



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Science

Choice Based Credit System (CBCS) in the light of NEP-2020

B.Sc. Physics

SEMESTER-I

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTIC AL					
				END SEM University	Two Term Exam	Teachers Assessment*	END SEM University	Teachers Assessment*				
BSPHC101	Major-I	General Properties of Matter	Max	60	20	20	30	20	4	0	4	6
			Min	24	16		14	9				

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:

The student will have ability to:

1. Develop an understanding of the dynamics of systems of particles, conservation laws, centre of mass motion, and applications to planetary and rocket motion.
2. Familiarize students with the principles of rotational dynamics, angular momentum, moment of inertia, and rotational kinetic energy of rigid bodies.
3. Introduce the concepts of elasticity, stress-strain relationships, elastic constants, bending of beams, and torsional motion of materials.
4. Develop an understanding of simple, damped, and forced oscillations, resonance phenomena, and the dynamics of oscillatory systems, including the use of AI tools for data-driven analysis.
5. To provide knowledge of fluid mechanics, viscosity, surface tension, and fluid flow phenomena, along with their physical principles and practical applications.
The student will have ability to develop experimental skills and apply the principles of mechanics and properties of matter to perform measurements, analyze experimental data, and determine physical constants
6. using standard laboratory techniques.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4(Quality Education)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

1. Apply conservation laws of linear and angular momentum to analyze the motion of systems of particles, planetary motion, and propulsion systems.
2. Analyze rotational motion of rigid bodies using concepts of torque, moment of inertia, radius of gyration, and rotational energy.

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- Evaluate the elastic behaviour of materials by relating stress, strain, elastic moduli, beam bending, and torsional effects.
 - Analyze oscillatory systems and determine the characteristics of simple, damped, and forced oscillations, resonance, and quality factor, including AI-assisted interpretation of oscillatory data.
 - Apply the principles of fluid mechanics, viscosity, Bernoulli's theorem, surface tension, and fluid flow to solve physical and engineering problems.
- Upon successful completion of the course, the student will be able to perform experiments related to mechanics and properties of matter, analyze experimental observations, estimate errors, and interpret results to determine relevant physical parameters and constants.

TEACHING PEDAGOGY:

- T1** Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
- T2** ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

ATL1	Quiz
ATL2	Activity Based Learning
ATL3	Midterm Exams
ATL4	Flip Class
ATL5	Seminar Presentation
ATL6	Assignments
ATL7	Poster
ATL8	Oral Viva-voce examination
ATL9	Industrial Visit Report

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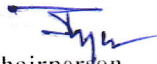
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PREREQUISITES:

Knowledge of General Properties of Matter and Mechanics.

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	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.	10	ATL1 ATL2 ATL3 ATL6 ATL8


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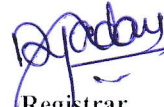
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II	Motion of rigid body, rotatory motion, equations of rotationary motion of a particle under a constant angular acceleration, angular momentum and concept of moment of inertia in rotational motion, Newtons law of motion in rotational motion, Moment 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.	10	ATL1 ATL2 ATL3 ATL6 ATL8
III	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 oscillations of a cantilever, torsion of cylinder.	10	ATL1 ATL2 ATL3 ATL6 ATL8

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IV	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, use of AI to solve differential equations from real oscillation data, predict behavior, and estimate physical parameters.	10	ATL1 ATL2 ATL3 ATL6 ATL8
V	Ideal and Viscous fluid, Stream line and Turbulent flow, Reynold's number, Rotational and irrotational 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, Poiseuille'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	10	ATL1 ATL2 ATL3 ATL6 ATL8

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surface.		
Total Hours	50	

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 Young's Modulus using Cantilever method.
	4.	To determine Modulus of rigidity by Torsional pendulum.
	5.	To determine Young's Modulus of long wire by Searl's method.
	6.	To determine Poisson's ratio of rubber tube.
	7.	To determine the force constant of the given spring and to verify that the force constant of a parallel combination of spring.
	8.	To determine the force constant of the given spring and to verify that the force constant of a series combination of spring.

ADDITIONAL RESOURCES

A. Value addition to course content/ Skill enhancement content:

Refer relevant online tutorial/ course available on "Swayamportal".

<https://swayam.gov.in/explorer?searchText=classical+mechanics&utm>

<https://swayam.gov.in/explorer?searchText=engineering+mechanics&utm>

<https://swayam.gov.in/explorer?searchText=oscillations+and+waves&utm>

<https://swayam.gov.in/explorer?searchText=fluid+mechanics&utm>

B. Remedial classes for slow learners: As per the AUMP SOP for slow and fast learners.


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SUGGESTED READINGS:

Textbooks

1. D. S. Mathur, *Mechanics*, S. Chand & Company Ltd., New Delhi.
2. Charles Kittel et al., *Berkeley Physics Course, Vol. 1: Mechanics*, Tata McGraw-Hill Education.
3. Arora, C. L., *B.Sc. Practical Physics*, S. Chand & Company Ltd., New Delhi, Latest Edition.

