U.G. PROGRAM B. Sc. Physics (Hons.)

SEM- I- Paper -I

SUB-JECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment *	End Sem University Exam	Teachers Assessment*				
BSPH 102	DC	**General Properties and Mechanics**	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A – Quiz/Assignment/Attendance, MST Mid Sem Test.

*Teacher Assessment shall be based on following components: Quiz/Assignment/ Project/Participation in class (Given that no component shall be exceed 10 Marks)

Course Objectives:-

1. To develop the comprehensive understanding of laws of physics related to General Properties and Mechanics and ability to apply them for laying the foundation for research and development.
2. To work ethically as member as well as leader in a diverse team.

Course Outcomes:-

1. Student will be able to understand and solve the problems related to General Properties and Mechanics and Student will be able to understand and solve the problems related to General Properties and Mechanics
2. Student will be able to determine physical parameter experimentally with optimal usage of resources and complete the assignments in time.

(5)

BSPH 102: General Properties and Mechanics

Unit – I: Conservation Laws

System of particles: Centre of mass for a system of particles, motion of the centre of mass. Expressions for kinetic energy, linear momentum and angular momentum for a system of particles in terms of centre of mass values. Central forces and the law of conservation of angular momentum

Unit-II: Elasticity

Elasticity, Effect of temperature and impurities on elasticity of a substance; deformation, Stress and Strain; Hook's law, Young's modulus, Poission's ratio, Relationship between the various elastic moduli. Bending of beam and bending moment, Cantilever, transverse oscilations of a cantilever. Elastic and Inelastic Collisions between particles

Unit- III: Oscillations

SHM: Simple Harmonic Oscillations, Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor.

Unit-IV: Rotational Dynamics

Angular momentum, Torque, Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinctic energy of rotation. Motion involving both translation and rotation. Kepler's laws, deduction of Newton's law of gravitation from Kepler's laws.

Unit-V: Fluid Mechanics

Ideal and Viscous fluid, Stream line nd Turbulent flow, Reynold's number, Rotational and irrotatinal flow, Equation of continuity, Bernoulli's theorem, viscous flow of fluids, Effect of pressure and temperature on the coefficient of viscosity. Intermolecular forces- cohesive and adhesive forces, Surface tension, Surface energy, Effect of temperature and impurities on the surface tension, Angle of contact; expression for pressure on a curved surface.

References

1. Mathur, D.S. : Mechanics (S. Chand)
2. Mechanics, Berkeley Physics, vol.1, C.Kittel, W.Knight, et.al. 2007, Tata McGraw-Hill.
3. Berkley Physics Course vol. I (Mechanics)
4. Halliday and Resnic; Physics, vol. I
5. Keppler and Kolenkow; Classical Mechanics
6. Halliday and Resnick; Physics, vol. I
7. Klepper and Kolenkow; Classical Mechanics

List of experiments: (Any Eight)

1. To verify laws of perpendicular axes for moment of inertia.
2. To determine acceleration due to gravity using compound pendulum.
3. To determine Young's Modulus by bending of beam method.
4. To determine Young's Modulus using Cantilever method.
5. To determine Surface Tension by Jaeger's method.
6. To determine Viscosity of fluid using Poisellie's method.
7. To determine Modulus of rigidity by Torsion pendulum.
8. To determine Young's Modulus of long wire by Searl's method.
9. To determine Poisson's ratio of rubber tube.
10. To determine the force constant of the given spring and to verify that the force constant of a parallel combination of spring.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

U.G. PROGRAM B. Sc. Physics (Hons.)

SEM- I- Paper -II

Basic Mathematical Physics

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment	End Sem University Exam	Teachers Assessment				
BSPHPH103	DC	Basic Mathematical Physics	60	20	20	0	0	4	0	0	4

Course Objectives:-

- To develop the comprehensive understanding of laws of Mathematical Physics and ability to apply them for laying the foundation for research and development.
- To work ethically as member as well as leader in a diverse team.

Course Outcomes:-

- Student will be able to understand and solve the problems related to Mathematical Physics.
- Student will be able to determine physical parameter experimentally with optimal usage of resources and complete the assignments in time.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

BSPHPH103: Mathematical Physics

Unit-I: Vector Calculus: Scalar and vector fields, gradient, divergence and curl with their physical significance. Line, Surface and Volume Integrals.Important Vector Identities.Introduction to Gauss's divergence and Stoke's theorem and their applications.

Unit-II: Matrices: Introduction, Review of Algebraic Operation of Matrices, Sub-matrices. Special types of matrices.Transpose and Conjugate of a Matrix.Symmetric andAntisymmetric Matrices, Hermitian and Skew- Hermitian Matrices, Determinant of a matrix, Trace and Rank of a Matrix.Eigen values, Eigen Vectors; Characteristic equation of a Matrix.Cayley- Hamilton Theorem.

Unit-III: Orthogonal curvilinear coordinates; cylindrical and spherical polar coordinates- divergence, gradient, curl and Laplacian in these coordinates. Unit Vectors in Cylindrical and Spherical Coordinates. Expression for Velocity and Acceleration in Cylindrical and Spherical Coordinates.

Unit-IV: Reference Frames: Inertial Frames and Galilean Transformations. Galilean Invariance andConservation Laws.Non-inertial Frames and Fictitious Forces.Uniformly Rotating Frame.Centrifugal forces: CoriolisForce and itsApplications.Michelson-Morley Experiment and its Outcome.

Unit-V: Postulates of Special Theory of Relativity. Lorentz Transformations.space-time interval between the two events, Simultaneity and Order of Events. Lorentz Contraction. Time Dilation.Relativistic Transformation of Velocity, Frequency and Wave Number.Theorem of Addition of Relativistic Velocities.Variation of Mass with Velocity.Particle with zero rest mass.Mass energy Equivalence.Relationship between the relativistic energy and momentum.

Reference Books:

1. An introduction to ordinary differential equations, E.A. Coddington, 2009, PHI learning
2. Differential Equations, George F. Simmons, 2007, McGraw Hill.
3. Mathematical Tools for Physics, James Nearing, 2010, Dover Publications.