resources, e-resources, seminars, workshops, models)
- Teaching through laboratory work

LEARNING OUTCOME:

- After the successful completion of the course, students will be able to learn about Newton's Law of Gravitation, Kepler's laws of planetary motion, satellites, vector analysis and laws of motion, conservation of energy and momentum, moment of inertia, elasticity, Young's modulus, bulk modulus, modulus of rigidity.

Arrangement of lectures duration and practical session as per defined credit numbers:

Units	Lecture Duration (In Hrs.)		Calculation of Credits (In Numbers)		Total Lecture Duration	Credit Calculation
	Theory	Practical	Theory	Practical	Theory+ Practical	Theory+ Practical
Unit – 1	15	30	3	1	45 + 30	4
Unit – 2	15					
Unit – 3	15					
TOTAL	45	30	3	1	75	4

Evaluation

Theory Marks	Practical Marks	Total Marks
75	**25**	**100**

REFERENCE BOOKS:

1. 'B. Sc. Practical Physics', **C. L. Arora**, *S. Chand and Company Ltd*.
2. 'Advanced Practical Physics', **M. S. Chauhan and S. P. Sing**, *Pragati Prakashan*.
3. 'Experimental Physics', **University Granth Nirman Board**, (Gujarati Medium).
4. 'Physics through experiments Vol. I & II', **B. Saraf et al.**, *Vikas Publishing House*.
5. 'Advanced Practical Physics', **S. L. Gupta and V. Kumar**,*Pragati Prakashan*.
6. 'An advanced course in practical Physics', **D. Chattopadhyay and P. C. Rakshit**,*New Central Book Agency Pvt. Ltd.*
7. 'Electronic Laboratory Primer', **Poorna Chandra and Sasikala**,*S. Chand and Company Ltd*.
8. 'Advanced Practical Physics for Students', **B. L. Wosnop and H. T. Flint**,*Asia Publishing House*.
9. 'Advanced Level Physics Practicals', **Michael Nelson and Jon M. Ogborn**, 4th Ed., *Heinemann Educational Publishers*.
10. 'Engineering Practical Physics', **S. Panigrahi and B. Mallick**, *Cengage Learning India Pvt. Ltd*.
11. 'A Text Book of Practical Physics', **Indu Prakash and Ramakrishna**, 11th Ed., *Kitab Mahal*.
12. 'A Laboratory Manual of Physics for Undergraduate Classes', **D. P. Khandelwal**, *Vani Publication*.
13. 'Basic Electronics: A Text Lab Manual, **P. B. Zbar, A. P. Malvino and M. A. Miller**, *McGraw Hill*.