Reference Books

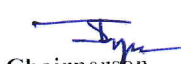
1. D. Kleppner and R. J. Kolenkow, *An Introduction to Mechanics*, Cambridge University Press.
2. D. Halliday, R. Resnick, and J. Walker, *Fundamentals of Physics, Vol. I*, Wiley India.
3. Singh, S. P., *Advanced Practical Physics*, Pragati Prakashan, Meerut. Latest Edition.
- Chattopadhyay, D., Rakshit, P. C., and Saha, B., *An Advanced Course in Practical Physics*, New Central Book Agency, Kolkata, Latest Edition.

Suggested e-resources (Websites/e-books)

1. NPTEL:
https://onlinecourses.nptel.ac.in/noc26_cs85/preview
2. https://openstax.org/details/books/university-physics-volume-1?utm_source=shri-vaishnav-vidyapeeth-vishwavidyalaya-indore
https://openstax.org/details/books/college-physics-2e?utm_source=shri-vaishnav-vidyapeeth-vishwavidyalaya-indore


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COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	Correlation with POs										Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PS O1	PS O2	PS O3
CO1	3	3	1	2	2	2	-	-	2	1	3	2	2
CO2	3	3	2	2	2	2	-	-	2	1	3	2	2
CO3	3	3	2	2	2	2	1	-	2	1	3	2	2
CO4	3	3	2	3	3	2	-	1	2	2	3	3	2
CO5	3	3	2	2	2	3	1	-	3	1	3	2	3
CO6	3	3	3	3	2	2	2	2	2	2	2	3	2

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SEMESTER-I (2026-29)

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				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSMAM101	Minor	Differential Calculus	Max	60	20	20	0	0	4	0	0	4
			Min	24	16		0	0				

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COURSE OBJECTIVES:

The student will have ability to:

1. Understand the concepts of derivatives and applications.
2. Learn series expansions and curve analysis.
3. Apply partial differentiation techniques.
4. Solve optimization problems involving multiple variables.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, SDG 4 (Quality Education).

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- | | |
|-----|---|
| CO1 | Understand the significance of derivatives and their applications. |
| CO2 | Construct Taylor's and Maclaurin's series expansions. |
| CO3 | Apply partial differentiation and curve tracing techniques. |
| CO4 | Solve optimization problems involving functions of several variables. |

TEACHING PEDAGOGY:

- | | |
|----|---|
| T1 | Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching |
| T2 | ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination |

ASSESSMENT TOOLS:

- | | |
|------|-------------------------|
| ATL1 | Quiz |
| ATL2 | Activity Based Learning |
| ATL3 | Midterm Exams |
| ATL4 | Seminar Presentation |
| ATL5 | Poster |


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ATL6	Assignments
ATL7	Oral Viva-voce examination

PREREQUISITES:

Knowledge of Higher Secondary Mathematics

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Derivative and its geometrical and physical interpretation, Sign of derivatives and monotonic increasing and decreasing functions, Rolle's and Mean value theorems and simple applications.	10	ATL1 ATL3 ATL6
II	Successive differentiation, Leibnitz theorem, Maclaurin's and Taylor's series expansion, Asymptotes.	10	ATL1 ATL3 ATL6
III	Curvature, test for concavity and convexity, points of inflection, multiple points, tracing of curves in cartesian and polar coordinates.	10	ATL1 ATL3 ATL6
IV	Indeterminant form, L'Hospital's rule, Tangents and Normal, Partial differentiation, Euler's theorem, total derivatives.	10	ATL1 ATL3 ATL6
V	Functions of two and three variables, Maxima and minima of functions of two variables - Lagrange's Method of undetermined multiplier - Problems only. Implicit function in case of function of two variables (existence assumed) and derivative.	10	ATL1 ATL3 ATL6 ATL7
Total Hours		50	

ADDITIONAL RESOURCES

A. Value addition to course content/ Skill enhancement content:

<https://www.youtube.com/@satishshukla2553330>

B. Remedial classes for slow learners:

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As per the AUMP SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. Gorakh Prasad, *Differential Calculus*, Pothishala Pvt. Ltd., Allahabad.
2. Shanti Narayan, *Differential Calculus*, S. Chand Publications.

Reference Books

1. Walter Rudin, *Principles of Mathematical Analysis*, McGraw-Hill Publications.
2. J. Edwards, *An Elementary Treatise on Differential Calculus*, Radha Publishing House.
3. David V. Widder, *Advanced Calculus*, Prentice Hall.
4. Courant and John, *Differential and Integral Calculus*, Wiley Eastern Ltd.
5. N. Piskunov, *Differential and Integral Calculus*, CBS Publishers & Distributors.
6. T. M. Apostol, *Mathematical Analysis*, Addison Wesley Publishing Company.
7. T. M. Apostol, *Calculus, Vol. I & II*, Wiley.

