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*				
HU201	**II**	**Foundation English II**	60	20	20	0	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher's Assessment** shall be based upon 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:**

- Participation in seminars, group discussions, paper presentation and general personal interactions at the professional level.
- Have adequate mastery over communicative english, reading and writing skills, secondarily listening and speaking skills.

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

- Improve their language skills, oral communication skills, group discussion skills, personal skills and confidence level.
- express his /her ideas and thoughts in speech or writing,
- Bridge the language gap vital to their success.
- Communicate effectively.

COURSE CONTENTS:

UNIT I

Communication: Objectives of Communication, Formal and Informal Channels of Communication, Advantages and Disadvantages, Extrapersonal communication, Interpersonal communication, Intrapersonal communication, Principles of communication.

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UNIT II

Developing Reading Skills: Reading Comprehension, Process, Active & Passive reading, Reading speed Strategies, Benefits of effective reading, SQ3R Reading technique.

UNIT III

Vocabulary Building: Using Dictionaries and Thesaurus, Synonyms, Antonyms, Homophones, One Word Substitution, Affixation: Prefixes & Suffixes, Derivation from root words, Jargon, Scientific Jargon, Word Formation.

UNIT IV

Developing Writing Skills: Planning, Drafting and Editing, Developing Logical Paragraphs, Report Writing: Importance of Report, Characteristics of Good Report, Types of Report, Various Structures of a Report.

UNIT V

Professional Skills: Negotiation Skills, Telephonic Skills, Interview Skills: Team building Skills and Time management

Practical:

- Listening
- Linguistics and Phonetics
- Telephonic Conversation
- Mock Interviews
- Group discussions
- Extempore
- Debate
- Role Plays

Suggested Readings

- Ashraf Rizvi.(2005**).***Effective Technical Communication*. New Delhi:Tata Mc Graw Hill
- Prasad, H. M.(2001*) How to Prepare for Group Discussion and Interview*. New Delhi: Tata McGraw-Hill.
- Pease, Allan. (1998).*Body Language*. Delhi: Sudha Publications.
- Morgan, Dana (1998).*10 Minute Guide to Job Interviews*. New York: Macmillan.

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Shri Vaishnav Vidyapeeth Vishwavidyalaya

B.Sc. (Chemistry Hons)

Choice Based Credit System (CBCS) (Batch 2019-2022)

Semester-II (B.Sc. - Honours) Chemistry

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*
BSHCH202	DC	Concept of Physical Chemistry-II	4	0	0	4	60	20	20	0	0

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

COURSE OBJECTIVE:

1. To develop the understanding of fundamentals of Thermodynamics & its applications.
2. To give basic knowledge of Chemical equilibrium and Solution.

COURSE OUTCOMES

CO1 After completion of the course students are expected to be able to demonstrate the following knowledge, skills and attitude. The students demonstrate capability of understanding of fundamentals of Thermodynamics & its applications.
CO2 Become aware of fundamentals of Chemical equilibrium and Solution.

SYLLABUS:

Unit-I: Chemical Thermodynamics- I :

Intensive and extensive variables; state and path functions; isolated, closed and open systems. First law: Concept of heat, Q, work, W, internal energy, U, and statement of first law; enthalpy, H, relation between heat capacities, calculations of Q, W, ΔU and ΔH for reversible, irreversible and free expansion of gases (ideal and van der Waals) under isothermal and adiabatic conditions. Thermochemistry: Heats of reactions: standard states; enthalpy of formation and enthalpy of combustion and its applications; effect of temperature (Kirchhoff's equations) and pressure on enthalpy of reactions.

Unit-II: Chemical Thermodynamics- II :

Second Law: Concept of entropy; thermodynamic scale of temperature, statement of the second law of thermodynamics. Calculation of entropy change for reversible and irreversible processes. Third Law: Statement of third law, concept of residual entropy, calculation of absolute entropy

of molecules. Free Energy Functions: Gibbs and Helmholtz energy; variation of S, G, A with T, V, P; Free energy change and spontaneity. Gibbs-Helmholtz equation.

Unit-III: Thermodynamic Equilibrium:

Criteria of thermodynamic equilibrium, degree of advancement of reaction, chemical equilibria in ideal gases. Thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient. Equilibrium constants and their quantitative dependence on temperature, pressure and concentration (Le Chatelier Principle, Quantitatively)). Free energy of mixing and spontaneity. equilibrium between ideal gases and a pure condensed phase.

Unit-IV: Solutions and Colligative Properties-I:

Ideal solution-Thermodynamics of Ideal solutions; Raoult's Law- derivation of Raoult's Law; NonIdeal or real solutions; activity and activity coeifficent; colligatives properties: (i) relative lowering of vapour pressure- determinaton of molecular weight; osmotic pressure- osmosis, measurment of osmotic pressure, Law of osmotic pressure and determinaton of molecular weight.

