Shri VaishnavVidyapeethVishwavidyalaya, Indore

B.A. Honors Economics

BATCH2018-2021

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	SOC. SC., ARTS& HUM	**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:

- Participate 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.

UNIT II

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

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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.(200**5).***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.

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

SEM-II-Paper-I

Waves, Acoustics and Optics

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*				
BSPH 202	DC	Waves ,Acoustics and Optics	60	20	20	30	20	3	1	4	6

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 Waves, Acoustics 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 Outcomes:-

1. Student will be able to understand and solve the problems related to Waves ,Acoustics and Optics
2. Student will be able to determine physical parameter experimentally with optimal usage of resources and complete the assignments in time.

BSPH 202: Waves, Acoustics and Optics

Unit-I:

Waves in Media : Speed of transverse waves on a uniform string, speed of longitudinal waves in a fluid, energy density and energy transmission in waves, typical measurements. Waves over liquid surface : gravity waves and ripples Group velocity and phase velocity, their measurements
Superposition of waves: Linear homogeneous equation and the superposition principle, non linear superposition and consequences.
Standing waves: Standing waves as normal modes of bounded systems, examples. Harmonics and the quality of sound; Chaldni's figures and vibrations of a drum . Production and detection of ultrasonic and instrasonic waves and applications.

Unit-II:

Noise and Music ; The human ear and its responses ; limits of human audibility, intensity and loudness, bel and decibel, the musical scale, temperament and musical instrument.
Reflection, refraction and diffraction of sound. Acoustic impedance of a medium, percentage reflection and refraction at a boundary, impedance matching for transducers, diffraction of sound, principle of a sonar system ranging.

Unit-III:

Applied acoustics: Transducers and their characteristics, recording and reproduction of sounds, various systems, Measurements of frequency, waveform, intensity and velocity. The acoustics of halls, reverberation period, Sabine's formula.
Fermat's Principle of extremum path, the aplantic points of a sphere and other applications. General theory of image formation: cardinal points of an optical system, general relationship, lens and lens combinations, Lagrange equation of magnification, telescopic combinations, telephoto lenses and eyepieces.

UNIT IV:

Introduction to Interference, Fresnel's Bi-prism, Interference in Thin films, Newton's rings experiment, Michelson's interferometer and its application, Introduction to Diffraction and its Types, Diffraction at single slit, double slit and diffraction grating

Unit V:

Rayleigh criterion, resolving power of grating, Concept of polarized light, Brewster's laws, Double refraction, Nicol prism, quarter and half wave plate, circularly & elliptically polarized light.

References:

1. Optics by Ajoy Ghatak, McGraw-Hill International Editions.
2. *A text book on Optics by Subrahmanyam.*
3. *Optics by Brijlal and Avadhanulu*, South Asian Publication.
4. *Concept of Physics* by H.C. Verma, Bharati Bhavan Publishers.

List of Experiments (Any Eight)

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 "λ" of Na light source using Diffraction Grating.
6. To determine the mass of cane sugar dissolved in water using half shade polarimeter.
7. Heating efficiency of electrical Kettle with varying voltages.
8. Measurement of Resolving Power of prism.
9. Measurement of Resolving Power of grating.
10. Measurement of Frequency of A.C. mains by electrically maintained vibrating rod.

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

SEM-II-Paper-II

Quantum and Atomic 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				
BSPHPH203	DC	Quantum and Atomic Physics	60	20	20	0	0	4	0	0	4

Course Objectives:-

- To develop the comprehensive understanding of laws of Quantum and Atomic 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 Quantum and Atomic Physics.
- Student will be able to determine physical parameter experimentally with optimal usage of resources and complete the assignments in time.

BSPHPH203:Quantum and Atomic Physics

Unit-I Limits of Classical mechanics, Black body spectrum, Explanation of Black Body radiation: Stefan's Law, Wien's Law, Rayleigh-Jean's law, Planck's Law, Ultraviolet Catastrophe, Photoelectric effect, Compton effect, de Broglie hypothesis, Wave-particle duality, Davisson-Germer experiment, Wave packets, Group velocity and phase velocity and their relationship, Uncertainty principle and its applications.

Unit-II Quantum Mechanics Basic Postulates and Formalism :- Energy, Momentum and Hamiltonian Operators. Time-independent Schrödinger Wave Equation for Stationary States. Properties of Wave Function.Interpretation of Wave Function.Probability Density and Probability. Conditions for Physical Acceptability of Wave Functions, Normalization, Linearity and Superposition Principles,.

Unit-III Wave Mechanics; Schrodinger's wave equation: Time dependent Schrodinger's equation, Time independent Schrodinger's equation; Schrodinger equation by the method of operator, Expectation value of dynamical variables, Hermite operator and its properties, Solution of Schrodinger equation, transition probability, Eigenvalues and Eigenfunctions, Expectation Values and transition probabilities.

Unit-IV Solution of Schrodinger's equation for a free particle; free particle enclosed in a three dimensional box; reflection of a particle through a potential step (or a potential barrier of infinite width and finite hight); transmission through a rectangularpotential barrier; tunnel effect and application of barrier potential (Alfa decay), Reflection from a one dimensional potential well of finite width and depth.

Unit-V Bound State Problems :- General Features of a Bound Particle System, (1) One Dimensional Simple Harmonic Oscillator : Energy Levels and Wave Functions. Zero Point Energy, (2) Quantum Theory of Hydrogen Atom : Particle in a Spherically Symmetric Potential. Schrodinger Equation.Separation of Variables.Radial Solutions and Principal Quantum Number, Orbital and Magnetic Quantum Numbers.Quantization of Energy and Angular Momentum.Space Quantization.

Reference Books:

1. Quantum Physics: S. Gasiorowicz.

2. Quantum Mechanics: B. H. Bransden and C. J. Joachain.

3. Quantum Physics of Atoms, Molecules, Nuclei and Solids: R. M. Eisberg and R. Resnick.

4. Quantum Mechanics: V. Devanathan.

5. Quantum Mechanics: C. S. Chaddha.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

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				
BSHMA 204	Hons	MATHEMATICS – II (Vector Algebra & Differential Calculus)	60	20	20	-	-	4	-	-	4

Course Objective

To introduce the students with the Fundamentals of the Vector Algebra and Differential 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 and Coplanar 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. Application 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.

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Concept of convergence and divergence of monotone sequences – applications of the theorems, in particular, definition of *e*. Statement of Cauchy's general principle of convergence 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 of positive 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. Acquianance (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 ex, sin x, cos x. (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 (Springer Verlag, 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.

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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
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
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 – Kirchhoff'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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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. $KMnO_4$, acidic dichromate, conc. HNO_3). 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. & Dnyder, 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.

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