Vidyasagar University

Curriculum for B.Sc (General) in Physics [Choice Based Credit System]

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	Т	Р		
CC1 [DSC-1A]		C1T:Mechanics	Core Course-1	4	0	0	6	75
		C1P:Mechanics		0	0	4		
CC2	TBD	DSC-2A	Core				6	75
[DSC-2A]		(other Discipline)	Course-2					
CC3	TBD	DSC-3A	Core				6	75
[DSC-3A]		(other Discipline)	Course-3					
AECC		English	AECC (Elective)	1	1	0	2	50
Semester Total							20	275

Semester-I

L=Lecture, T=Tutorial, P=Practical, CC = Core Course, TBD = To be decided, AECC= Ability Enhancement Compulsory Course

DSC-1 = Discipline Specific Core of Subject-1, **DSC-2** = Discipline Specific Core of Subject-2,**DSC-3** = Discipline Specific Core of Subject-3.

Semester-I Core Course (CC)

CC-1: Mechanics

C1T: Mechanics

Vectors: Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter.

Ordinary Differential Equations:1st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients.

Laws of Motion: Frames of reference. Newton's Laws of motion. Dynamics of a system of particles. Centre of Mass.

Momentum and Energy: Conservation of momentum. Work and energy. Conservation of energy. Motion of rockets.

Rotational Motion: Angular velocity and angular momentum. Torque. Conservation of angular momentum.

Gravitation: Newton's Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's Laws (statement only). Satellite in circular orbit and applications.Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS).

Oscillations: Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages. Damped oscillations.

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 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 Searles method

Special Theory of Relativity: Constancy of speed of light. Postulates of Special Theory of Relativity. Length contraction. Time dilation. Relativistic addition of velocities.

C1P: Mechanics (Practical)

- 1. Measurements of length (or diameter) using vernier caliper, screw gauge and travelling microscope.
- 2. To determine the Height of a Building using a Sextant.
- 3. To determine the Moment of Inertia of a Flywheel.
- 4. To determine the Young's Modulus of a Wire by Optical Lever Method.
- 5. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
- 6. To determine the Elastic Constants of a Wire by Searle's method.
- 7. To determine g by Bar Pendulum.

Credits 06

Credits 04

Credits 02

- 8. To determine g by Kater's Pendulum.
- 9. To determine **g** and velocity for a freely falling body using Digital Timing Technique
- 10. To study the Motion of a Spring and calculate (a) Spring Constant (b) Value of g

Suggested Readings:

- 1. University Physics. FW Sears, MW Zemansky and HD Young13/e,. Addison- Wesley
- 2. Mechanics Berkeley Physics course, v.1: Charles Kittel, et. Al., Tata McGraw-Hill.
- 3. Physics Resnick, Halliday & Walker 9/e, , Wiley
- 4. Engineering Mechanics, Basudeb Bhattacharya, 2nd edn., , Oxford University Press
- 5. University Physics, Ronald Lane Reese, , Thomson Brooks/Cole.
- 6. Advanced Practical Physics for students, B.L.Flint and H.T.Worsnop, Asia Publishing House.
- 7. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted, Heinemann Educational Publishers.
- 8. Engineering Practical Physics, S.Panigrahi & B.Mallick, Cengage Learning India Pvt. Ltd.
- 9. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, Kitab Mahal, New Delhi.