Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
B.Sc. (Chemistry) Honours
SEMESTER I (Batch 2019-2022)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM	Two	Teache	END SEM	Teacher				
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.

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.

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SEMESTER I (Batch 2019-2022)

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY	PRACTICAL			
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BSHCH102	DC	Concept of Physical Chemistry-I	3	1	0	4	60	20	20	0	0

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Concept of Physical Chemistry- I

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 I: Gaseous state:

Kinetic molecular model of a gas: postulates and derivation of the kinetic gas equation; collision frequency; collision diameter; mean free path and viscosity of gases, including their temperature and pressure dependence, relation between mean free path and coefficient of viscosity, calculation of σ from η ; variation of viscosity with temperature and pressure.

Maxwell distribution and its use in evaluating molecular velocities (average, root mean square and most probable) and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities.

Unit II: Liquid state:

Qualitative treatment of the structure of the liquid state; physical properties of liquids; vapour pressure, surface tension and coefficient of viscosity, and their determination. Effect of addition of various solutes on surface tension and viscosity. Explanation of cleansing action of detergents. Temperature variation of viscosity of liquids and comparison with that of gases. Qualitative discussion of structure of water.

Unit III: Solid state:

Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of rotating crystal method and powder pattern method. Analysis of powder diffraction patterns of NaCl, CsCl and KCl. Defects in crystals. Glasses and liquid crystals.

Unit IV: Ionic equilibria:

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono-, di- and tri-protic acids (exact treatment). Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions; derivation of Henderson equation and its applications.

Unit V: Phase equilibria:

Definitions of phase, component and degrees of freedom. Phase rule and its derivations. Definition of phase diagram. Phase equilibria for one component system – water, CO2. First order phase transition and Clapeyron equation; Clausius-Clapeyron equation - derivation and use. Solid-liquid phase diagram. Eutectic mixture.

Recommended Texts:

1. Atkins, P. W. & Paula, J. de Atkin's Physical Chemistry 8th Ed., Oxford University Press (2006).
2. Ball, D. W. Physical Chemistry Thomson Press, India (2007).
3. Castellan, G. W. Physical Chemistry 4thEd. Narosa (2004).
4. Mortimer, R. G. Physical Chemistry3rd Ed. Elsevier: NOIDA, UP (2009).

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COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BSHCH103	DC	Concept of Inorganic Chemistry-I	3	1	0	4	60	20	20	0	0

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Concept of Inorganic Chemistry - I

Course Objectives:-
To give basic knowledge of structure of atom.
To understand and apply the knowledge of chemical 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 structure of atom.
CO2. Became aware of the importance of bonding and its theory in the field of chemistry and dealing with its molecular structure of various compounds.

Unit I: Atomic Structure :

Bohr's theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de Broglie equation, Heisenberg's uncertainty principle and its significance, Postulates of Quantum mechanices ,Schrödinger's wave equation,eigen value and eigen function , significance of ψ and ψ2. Quantum numbers and their significance. Normal and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions. Radial and angular distribution curves.
Shapes of s, p, d and f orbitals. Contour boundary and probability diagrams. Pauli s exclusion principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations, Variation of orbital energy with atomic number.

Unit II: Periodicity of Elements:

s, p, d, f block elements, the long form of periodic table. Detailed discussion of the following properties of the elements, with reference to s & p- block. (a)Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table. (b)Atomic radii
(van der Waals) (c)Ionic and crystal radii. (d)Covalent radii (octahedral and tetrahedral)
(e)Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy.
Applications of ionization enthalpy. (f) Electron gain enthalpy, trends of electron gain enthalpy. (g)Electronegativity, Pauling/ Mulliken/ Allred Rachow/ and Mulliken-Jaffe electronegativity scales.

Variation of electronegativity with bond order, partial charge, hybridization, group electronegativity.

Unit-III: Chemical Bonding I:

Ionic bond: General characteristics, types of ions, size effects, radius ratio rule and its limitations, Born – Haber cycle and its application, Solvation energy.
Covalent bond: Lewis structure, Valence Bond theory (Heitler- London approach).

Energetics of hybridization, equivalent and non- equivalent hybrid orbitals. Bent'srule, Resonance and resonance energy. Valence shell electron pair repulsion theory (VSEPR). Multiple bonding(ζand π bond approach) and bond lengths. Covalent character in ionic compounds, polarizing power and polarizability. Fajan's rules and consequences of polarization. Molecular orbital theory. Molecular orbital diagrams of diatomic and simple polyatomic molecules, and their ions; (idea of s-p mixing and orbital interaction to be given).

Unit-IV: Chemical Bonding II:

Metallic Bond:Qualitative idea of valence bond and band theories. Semiconductors and insulators, defects in solids.

