



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

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*				
HU101	1	Foundation English I	60	20	20	0	20	3	0	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

.Course Educational Objectives (CEOs): The students will be able to:

- Develop the second language learners' ability to enhance and demonstrate LSRW Skills.
- Enable students to acquire English Language Skills to further their studies at advanced levels.
- prepare students to become more confident and active participants in all aspects of their undergraduate programs


Course Outcomes (COs): The students should be able to:

- Enhance confidence in their ability to read, comprehend, organize, and retain written information.
- Write grammatically correct sentences for various forms of written communication to express oneself.

COURSE CONTENTS:

UNIT I

Communication: Nature, Meaning, Definition, Process, Functions and importance, Characteristics of Business Communication Verbal and Non Verbal Communication Barriers to Communication.


Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore


Joint Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
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UNIT II

Listening: Process, Types, Difference between Hearing and Listening, Benefits of Effective Listening Barriers to Effective Listening, Overcoming Listening Barriers, and How to Become an Effective Listener

UNIT III

Basic Language Skills: Grammar and usage- Parts of Speech, Tenses, S-V Agreement, Preposition, Article, Types of Sentence, Direct - Indirect, Active - Passive voice, Phrases & Clauses.

UNIT IV

Business Correspondence : Business Letters, Parts & Layouts of Business Letter, Resume and Job application , Application Calling/ Sending Quotations/ Orders/ Complaints. E-mail writing

UNIT V

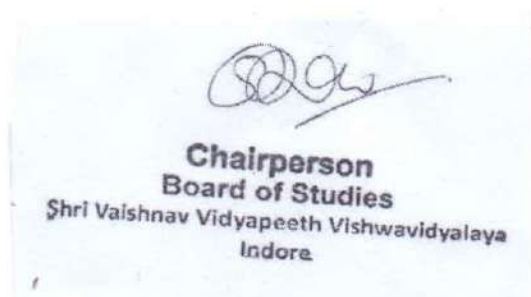
Précis Writing, Noting: The Purpose of Notes, Methods of Note-Taking, General Principles of Good Notes. Drafting: Notice, Agenda and Minutes. Advertisement: Importance, Types, Various Media of Advertising. Slogan Writing.

Practical:

- Self Introduction
- Reading Skills and Listening Skills
- Linguistics and Phonetics
- Role play
- Oral Presentation – Preparation & Delivery using Audio – Visual Aids with stress on body language and voice modulations.

Suggested Readings

- Ashraf Rizvi.(2005).*Effective Technical Communication*. New Delhi:Tata Mc Graw Hill
- A.J. Thomson and A.V. Martinet(1991).*A Practical English Grammar*(4th ed). Newyork: Ox- ford IBH Pub.
- Kratz, Abby Robinson (1995). *Effective Listening Skills*. Toronto: ON: Irwin Professional Publishing.
- Adair, John (2003). *Effective Communication*. London: Pan Macmillan Ltd.





Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

B. Sc. Physics Hons

I Sem

Subject Code	Category	Subject Name	Teaching and Evaluation Scheme								
			Theory			Practical		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment *	End Sem University Exam	Teachers Assessment *				
BSPH102	DC	General Properties of Matter	60	20	20	30	20	3	1	0	4

Course Objectives	<ol style="list-style-type: none"> To develop the comprehensive understanding of laws of physics related to General Properties of Matter 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 Ourcomes	<ol style="list-style-type: none"> Student will be able to understand and solve the problems related to General Properties of Matter. Student will be able to determine physical parameter experimentally with optimal usage of resources and complete the assignments in time.

Abbreviation		Teacher Assessment (Theory) shall be based on following components: Quiz / Assignment/ Project / Participation in class (Given that no component shall be exceed 10 Marks).
Th	Theory	
T	Tutorial	
P	Practical	Teacher Assessment (Practical) shall be based on following components: Viva / File / Participation in Lab work (Given that no component shall be exceed 50% of Marks).



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BSPH 102: General Properties of Matter

UNIT I: System of Many Particles

System of particles and equation of motion, Centre of mass for a system of particles, motion of the centre of mass, law of conservation of linear momentum for a system of one, two, n particles, law of conservation of angular momentum for a single particle, system of n particles and examples, recoil velocity on firing a bullet from a gun, motion of a boat or propulsion of an aeroplane, jet propulsion, motion of rocket. Keplers law of Planetary motion.