Unit-V: Solutions and Colligative Properties-II:

Elevation in boiling point: Thermodynamic derivation of relation between molecular weight and elevation in boiling point, determinaton of molecular weight.
Depression of freezing point: Thermodynamic derivation of relation between molecular weight and depression of freezing point, determinaton of molecular weight.
Abnormal molarmass- Degree of dissositation and degree of association; Van't Hoff factor (i).

Reference Books:

1. Peter, A. & Paula, J. de. Physical Chemistry 9th Ed., Oxford University Press (2011).
2. Castellan, G. W. Physical Chemistry 4th Ed., Narosa (2004).
3. Engel, T. & Reid, P. Physical Chemistry 3rd Ed., Prentice-Hall (2012).
4. McQuarrie, D. A. & Simon, J. D. Molecular Thermodynamics Viva Books Pvt. Ltd.: New Delhi (2004).
5. Assael, M. J.; Goodwin, A. R. H.; Stamatoudis, M.; Wakeham, W. A. & Will, S. Commonly Asked Questions in Thermodynamics. CRC Press: NY (2011).
6. Levine, I .N. Physical Chemistry 6th Ed., Tata Mc Graw Hill (2010).
7. Metz, C.R. 2000 solved problems in chemistry, Schaum Series (2006)

Shri Vaishnav Vidyapeeth Vishwavidyalaya

B.Sc. (Chemistry Hons)

Choice Based Credit System (CBCS) (Batch 2019-2022)

Semester-II (B.Sc. - Honours) Chemistry

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*
BSHCH203	DC	Concept of Organic Chemistry-I	4	1	0	5	60	20	20	0	0

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

COURSE OBJECTIVE:

To give basic knowledge of concept of organic chemistry.
To develop the understanding of Chemistry of aliphatic and aromatic hydrocarbons

COURSE OUTCOMES

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

CO1. Be able to rationalise the priciples of organic chemistry, reaction mechanisms and conformational analysis of molecules

CO2. Theoretical understanding of basic concept of organic chemistry such as hybridization, reactive intermediates and concept of stereochemistry

CO3. The significance of Chemistry of aliphatic hydrocarbons, cycloalkanes and aromtic hydrocarbons

Unit-I: Basics of Organic Chemistry

Classification, and Nomenclature, Hybridization, Shapes of molecules. Electronic Displacements: Inductive, electromeric, resonance, mesomeric effects, hyperconjugation and Dipole moment. Organic acids and bases, their relative strength. Homolytic and Heterolytic fission with suitable examples. Electrophiles and Nucleophiles; Nucleophlicity and basicity; Types, shape and their relative stability of Carbocations, Carbanions, Free radicals and Carbenes Introduction to types of organic reactions: Addition, Elimination and Substitution reactions.

Unit II: Stereochemistry

Fischer Projection, Newmann and Sawhorse projection formulae and their interconversions. Geometrical isomerism: cis–trans and, syn-anti isomerism. E/Z notations with CIP rules. Optical

isomerism: optical activity, specific rotation, chirality / asymmetry, enantiomers, molecules with two or more chiral-centres, distereoisomers, meso structures, racemic mixture and resolution. Configuration: relative (D/L) configuration.

Unit III: Chemistry of Aliphatic Hydrocarbons

A. Carbon-Carbon sigma bonds Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz-Fittig Reactions, Free radical substitutions: Halogenation - relative reactivity and selectivity.

B. Carbon-Carbon π bonds: Chemistry of alkenes, formation of alkenes and alkynes by elimination reactions, mechanism of E1, E2, E1cb reactions. Saytzeff and Hofmann eliminations. Reactions of alkenes: Electrophilic additions their mechanisms (Markownikoff/ Anti Markownikoff addition), mechanism of oxymercuration-demercuration, hydroboration-oxidation, ozonolysis, reduction (catalytic and chemical), syn and anti hydroxylation (oxidation). Reactions of alkynes: Acidity, Hydration to form carbonyl compounds and Alkylation reaction.

Unit IV: Cycloalkanes and Conformational Analysis

Types of cycloalkanes and their relative stability, Baeyer strain theory, Conformational analysis of alkanes: Relative stability: Energy diagrams of cyclohexane: Chair, Boat and Twist boat forms; Relative stability with energy diagrams.

Unit V: Aromatic Hydrocarbons

Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism.

Recommended Texts:

1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Cary, Sundberg A., Organic chemistry, Vol 1 & 2, Wiley Interscience, New York (2005)

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

B. Sc. Hons. Maths / Chemistry

II 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*				
BSPH 202	DC	Waves and Optics	60	20	20	0	0	3	1	0	4

Course Objectives	1. To develop the comprehensive understanding of laws of physics related to Waves and Optics 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 Waves and Optics. 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 202: Waves and Optics

UNIT I: Waves

Wave motion, One dimensional wave equation and solution, speed of transverse waves in a uniform stretched string, speed of longitudinal waves in a fluid and gases, speed of longitudinal waves in a solid, variation in velocity and presure in a plane progressive wave, Energy, Energy density of a progressive wave and intenisty of a wave; waves on liquid surface, gravity waves and ripples, phase velocity and group velocity.