Suggested e- resources (Websites/e- books)

1. <https://www.youtube.com/@satishshukla2553330>
<https://sites.google.com/view/satishmathematics1978/home?authuser=0>
2. <https://youtube.com/@priva-mathematics1030?si=pZJZYTytr-l5pV7q>

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	Correlation with POs												Correlation with PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	-	-	PSO1	PSO2	-
CO1	3	1	-	2	2	-	-	-	-	-	-	-	1	-	-
CO2	3	1	-	2	2	-	-	1	-	-	-	-	1	1	-
CO3	3	2	1	3	3	-	-	1	-	-	-	-	2	-	-
CO4	3	2	1	3	3	1	-	1	-	-	-	-	2	3	-

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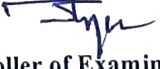
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Choice Based Credit System (CBCS) in the light of NEP-2020

B.Sc. Chemistry

SEMESTER- (2026-2029)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
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COURSE OBJECTIVES:

The subject aims to provide the student with:

1. To understand the periodic law and significance of atomic no and electronic configuration as the basis for periodic classification and to include the importance of different types and theories of chemical bonding.
2. To understand different properties and reactions of the compounds of s- and p- block elements and to acquire required knowledge about coordination compounds and different theories of complexes.
3. To understand and analyze traditional Indian chemical knowledge systems and relate them to modern chemical principles and sustainable practices.
4. To acquaint the students with practical knowledge of the concepts of inorganic chemistry.

Course Alignment with UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)**.

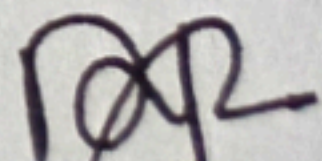

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SEMESTER- (2026-2029)

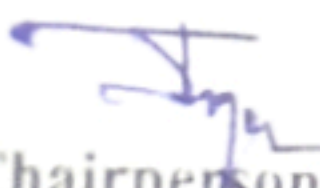
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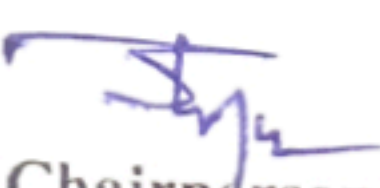
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Course outcomes: After completion of the course:

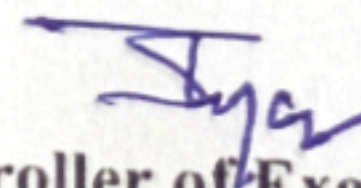
CO-1	Students will understand traditional Indian chemical knowledge systems and relate them to modern chemical principles and sustainable practices.
CO-2	Students will gain the basic knowledge of periodic law and significance of atomic no and electronic configuration as the basis for periodic classification and able to classify elements into s, p, d and f blocks.
CO-3	They learn the importance of different types of chemical bonding in terms of the attainment of a stable electronic structure.
CO-4	They will be able to understand the properties of s- and p- block elements and their compounds.
CO-5	Students will be able to explain the fundamental concepts in coordination chemistry. They can predict potential applications of inorganic chemistry and practical utility to become good chemist.


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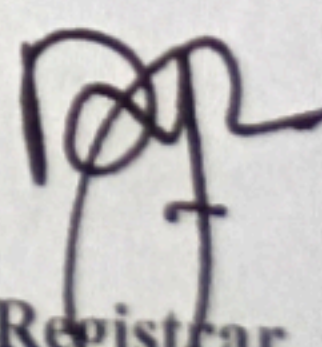
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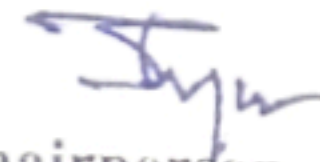
*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Teaching Pedagogy:

T1	Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
T2	ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

Experiential Learning: Project Based Learning(PBL) and Case Studies

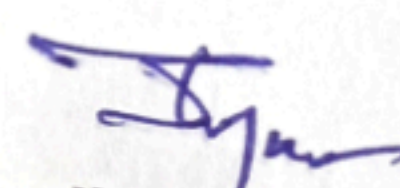
Modules	Name	Experiment/ABL/PBL	Bloom Taxonomy
Module 1	Preparation of Natural Dyes and Pigments using Traditional Indian Methods	PBL	Apply, Create
Module 1	Case Study on Ancient Indian Rasashala and Alchemical Practices	Case study	All Levels
Module 2	Visualization of Atomic Orbitals using Models/Software	PBL	Understand, Apply
Module 2	Assignment on Quantum Numbers	PBL	Appky, Analysis


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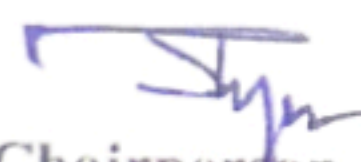
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	and Electronic Configuration of Elements		
Module 3	Preparation and Interpretation of Molecular Orbital Diagrams of Diatomic Molecules	PBL	Appky, Analysis
Module 4	Case Study on Industrial Applications of Interhalogen Compounds	Case Study	All Levels
Module 4	Project on Extraction and Uses of Ancient Metals (Gold, Silver, Copper, Iron)	PBL	Apply, Evaluate
Module 5	Project on Industrial and Biological Applications of Coordination Complexes	PBL	Apply, Create, Evaluate