UNIT II: Rotational Dynamics

Motion of rigid body, rotatory motion, equations of rotationary motion of a particle under a constant angular acceleration, angular momentum and concept of moment of inertia in rotational motion, Newtons law of motion in rotational motion, Moment of inertia and its examples, radius of gyration, rotatinal kinetic energy, relation between Torque and moment of inertia, Kinetic energy of rotation, Theorem of parallel axis, theorem of perpendicular axis.

UNIT III: Elasticity

Elasticity, Effect of temperature and impurities on elasticity of a substance; small deformation, Stress and Strain; Hook's law, elasticity constants for an isotropic solid, Young's modulus, Bulk Modulus, Modulus of rigidity, Poission's ratio, Relationship between the various elastic moduli. Bending of beam and bending moment, Cantilever, transverse oscilations of a cantilever, torsion of cylinder.

UNIT IV: 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, motion of simple pendulum, motion of compound pendulum, motion of mass connected with spring, motion of torsional pendulum,

UNIT V: Fluid Mechanics

Ideal and Viscous fluid, Stream line and Turbulent flow, Reynold's number, Rotational and irrotatinal flow, Equation of continuity, Bernoulli's theorem and its application, Stokes law, viscous flow of fluids,



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Effect of pressure and temperature on the coefficient of viscosity, Poiseulle's formula, 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

1. To verify laws of Perpendicular axes for moment of inertia.
2. To determine Acceleration due to gravity using compound pendulum.
3. To determine Coefficient of Viscosity of fluid using Stoke's law.
4. To determine Young's Modulus using Cantilever method.
5. To determine Surface Tension by Jaeger's method.
6. To determine Coefficient of Viscosity of fluid using Poiseuille's method.
7. To determine Modulus of rigidity by Torsional 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.



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B. Sc. Physics Hons

I Sem

Subject Code	Category	Subject Name	Teaching and Evaluation Scheme								
			Theory			Practical		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment	End Sem University Exam	Teachers Assessment				
BSPHPH 103	DC	Mathematical Physics and Relativity	60	20	20	0	0	4	1	0	5

Course Objectives	<ol style="list-style-type: none"> To develop the comprehensive understanding of laws of physics related to Mathematical Physics and Relativity 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 Ourcomes	<ol style="list-style-type: none"> Student will be able to understand and solve the problems related to Mathematical Physics and Relativity. Student will be able to determine physical parameter experimentally with optimal usage of resources and complete the assignments in time.

Abbreviation		Teacher Assessment (Theory) shall be based on following components: Quiz / Assignment/ Project / Participation in class (Given that no component shall be exceed 10 Marks).
Th	Theory	
T	Tutorial	
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BSPHPH 103: Mathematical Physics and Relativity

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 and Antisymmetric 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 and Conservation Laws. Non-inertial Frames and Fictitious Forces. Uniformly Rotating Frame. Centrifugal forces: Coriolis Force and its Applications, Michelson-Morley Experiment and its Outcome.

UNIT V: Relativity: 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.

REFERENCES

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.



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Name of the Program: **B. Sc. (Honours)**

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM	MST	Q/A	END SEM	Q/A				
BSHMA104	HONS	Classical Algebra & Analytical Geometry of two dimensions	60	20	20	-	-	4	0	-	4

Course Objective

To introduce the students with the Fundamentals of the Classical Algebra and Analytical Geometry of two dimensions.

Course Outcomes

After the successful completion of this course students will be able to

- 1. understand and apply the basics of the Set theory.*
- 2. know the fundamental principles of the algebra of the complex numbers.*
- 3. apply the techniques to find the roots of an equation after knowing the relation between the roots and the coefficients.*
- 4. know the basic principles of the Analytical Geometry of two dimensions.*
- 5. understand and apply the basics of the calculus of the Matrices.*

Course Content:

UNIT – I

Classical Algebra: Complex Numbers: De Moivre's Theorem and its applications. Exponential, Sine, Cosine and Logarithm of a complex number. Definition of az , ($a \neq 0$). Inverse circular and Hyperbolic functions. **Polynomials:** Fundamental Theorem of Classical Algebra (Statement only). Polynomials with real co-efficients: The n th degree polynomial equation has exactly n roots. Nature of roots of an equation (Surd or Complex roots occur in pairs). Statement of Descartes's Rule of signs and its applications.