UNIT II: Interference of light

Condition of constructive and distructive interference, necessary condition of interference, Interference of light by division of wave front: Fresnel's Bi-Prism, shape of biprism fringes, Interference by division of amplitude, interference in thin films, pathdifference , phase difference due to reflection from denser medium: Stokes law, localised fringes, Newton's rings and applications. Haidinger fringes (Fringes of equal inclination), Michelson interferometer and its application.

UNIT III: Diffraction

Fraunhoffer's diffraction at a single slit, double slit, plane transmission grating, n-slit diffraction, formation of spectra by the grating, determination of wavelength of light by with a grating, resolving power of an optical instruments, Rayleigh criterion of resolution of images. Resolving power of plane transmission grating.

UNIT IV: Polarisation

Polarization of light, production of plane polarized light by reflection; Brewster law, Production of plane polarized light by double refraction: double refraction in uniaxial crystal, Huygens explanation of double refraction, calcite crystal, Nicol prism, quarter and half wave plates, circularly and eliptically polarized light, analysis of polarized light, rotation of plane of polarizaton, polarimeter, laurent'z half shade device.

UNIT V: Laser

Stimulated and Spontaneous Emission, Einstein's A & B Coefficients, Population Inversion, Pumping, Techniques of Pumping, Two three and four level lasers. Optical Resonator, Properties and Applications of Laser, Ruby Laser, Nd:YAG Laser, He-Ne Laser, CO2 Lasers.

References

1. Fundamentals of Optics: F.A. Jenkins and H. E. White, 1976, McGraw-Hill.
2. Principles of Optics: B. K. Mathur, 1995, Gopal Printing. . University Physics: F.W. Sears, M.W. Zemansky and H.D. Young, 13/e, 1986.
3. Optics: A. K. Ghatak, McGraw Hill Publications. . Principles of Optics: Max Born and Wolf. Pregmon Press. . Optics and Atomic Physics, D. P. Khandelwal. Himalaya Publication.
4. Lasers: Theory and Applications: K. Thyagrajan and A. K. Ghatak.

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*				
BSCHPRP206	DC	**Physics Laboratory II**	0	0	0	30	20	0	0	2	1

List of experiment

1. To determine the refractive index of the material of the prism using Na light.
2. To determine the dispersive power of the material of the prism.
3. Measurement of radius of curvature R of convex lens by Newton's ring experiment.
4. Measurement of resolving power of telescope.
5. Measurement of wavelength of Na light source using diffraction grating.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

B.Sc. Chemistry Honours

COURSE CODE	Category	COURSE 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*				
BSBT 205	DC	Molecular Biology	60	20	20	30	20	3	0	2	4

BSBT 205: Molecular Biology

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:

1. To have the knowledge of principles of genetics
2. To have the knowledge of molecular biology and the role of macromolecules in transfer of genetic information

Course Outcomes:

1. Student will be able to understand the classical experiments of genetics that laid the foundations of genetic principles
2. Student will be able to understand the molecular nature of genes and techniques of transferring genes

SYLLABUS

Unit – I

Mendelian Laws of genetics, Dominance, Segregation, Independent Assortment; Epistasis, Complementary ratio and supplementary ratio, Cytoplasmic inheritance; plastid and kappa particles.

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B.Sc. Chemistry Honours

Unit - II

Gene regulation in eukaryotic system – Promoters, enhancers elements and gene amplification. Genetic engineering: Isolation of genomic and plasmid DNA from bacteria, Isolation of genomicDNA from plant and animal cells.

Unit-III

Transformation, Conjugation and transduction in bacteria; Gene mapping in bacteria; Transcription, Translation, Processing of m-RNA, Splicing, DNA and RNA polymerases Prokaryotic and Eukaryotic Translation - Mechanism of initiation, elongation and termination.

Unit-IV

Recombinant DNA technology – cloning vectors (pUC 19, phage λ, cosmid and M13); Restrictionenzymes, introduction of DNA into living cells, methods of gene transfer, expression and detectionof clones.

Unit – V

Introduction to blotting technique: Western , Southern and Northern Blots.