Assessment Tools

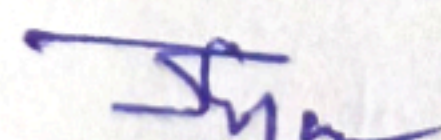
AT1-1	Quiz
AT1-2	Activity Based Learning
AT1-3	Midterm Exams
AT1-4	Flip Class


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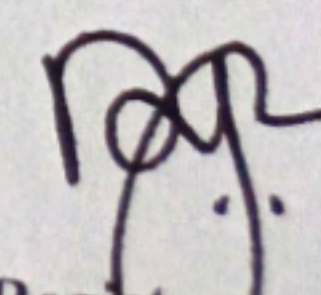
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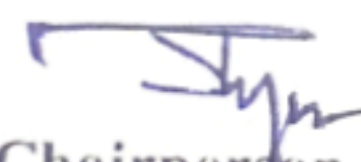
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Assessment Tools

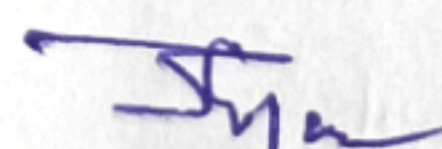
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AT1-3	Midterm Exams
AT1-4	Flip Class


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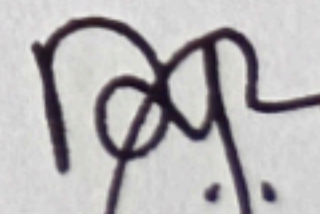
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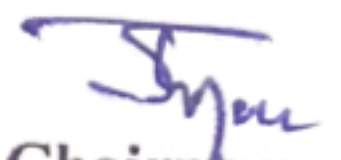
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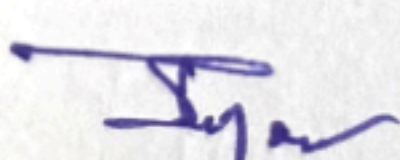
AT1-5	Seminar Presentation
AT1-6	Assignments
AT1-7	Poster
AT1-8	Oral Viva-voce examination

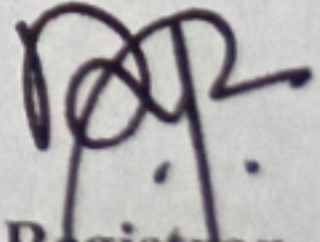
Prerequisites: Solid foundation in basic inorganic chemistry (periodic table, chemical bonding, hybridization, etc.)

Module	Descriptors/Topics	Hours	Assessment tools
I	Introduction of Bhartiya Knowledge System: Chemistry in Ancient Indian - History and Development. Ancient Indian Alchemical Lab 'Rasashala' Ancient Indian Chemist- their contribution and books- Rishi Kanad, Acharya Nagarjuna, Vagbhatta, Somadeva, Gopalbhatta, Indian Chemist of 19th century- Acharya Prafulla Chandra Ray- His Contribution and work for Indian Chemistry. General Introduction of Ancient Indian Chemical Techniques- Metallurgy, Dyes, Pigments, Cosmetics-their production and uses.	09	Quiz Mid-term Exam Assignment Presentation


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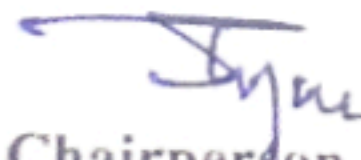
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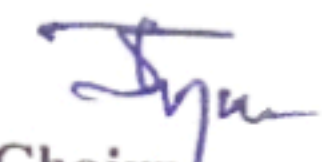
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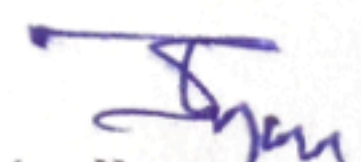
	and Mercury- their extraction and uses.		
II	Atomic structure and Periodic properties of elements: Bohr's theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de Broglie equation, Heisenberg's uncertainty principle, and its significance. Schrödinger's wave equation, significance of ψ and ψ^2. Quantum numbers and their significance. Pauli's Exclusion Principle, Hund's rule of maximum spin multiplicity, Aufbau principle and its limitations. Brief discussion of the following properties of the elements and the trends shown: (a) Effective nuclear charge, shielding or screening effect. (b) Atomic and ionic radii, Ionization enthalpy, Electron gain enthalpy, and Electronegativity.	09	Mid-Term Quiz Assignment
III	Chemical bonding: Ionic bond: General characteristics, Covalent character in ionic compounds, polarizing power and polarizability. Covalent bond: Valence Bond theory and its limitations. Types of	09	Mid-Term Quiz Assignment Oral Viva-voce


