4 Scheme for CBCS Curriculum B.Sc. (General) Program with *Physics* as one of the disciplines

- **Scheme for CBCS Curriculum**

Semester	Course Name	Course Detail	Credits
I	Ability Enhancement Compulsory Course – I	English communication / Environmental Science	2
	Core course – I (from Physics)	**PHSGCOR01T** : Mechanics	4
		PHSGCOR01P : Mechanics Lab	2
	Core course – II	DSC 2A (from Discipline 2)	6
	Core course – III	DSC 3A (from Discipline 3)	6
II	Ability Enhancement Compulsory Course – II	English communication / Environmental Science	2
	Core course – IV (from Physics)	**PHSGCOR02T** : Electricity and Magnetism	4
		PHSGCOR02P : Electricity and Magnetism Lab	2
	Core course – V	DSC 2B (from Discipline 2)	6
	Core course – VI	DSC 3B (from Discipline 3)	6
III	Core course – VII (from Physics)	**PHSGCOR03T** : Thermal Physics and Statistical Mechanics	4
		PHSGCOR03P : Thermal Physics and Statistical Mechanics Lab	2
	Core course – VIII	DSC 2C (from Discipline 2)	6
	Core course – IX	DSC 3C (from Discipline 3)	6
	Skill Enhancement Course – 1	TBD	2
IV	Core course – X (from Physics)	**PHSGCOR04T** : Waves and Optics	4
		PHSGCOR04P : Waves and Optics Lab	2
	Core course – XI	DSC 2D (from Discipline 2)	6
	Core course – XII	DSC 3D (from Discipline 3)	6
	Skill Enhancement Course-2	TBD	2
V	Skill Enhancement Course-3	TBD	2

	Discipline Specific Elective – 1	TBD (from Physics)	6
	Discipline Specific Elective – 2	TBD (from Discipline 2)	6
	Discipline Specific Elective – 3	TBD (from Discipline 3)	6
VI	Skill Enhancement Course-4	TBD	2
	Discipline Specific Elective – 4	TBD (from Physics)	6
	Discipline Specific Elective – 5	TBD (from Discipline 2)	6
	Discipline Specific Elective – 6	TBD (from Discipline 3)	6

*TBD: To be decided by the student among the available choices mentioned below.

5. Syllabi of Core Papers (from Physics) for B.Sc. General with Physics

- **PHSGCOR01T - Mechanics**

Mechanics	
60 Lectures	**4 Credits**
Mathematical Methods	**10 Lectures**
Vectors: Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter. Ordinary Differential Equations: 1^{st} order homogeneous differential equations. 2^{nd} order homogeneous and inhomogeneous differential equations with constant coefficients.	
Particle Dynamics	**21 Lectures**
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	**8 Lectures**
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	**6 Lectures**
Oscillations: Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages. Damped oscillations. Forced harmonic oscillations, resonance.	
Elasticity	**8 Lectures**
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.- Bending of beam.

Special Theory of Relativity	**7 Lectures**

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

Reference Books

- Classical Mechanics. T.W.B. Kibble and F.H. Berkshire, 2004, Imp. Col. Press, World Scientific.
- An introduction to mechanics, D. Kleppner, R.J. Kolenkow, 1973, McGraw-Hill.
- Classical Dynamics of Particles and Systems. S.T. Thornton and J. B. Marion, 2009, Brooks/Cole.
- Mechanics, Berkeley Physics, vol.1, C.Kittel, W.Knight, et.al. 2007, Tata McGraw-Hill.
- Physics, Resnick, Halliday and Walker 8/e. 2008, Wiley.
- University Physics. F.W Sears, M.W Zemansky, H.D Young 13/e, 1986, Addison Wesley
- Theoretical Mechanics, M.R. Spiegel, 2006, Tata McGraw Hill.
- Classical Mechanics and General Properties of Matter. S.N. Maiti and D.P. Raychaudhuri, New Age
- Feynman Lectures, Vol. I, R.P.Feynman, R.B.Leighton, M.Sands, 2008, Pearson Education
- Introduction to Special Relativity, R. Resnick, 2005, John Wiley and Sons.
- Special Relativity (MIT Introductory Physics). A.P. French, 2018, CRC Press.
- University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
- Analytical Mechanics, G.R. Fowles and G.L. Cassiday. 2005, Cengage Learning.

- **PHSGCOR01P – Mechanics Lab**

Mechanics	
60 class hours	**2 Credits**

General Topic

Discussion on random errors in observations. Measurement principles of length (or diameter) using vernier caliper, screw gauge and travelling microscope. Discussion on the parts of Sextant.

List of Practical

1. To study the random error in observations of time period of some oscillation using chronometer.
2. To determine the Moment of Inertia of a regular body using another auxilary body and a cradle suspeded by a metalic wire.
3. To determine g and velocity for a freely falling body using Digital Timing Technique
4. To determine the Young's Modulus by flexure method.
5. To determine the Modulus of Rigidity of a Wire by a torsional pendulum.
6. To determine the height of a building using a Sextant.
7. To determine the elastic Constants of a wire by Searle's method.
8. To determine the value of g using Bar Pendulum.
9. To determine the value of g using Kater's Pendulum.
10. To study the Motion of Spring and calculate, (a) Spring constant, (b) g and (c) Modulus of rigidity.

Reference Books

- Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House
- Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
- A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Edn, 2011, Kitab Mahal
- Engineering Practical Physics, S.Panigrahi & B.Mallick, 2015, Cengage Learning India Pvt. Ltd.
- Practical Physics, G.L. Squires, 2015, 4th Edition, Cambridge University Press.