Practical:

1. Isolation of DNA from bacterial cell
2. Isolation of DNA from plant cell
3. Isolation of DNA from animal cell
4. Isolation of plasmid DNA from bacteria and determination of its molecular weight by agarose gel method
5. Isolation of RNA from bacterial cell
6. Analysis of DNA by gel electrophoresis
7. UV as a physical mutagen
8. Genetic transformation of *E.coli*with standard plasmids and calculation of transformation efficiency
9. Development of antibiotic resistant bacterial starins using conjugation
10. Restriction digestion of DNA and agarose gel electrophoresis of fragments
11. Ligation of cleaved DNA fragments by using ligase enzyme
12. Artificial transformation of bacterial cells
13. Blue-white screening of recombinants
14. Amplification of β-galactosidase gene in *E.coli*using PCR
15. RFLP and DNA finger printing
16. Steps in cloning using GPF (Green Fluorescent Protein) gene
17. Southern Blotting

Books

1. Lewin, B., Genes VII, Oxford University Press.
2. Strickberger M, W. [2002], Genetics – Prentice Hall, India.
3. Brown T. A., Genetics; a molecular approach – Chapman & Hall, London.
4. Friefelder, D., Molecular Biology, Jones & Barltlett Publishers.

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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				
BSHMA204	BS	**Vector Algebra and Differential Calculus**	60	20	20	-	-	4	0	-	4

Course Objective

To introduce the students with the Fundamentals of the Vector Algebra andDifferential Calculus.

Course Outcomes

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

1. *understand and apply the basics of the Vector Algebra.*
2. *know the fundamental principles of the algebra of the real numbers and sequences.*
3. *apply the techniques to test the convergence and the divergence of an infinite series.*
4. *know the basic principles of the Differential Calculus of single real variable.*
5. *understand and apply the basics of the Calculus of more than one real variable.*

Course Content:

UNIT – I

Vector Algebra: Addition of Vectors. Multiplication of a Vector by a scalar. Collinear andCoplanar Vectors. Scalar and Vector products of two and three vectors. Simple applications to problems of Geometry. Vector equation of plane and straight line. Volume of Tetrahedron. Applications to problems of Mechanics (Work done and Moment).

UNIT – II

Differential Calculus: Rational Numbers. Geometrical representation. Irrational number. Real number represented as point on a line – Linear Continuum. Acquaintance with basic properties of real number (No deduction or proof is included).**Sequence:** Definition of bounds of a sequence and monotone sequence. Limit of a sequence. Statements of limit theorems.

Concept of convergence and divergence of monotone sequences – applications of the theorems, inparticular, definition of *e*. Statement of Cauchy's general principle ofconvergence and its application.

UNIT – III

Infinite series of constant terms: Convergence and Divergence (definitions).Cauchy's principle as applied to infinite series (application only). Series ofpositive terms **:** Statements of Comparison test, D.Alembert's Ratio test. Cauchy's nth root test and Raabe's test – Applications. Alternating series: Statement of Leibnitz test and its applications. **Real-valued functions defined on an interval :** Limit of a function(Cauchy's definition). Algebra of limits. Continuity of a function at a point and in an interval. Acquaintance (no proof) with the important properties of continuous functions on closed intervals. Statement of existence of inverse function of a strictly monotone function and its continuity.

UNIT – IV

Derivative: Its geometrical and physical interpretation. Sign of derivative –Monotonic increasing and decreasing functions. Relation between continuity and derivability. Differential – application in finding approximation. **Successive derivative:** Leibnitz's Theorem and its application. Application of the principle of Maxima and Minima for a function of single variable in geometrical, physical and other problems. **Applications of Differential Calculus:** Tangents and Normals, Pedal equation and Pedal of a curve. Rectilinear Asymptotes (Cartesian only).

UNIT – V

Statement of Rolle's theorem and its geometrical interpretation. Mean Value Theorems of Lagrange and Cauchy. Statements of Taylors and Maclaurin's Theorems with Lagrange's and Cauchy's form of remainders. Taylor's and Maclaurin's Infinite series for functions like e^x, sin x, cosx. $(1+x)^n$, log(1+x) [with restrictions wherever necessary]. **Indeterminate Forms:** L'Hospital's Rule : Statement and problems only. **Functions of two and three variables:** Their geometrical representations. Limit and Continuity (definitions only) for functions of two variables. Partial derivatives: Knowledge and use of Chain Rule. Exact differentials (emphasis on solving problems only).

BOOKS:

1. Vector Analysis – Louis Brand.
2. Vector Analysis – Barry Spain.
3. Vector & Tensor Analysis – Spiegel (Schaum).
4. Elementary Vector Analysis – C. E. Weatherburn (Vol. I & II).
5. Basic Real & Abstract Analysis – Randolph J. P. (Academic Press).
6. A First Course in Real Analysis – M. H. Protter& G. B. Morrey (SpringerVerlag, NBHM).
7. A Course of Analysis – Phillips.
8. Problems in Mathematical Analysis – B. P. Demidovich (Mir).
9. Problems in Mathematical Analysis – Berman (Mir).
10. Differential & Integral Calculus (Vol. I & II) – Courant & John.