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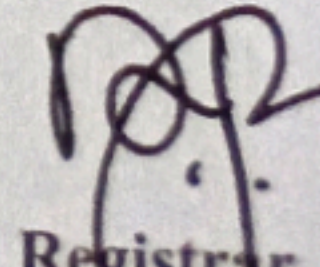
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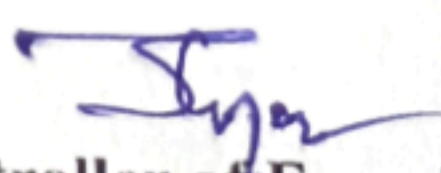
	hybridization with examples. Valence shell electron pair repulsion (VSEPR) theory, shapes of some inorganic molecules based on VSEPR (H ₂ O, NH ₃ , PCl ₅ , SF ₆). Molecular orbital theory. Linear Combination of Atomic Orbitals (LCAO), Molecular orbital diagrams of diatomic and simple polyatomic molecules H ₂ , B ₂ , C ₂ , N ₂ , O ₂ , F ₂ , CO, NO.		examination
IV	Chemistry of s and p block elements: General properties of s-block and p-block elements, physical and chemical properties of s- and p-block elements, diagonal relationships, Comparative properties of s and p block elements. Catenation. Hydrides and their classification ionic, covalent, and interstitial. Study of the following compounds with emphasis on structure, bonding, preparation, properties and uses: Borohydrides (diborane), carboranes, silanes. Interhalogen compounds. Pseudohalogens.	09	Quiz Assignment Mid-Term Presentations
V	Coordination compounds	09	Quiz


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Werner's coordination theory and its experimental verification, IUPAC nomenclature of coordination compounds, isomerism in coordination compounds. Examples of inner and outer orbital complexes. AI Applications in inorganic chemistry	Assignment Mid-Term
Total Hours	45

Additional Resources

A. Value addition to course content/ Skill enhancement content:

Preview: Industrial Inorganic Chemistry | SWAYAM

B. Remedial classes for slow learners: As per the AUMP SOP for slow and fast learners.

Suggested Readings:

Reference Books	
1. Huheey, J.E.; Keiter, E.A.; Keiter; R. L.; Medhi, O.K., Inorganic Chemistry- Principles of Structure and Reactivity, Pearson Education.	
2. Lee, J.D. Concise Inorganic Chemistry, ELBS.	
3. Atkins, P.W.; Overton, T.L.; Rourke, J.P.; Weller, M.T.; Armstrong, F.A., Shriver and Atkins Inorganic Chemistry, 5th Edition, Oxford University Press.	

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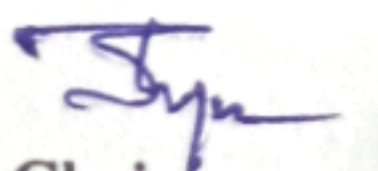
	4. Cotton, F.A.; Wilkinson, G., Advanced Inorganic Chemistry Wiley-VCH. 5. Sodhi, G.S., Principles of Inorganic Chemistry, Viva books. 6. Garg, R., Singh, R., Inorganic Chemistry, McGraw Hill Education.
Suggested e- resources (Websites/e-books)	<u>Preview: Chemistry Of Main Group Elements SWAYAM</u> <u>Preview: Basics in Inorganic Chemistry SWAYAM</u>

List of Experiments:

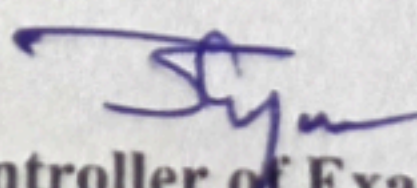
1. Preparation of Standard solutions.
2. Standardization of solutions.
3. Calibration of Pipette.
4. An analysis of a mixture of Na_2CO_3 and NaOH using two indicators and a standard HCl solution.
5. Quantitative analysis of binary mixture of inorganic compound (ESTIMATION OF BARIUM).
6. Inorganic mixture analysis
Mixture Analysis for 2 Cations and 2 Anions with typical combinations.


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Course Articulation Matrix (Mapping of COs with POs)

Course Outcomes	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	1	2	-	3	3	2	1	2	-	-	2	1	3
CO2	3	2	2	1	1	2	-	-	2	1	-	-	3	2	1
CO3	3	3	2	1	1	2	-	-	2	1	-	-	3	2	1
CO4	3	3	2	2	1	3	1	-	2	1	-	-	3	3	2
CO5	3	3	3	2	2	2	2	1	3	2	-	-	3	3	3

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Choice Based Credit System (CBCS) in the light of NEP-2020

Department of Life Science/Biotechnology

B.Sc. (Minor - Biotechnology)

Semester I (2026-2029)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSBTM101	Minor	Basics of Biomolecules and Metabolism	Max	60	20	20	30	20	3	0	1	4
			Min	24	16		14	9				

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:

The student will have ability to:

1. **Describe and explain** the relationship between the structure and functions of biomolecules in living systems.
2. **Interpret and analyze** the structure, classification, and biological significance of major biomolecules including carbohydrates, proteins, lipids, and nucleic acids.
3. **Explain and apply** the principles of metabolic reactions involved in the synthesis of biomolecules and energy production.
4. **Examine and evaluate** the biochemical pathways and regulatory mechanisms involved in carbohydrate, protein, lipid, and nucleic acid metabolism.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** **Describe and explain** the structural and functional properties of carbohydrates, proteins, lipids, and nucleic acids.
- CO2** **Interpret and analyze** the mechanisms of metabolic reactions.
- CO3** **Examine and evaluate** the major metabolic pathways and energy-generating processes occurring in living systems.
- CO4** **Apply and demonstrate** laboratory techniques, analytical methods, and experimental procedures used in biochemistry.

TEACHING PEDAGOGY:

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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.

T1 Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching

T2 ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

Experiential learning: Project Based Learning (PBL) and Case Studies

Module	Name	Experiment/ABL/PBL	Bloom's Taxonomy
I	Analysis Identification and qualitative analysis of carbohydrates, proteins, and lipids.	Experiment	Remembering, Understanding
II	Problem-based learning on biomolecules in diagnostics, therapeutics, and biotechnology	PBL	Understanding, Applying, Analyzing

ASSESSMENT TOOLS:

ATL1 Quiz

ATL2 Activity Based Learning

ATL3 Midterm Exams

ATL4 Flip Class

ATL5 Seminar Presentation

ATL6 Assignments

ATL7 Poster

ATL8 Oral Viva-voce examination

ATL9 Industrial Visit Report

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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.

PREREQUISITES:

Basic understanding of Intermediate Biology

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
Unit - I	Chemical composition of living matter, Carbohydrates: classification of monosaccharides. Di, tri and polysaccharides, their functions in energy storage and cell structure; Lipids: Structure and functions – Classification, nomenclature and properties of fatty acids.	10	Quiz, Activity Based Learning Seminar Presentation Assignments Midterm Exams
Unit – II	Proteins: primary, secondary, tertiary and quaternary structure; Ramchandran plot and Protein folding. Nucleic acids: Structure and properties of DNA; Double helical model of DNA structure A, B and Z form of DNA.	10	Quiz, Seminar Presentation Assignments Midterm Exams
Unit – III	Vitamins and co-enzymes: Structure, regulation of biochemical reactions and function of water-soluble vitamins; Fat soluble Vitamins A, D, E and K. AI in Drug Discovery: Using AI for virtual screening and designing new molecules.	9	Activity Based Learning Seminar Assignments
Unit – IV	Glycolysis, citric acid cycle and energy generation; Pentose phosphate pathway and its regulation, Electron Transport Chain, Oxidative phosphorylation.	8	Quiz, Activity Based Learning Seminar Assignments

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Unit – V	Lipid Metabolism: Fatty Acid Metabolism, Biosynthesis of saturated fatty acids, Protein Metabolism: Amino Acid Catabolism, Transamination and deamination reactions.	8	Activity Based Learning Seminar Assignments
Total Hours		45	

ADDITIONAL RESOURCES

A. Value addition to course content/ Skill enhancement content: <https://nptel.ac.in/courses/104103121>
<https://youtu.be/c-EBH0tuoI4?si=v0uvzrocBa9WPB3W>

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. Jain, J. L., Jain, S., & Jain, N. (n.d.). *Fundamentals of biochemistry*. S. Chand Publications.
2. Voet, D., Voet, J. G., & Pratt, C. W. (2018). *Voet's principles of biochemistry* (5th ed.). Wiley.
3. Nelson, D. L., & Cox, M. M. (2021). *Lehninger principles of biochemistry* (8th ed.). W. H. Freeman & Co.
4. Stryer, L., Berg, J. M., Tymoczko, J. L., & Gatto, G. J., Jr. (2019). *Biochemistry* (9th ed.). W. H. Freeman & Co.
5. Zubay, G. L., Parson, W. W., & Vance, D. E. (1995). *Principles of biochemistry*. William C. Brown Publishers.

Reference books:

1. Voet, D., Voet, J. G., & Pratt, C. W. (2018). *Voet's principles of biochemistry* (5th ed.). Wiley.
2. Nelson, D. L., & Cox, M. M. (2021). *Lehninger principles of biochemistry* (8th ed.). W. H. Freeman & Co.

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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.