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Name of the Program: B. Sc. (Honours)

UNIT – II

Polynomials: Statements of: (i) If the polynomial $f(x)$ has opposite signs for two real values of x , e.g. a and b , the equation $f(x) = 0$ has an odd number of real roots between a and b ; if $f(a)$ and $f(b)$ are of same sign, either no real root or an even number of roots lies between a and b . Rolle's Theorem and its direct applications. Relation between roots and co-efficients. Symmetric functions of roots, Transformations of equations. Cardan's method of solution of a cubic.

UNIT – III

Determinants up to the third order : Properties, Cofactor and Minor. Product of two determinants. Adjoint, Symmetric and Skew-symmetric determinants. Solutions of linear equations with not more than three variables by Cramer's Rule. **Matrices of Real Numbers:** Equality of matrices. Addition of matrices. Multiplication of matrices and properties. Transpose and its properties. Inverse of matrix. Symmetric and Skew-symmetric matrices. Scalar matrix. Orthogonal matrix. Elementary operations on matrices. **Rank of a matrix :** Rank a Matrix. Consistency and solution of a system of linear of equations with not more than 3 variables by matrix method.

UNIT – IV

Analytical Geometry of 2 Dimensions: Transformations of Rectangular axes : Translation, Rotation and their combinations. Invariants. General equation of second degree in x and y : Reduction to canonical forms. Classification of conic. **Pair of straight lines :** Condition that the general equation of 2nd degree in x and y may represent two straight lines. Points of intersection of two intersecting straight lines. Angle between two lines given by $ax^2 + 2hxy + by^2 = 0$. Equation of bisectors. Equation of two lines joining the origin to the points in which a line meets a conic.

UNIT – V

Analytical Geometry of 2 Dimensions: Equations of pair of tangents from an external point, chord of contact, poles and polars in case of General conic : Particular cases for Parabola, Ellipse, Circle, Hyperbola. Polar equation of straight lines and circles. Polar equation of a conic referred to a focus as pole. Equation of chord joining two points. Equations of tangent and normal.

BOOKS:

1. The Theory of Equations (Vol. I) – Burnside and Panton.
2. Topics in Algebra – Herstein.
3. Test book of algebra – Leadership Project Committee (University of Bombay).
4. Abstract Algebra – N. P. Chaudhuri (Tata Mc.Graw Hill).
5. Linear Algebra – Hadley
6. Test Book of Matrix – B. S. Vaatsa
7. Co-ordinate Geometry – S. L. Loney.
8. Solid Analytic Geometry – C. Smith.
9. Higher Geometry – Efimov.



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
DEGREE PROGRAM B.Sc. (Maths / Physics Honours)

Semester-I (B.Sc. - Honours)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			EN D S E M U n i v e r s i t y E x a m	T w o T e r m E x a m	T e a c h e r s A s s e s s m e n t*	E N D S E M U n i v e r s i t y E x a m	T e a c h e r s A s s e s s m e n t*				
BSHCH105	HONS	Chemistry - I (Atomic Structure, Bonding, General Organic Chemistry)	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;
***Teacher Assessment shall be based following components: Quiz/Assignment/Project/Participation in Class, given that no component shall exceed more than 10 marks.**

Course Objectives:-

To give basic knowledge of Basic Chemistry.

To understand and apply the knowledge of Atomic Structure and Bonding.

Course Outcomes:-

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The student will demonstrate capability of CO1. Theoretical understanding of various state of matter.

CO2. Became aware of the importance of Chemistry and its laws in the field of chemistry and dealing with its numerical approach.

UNIT 1: Inorganic Chemistry-1

Atomic Structure: Review of: Bohr's theory and its limitations, dual behaviour of matter and radiation, de Broglie's relation, Heisenberg Uncertainty principle. Hydrogen atom spectra. Need of a new approach to Atomic structure.

What is Quantum mechanics? Time independent Schrodinger equation and meaning of various terms in it. Significance of ψ and ψ^2 , quantum numbers, orbital angular momentum and quantum numbers m_l and m_s . Shapes of s , p and d atomic orbitals, nodal planes. Discovery of spin, spin quantum number (s) and magnetic spin quantum number (m_s).

Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configurations.



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DEGREE PROGRAM B.Sc. (Maths / Physics Honours)

UNIT 2: Chemical Bonding and Molecular Structure

Ionic Bonding: General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Polarizing power and polarizability. Fajan's rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character.

Covalent bonding: VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements.

UNIT 3: Organic Chemistry-1

Fundamentals of Organic Chemistry

Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis.

Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals.

Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Benzenoids and Hückel's rule.

UNIT 4:

Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). Threo and erythro; D and L; *cis - trans* nomenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) and E / Z Nomenclature (for upto two C=C systems).

UNIT 5: Physical Chemistry-1

Kinetic Theory of Gases

Postulates of Kinetic Theory of Gases and derivation of the kinetic gas equation.

Deviation of real gases from ideal behaviour, compressibility factor, causes of deviation. van der Waals equation of state for real gases. Boyle temperature (derivation not required). Maxwell Boltzmann distribution laws of molecular velocities and molecular energies (graphic representation – derivation not required) and their importance.

Temperature dependence of these distributions. Most probable, average and root mean square velocities (no derivation). Collision cross section, collision number, collision frequency, collision diameter and mean free path of molecules. Viscosity of gases and effect of temperature and pressure on coefficient of viscosity (qualitative treatment only).

Liquids

Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only).



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
DEGREE PROGRAM B.Sc. (Maths / Physics Honours)

Semester-II (B.Sc. - Honours)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			EN D S E M U n i v e r s i t y E x a m	T w o T e r m E x a m	T e a c h e r s A s s e s s m e n t*	E N D S E M U n i v e r s i t y E x a m	T e a c h e r s A s s e s s m e n t*				
BSHCH205	HONS	Chemistry - II (Chemical Energetic, Equilibria & Functional Organic Chemistry)	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

Course Objectives:-

- To give basic knowledge of state of matter.
- To understand and apply the knowledge of equilibria.

Course Outcomes:-

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The student will demonstrate capability of CO1. Theoretical understanding of various state of matter.

CO2. Became aware of the importance of equilibria and its laws in the field of chemistry and dealing with its numerical approach.

UNIT 1: Physical Chemistry

Chemical Energetic

Review of thermodynamics and the Laws of Thermodynamics. Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchoff's equation.

UNIT 2: Chemical Equilibrium:

Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between G and G° , Le Chatelier's principle. Relationships between K_p , K_c and K_x for reactions involving ideal gases.



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DEGREE PROGRAM B.Sc. (Maths / Physics Honours)

UNIT 3:

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

UNIT 4:

Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid.

Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation. Friedel-Craft's reaction (alkylation and acylation) (upto 4 carbons on benzene). Side chain oxidation of alkyl benzenes (upto 4 carbons on benzene).

UNIT 5: Alcohols, Phenols and Ethers (Upto 5 Carbons)

Alcohols: *Preparation:* Preparation of 1^o, 2^o and 3^o alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acid and esters.

Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. KMnO₄, acidic dichromate, conc. HNO₃). Oppeneauer oxidation *Diols:* (Upto 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement.

Phenols: (Phenol case) *Preparation:* Cumene hydroperoxide method, from diazonium salts. *Reactions:* Electrophilic substitution: Nitration, halogenation and sulphonation. Reimer-Tiemann Reaction, Gattermann-Koch Reaction, Houben–Hoesch Condensation, Schotten – Baumann Reaction.

Ethers (aliphatic and aromatic): Cleavage of ethers with HI.

Reference Books:

1. Graham Solomon, T.W., Fryhle, C.B. & Snyder, S.A. *Organic Chemistry*, John Wiley & Sons (2014).
2. McMurry, J.E. *Fundamentals of Organic Chemistry*, 7th Ed. Cengage Learning India Edition, 2013.
3. Sykes, P. *A Guidebook to Mechanism in Organic Chemistry*, Orient Longman, New Delhi (1988).
4. Finar, I.L. *Organic Chemistry* (Vol. I & II), E.L.B.S.
5. Morrison, R.T. & Boyd, R.N. *Organic Chemistry*, Pearson, 2010.