Weak Chemical Forces: Van der Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interaction. Hydrogen bonding (theories of hydrogen bonding, valence bond treatment). Melting and Boiling points and solubility.

Unit-V: Coordination Chemistry and Hydrogen:

Werner's Coordination theory and experimental verification, Effective atomic number concept, Chelates. Position of Hydrogen in periodic table, Occurrence, Isotopes. Preparations, Properties and uses of H_2. Compounds of Hydrogen, their physical and chemical properties. Hydrogen Economy.

Recommended Texts:

1. Lee, J.D. Concise Inorganic Chemistry, ELBS, 1991.
2. Douglas, B.E. and Mc Daniel, D.H., Concepts & Models of Inorganic Chemistry, Oxford, 1970
3. Atkins, P.W. & Paula, J. Physical Chemistry, Oxford Press, 2006.
4. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications 1962.
5. Malik, Tuli & Madan, Selected topics in Inorganic Chemistry, S Chand publications, 2010.

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SEMESTER I (Batch 2019-2022)

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	1. 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. 2. To work ethically as member as well as leader in a diverse team.
Course Ourcomes	1. Student will be able to understand and solve the problems related to General Properties of Matter. 2. 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	**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).**
P	Practical	

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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 Planetory 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,

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 Poisellie'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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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSBT 105	**DC**	**BIOCHEMISTRY**	60	20	20	30	20	3	0	2	4

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Course Objectives:

1. To have the knowledge of chemical nature of important biomolecules
2. To know the principles of techniques and instruments used in biological laboratories

Course Outcome:

1. Students will be able to understand the chemical nature of biomolecules and their physical and chemical properties
2. Students will be familiar with the analytical techniques and the working principles of the instruments used in biological laboratories

A. Biochemistry

Unit-I

Structure, classification and function ofCarbohydrates and Lipids
Structure and types of DNA and RNA

Unit - II

Structure, classification and function of Amino acids and Proteins
Structure and function of vitamins

Unit-III

Enzymes – Classification**,** Energy of activation andEnzyme kinetics, Michaelis – Menten equation. Cofactors and coenzymes; Isozyme, ribozyme and abzymes Allosteric enzymes

B. Instrumentation

Unit - IV

Spectroscopy: Beer Lambert's Law, Colorimeters, UV and Visible spectroscopy, Flame photometer. Chromatography: Paper, Thin layer, Ion exchange, affinity and Gel filtration

Unit – V

Electrophoresis: Agarose gel, SDS PAGE and Native PAGE.
Centrifugation – Basic principles, preparative and analytical centrifuges
Radioactivity – autoradiography, Geiger counterand Scintillation Counter.

Practical:

1. Qualitative and Quantitative [Nelson Somogyii's/DNS method] estimation of carbohydrates.
2. Qualitative and Quantitative [Folin Lowry's method] estimation of Proteins.
3. Determination of the enzyme activity by colorimetric methods
4. Effect of temperature on the activity of the given enzyme.
5. Effect of pH on the activity of the given enzyme
6. Effect of enzyme concentration on the activity of the given enzyme.
7. Effect of substrate concentration on the activity of the given enzyme and determination of V_{max} and K_m.
8. Determination of concentration of DNA by DPA method.
9. Determination of concentration of RNA byOrcinol method.
10. Separation of leaf pigments by paper chromatography.
11. Separation of aliphatic, aromatic and polar amino acids by TLC.
12. Isolation of biomolecules from natural sources.
13. Agarose gel electrophoresis of DNA/RNA sample.
14. Separation of proteins on the basis of size by SDS-PAGE.

Books:

1. Principles of Biochemistry. Lehniger, Nelson and Cox (Worth).
2. Biochemistry Stryer, W.H. Freeman.
3. Harper's Biochemistry, McGraw-Hill.
4. Zubey GL. Parson WW and Vance DE, Principles of Biochemistry – WM.C. Brown Publishers, Oxford, England
5. Fundamentals of Biochemistry, Jain, J.L..
6. Biochemical Methods of Analysis: *Theory and Applications*, SarojDua, S., Garg, N. Narosa Publishing House.
7. Biochemistry, Sharma, D.K. Narosa Publishing House
8. Experiments in Biotechnology – Nighojkar and Nighojkar

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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 andAnalytical 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≠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 occurin pairs). Statement of Descarte's Rule of signs and its applications.

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 rootor 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 equationswith 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 referredto a focus as pole. Equation of chord joining two points. Equations of tangentand normal.

BOOKS:

1. The Theory of Equations (Vol. I) – Burnside and Panton.
2. Topics in Algebra – Hernstein.
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.