Suggested e- resources (Websites/e- books)

<https://openstax.org/details/books/biology-2e>

<https://microbenotes.com/category/biochemistry/>

LIST OF PRACTICAL

	Title	CO Mapping
1.	Preparation of reagents	CO4
2.	Demonstration of pH meter	CO4
3.	Separation of leaf fragments by paper chromatography	CO4
4.	Qualitative estimation of Carbohydrate by Benedict Test	CO1, CO4
5.	Qualitative estimation of Carbohydrate by Fehling Test	CO1, CO4
6.	Qualitative estimation of Carbohydrate by Molish Test	CO1, CO2
7.	Qualitative estimation of Lipids by Iodine Test	CO2, CO4
8.	Qualitative estimation of Protein by Xanthoproteic test	CO2, CO4

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Semester I (2026-2029)

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			Marks	THEORY			PRACTICAL					
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COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	Correlation with POs										Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2	PSO3
CO1	2	1	2	-	3	1	1	-	1	-	3	2	1
CO2	2	2	2	1	2	1	1	-	1	1	2	1	1
CO3	2	1	2	2	2	1	1	1	2	1	2	-	3
CO4	2	3	3	3	3	1	1						

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BCA (No Branch)

SEMESTER-I (2026-29)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCCA103M	Minor -2	PC Software	Max	60	20	20	30	20	3	0	2	4
			Min	24	16		13.5	9				

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:

The student will have ability to:

1. To provide the knowledge of using different software packages including word processor, electronic spreadsheet, presentation s/w
2. To develop an understanding of database management system.
3. To explain how to integrate the data stored in word processor, spreadsheet etc.
4. To develop presentation skills using these software.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** To create word documents and to format them using various tools available
- CO2** To create tables and manipulate them, To use mail merge, labels
- CO3** Creating spreadsheet for storing and managing data using functions Format, print spreadsheet
- CO4** Create power point presentation for different purposes using objects, animation
- CO5** To store and manipulate data stored in databases.

TEACHING PEDAGOGY:

- T1** Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
- T2** ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

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SEMESTER-I (2026-29)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCCA103M	Minor -2	PC Software	Max	60	20	20	30	20	3	0	2	4
			Min	24	16		13.5	9				

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.

ASSESSMENT TOOLS:

ATL1	Quiz
ATL2	Activity Based Learning
ATL3	Midterm Exams
ATL4	Flip Class
ATL5	Seminar Presentation
ATL6	Assignments
ATL7	Poster
ATL8	Oral Viva-voce examination

PREREQUISITES:

Basic Computer Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Word Processor: Introduction, Word Processing, Advantages of word processing, Creating, Saving and editing a document: Selecting, Deleting, Replacing Text, Copying text to another file. Formatting Text and Paragraph: Using the Font Dialog Box, Paragraph Formatting using Bullets and Numbering in Paragraphs, Line spacing, Margins.	12	ATL3 ATL6
II	Creating and Formatting Tables: Changing Row height, inserting columns, merging cells Calculations in a Table, Sorting Text, Toolbar using word art, Mail merge: Definition, a Practical Example of mail merge, creating charts. Defining Tabs: Tabs Dialog Box, Enhancing a Document: Inserting page Breaks, Adding Border, Using Header and Footers in the Document.	12	ATL3 ATL6

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			Marks	THEORY			PRACTICAL					
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III	Spreadsheet: Introduction, Definition. Screen parts of worksheet, Entering information: Numbers, Formula, Editing Data in a cell, Using a Range with SUM, Moving and copying data, Inserting and Deleting Row and Columns in the worksheet, Using the format cells Dialog box.	12	ATL3 ATL6
IV	Protecting a workbook with Password, Macro: Recording and Running a Macro, Linking workbook files Using Pivot table, Inserting Hyper links, Using chart wizard to create a chart, Naming ranges, classification of Functions.	12	ATL3 ATL6
V	Presentation : Introduction, Slide show, Formatting, Creating a Presentation, Inserting clip Arts, Adding Objects, Applying Transitions, Animation effects, formatting and checking text, Modifying Visual elements, Preparing a complete presentation, Case studies.	12	ATL3 ATL6
Total Hours		60	

ADDITIONAL RESOURCES

A. Value addition to course content/ Skill enhancement content:

<https://www.redhat.com/en/services/training/rh124-red-hat-system-administration-i>

B. Remedial classes for slow learners:

As per the AUMP SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. Taxali R. K. "PC Software for Windows 98, Made Simple" TMH.
2. Saxena Sanjay, "MS Office 2000 "Vikas Publication House PVT LTD.
3. Busbby M. and Stultz R.A. "Microsoft Office 2000", BPB.
4. Jain S., Geetha M. and Kratika, "Microsoft Office-2007", BPB

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Suggested e- resources (Websites/e- books)

1. Microsoft Office – Complete Reference – BPB Publication.

LIST OF PRACTICAL

	Title	CO Mapping
1.	To open and practice of OS – Folder related operations, My-Computer, window explorer, Control Panel,	CO4
2.	To create, save and editing of Text files using word processor.	CO4
3.	Formatting and printing of document (setting of margins, size, orientation, different breaks etc. Checking of spelling and use of thesaurus)	CO4
4.	Creating, inserting tables, header, footers, hyperlink, different objects in a document	CO4
5.	Use of Charts in Word Processor.	CO4
6.	Creating and manipulating spreadsheets. To create, save and editing of spreadsheets. Use of cell	CO4
7.	Creating a mail merged documents, labels references, sorting and filtering data in a spreadsheet, using formulae	CO4

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8.	Formatting and printing of spreadsheets (setting of margins, size, orientation, different breaks etc. What if analysis, mail merging	CO4
9.	Creating header, footers, hyperlink, different objects in a spreadsheet	CO5
10.	Creation, editing and formatting presentation slides. Creating different types of graphs and printing	CO5

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	Correlation with POs												Correlation with PSOs		
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CO2	1	3	1	-	-	-	-	2	-	1	2	-			
CO3	2	3	2	1	-	-	-	1	-	-	2	-			
CO4	-	3	-	1	-	-	-	3	1	-	2	-			
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Vishwavidyalaya, Indore



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Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

Ability Enhancement Course for Undergraduate Program

SEMESTER-I (2026-30)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
ENGAEC101	AEC	Strategic Communication	Max	60	20	20	0	0	2	0	0	2
			Min	24	16		0	0				

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:

The student will have ability to:

1. To develop effective professional communication and business writing skills for corporate and digital workplaces.
2. To enhance interpersonal, leadership, presentation, and teamwork skills for professional growth and employability.
3. To cultivate ethical values, emotional intelligence, critical thinking, and workplace readiness aligned with industry requirements.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** Demonstrate effective verbal, written, and digital communication skills in professional environments.
CO2 Apply interpersonal, leadership, presentation, and teamwork skills in workplace and collaborative settings.
CO3 Analyze workplace situations using ethical values, emotional intelligence, and problem-solving abilities for career readiness.

TEACHING PEDAGOGY:

- T1** Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
T2 ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

- ATL1** Quiz
ATL2 Activity Based Learning
ATL3 Midterm Exams
ATL4 Group Discussions & Role Plays
ATL5 Case Study Analysis
ATL6 Assignments
ATL7 Practical Activities

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ATL8 Mock Interviews / Viva Voce

ATL9 Industrial Visit Report

PREREQUISITES:

Basic understanding of English language and communication skills.

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Communication Fundamentals Communication process Verbal, non-verbal, and cross-cultural communication Professional etiquette and corporate behavior Communication barriers and strategies for effective communication Different types of Channels of Communication Activity: Elevator Pitch Activity where students introduce themselves professionally in 60 seconds	6	ATL1, ATL2, ATL6
II	Developing Effective Listening and Speaking Skills Hearing versus Listening, Listening Process (hearing, understanding, remembering, evaluating and responding), Note-taking, Barriers to Listening, and Strategies for Effective Listening. Tools and techniques of Effective Speaking at Various Level, Types of listening Art of Conversation, Dialogue and debate, Telephonic Skills Activity: Think, Pair, Share, Structured Debates, Role-Playing and Collaborative Storytelling	6	ATL1, ATL2, ATL3, ATL6, ATL7, ATL8

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III	Developing Reading and Technical Writing Skills Concept, Strategies and Techniques (skimming, scanning, SQ3R technique) for Effective Reading and Comprehension, Process of Reading, Active Vs Passive Reading, Types of Reading Tips for Effective Business Letter Writing, Notice, E-mail Writing, Precis Writing, Email and Blog Writing, Movie and Film Review · Activity: Article and Report Writing and Story Writing and Film Review Sessions	6	ATL2, ATL5, ATL7, ATL8,
	Job Preparation and Digital Communication and Industry Readiness Sensitization to Building Portfolio, Job/Cover Letter and Resume, Interview Skills Digital Media Tools and Apps for Enhancing Communication Skills Activity: Role Plays, Mock Interviews, Resume Preparation, Usage of different AI tools		
	Value Science, Ethics, and Emotional Intelligence Human values and professional ethics Ethics Vs Morality Emotional intelligence in corporate life Workplace diversity and inclusion Stress management and work-life balance Corporate social responsibility and ethical decision-making Crisis Management and Conflict Management and Time management Skills, Negotiation, and Persuasion. Interpersonal effectiveness and Service Orientation		

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	Activity: CSR Campaign Design Activity where groups create a social responsibility initiative for a company		
	Total Hours	30	

ADDITIONAL RESOURCES

A. Value addition to course content/ Skill enhancement content:

Corporate Etiquette, Professional Communication and Workplace Communication

B. Remedial classes for slow learners:

Additional practice sessions for speaking and writing activities

SUGGESTED READINGS:

Textbooks

1. Lesikar, Raymond V., and Marie E. Flatley. Business Communication: Connecting in a Digital World. McGraw Hill Education, 2015.
2. Rizvi, M. Ashraf. Effective Technical Communication. McGraw Hill Education, 2017.
3. Raman, Meenakshi, and Sangeeta Sharma. Technical Communication: Principles and Practice. Oxford University Press, 2015.
4. Goleman, Daniel. Emotional Intelligence: Why It Can Matter More Than IQ. Bloomsbury Publishing, 2005.
5. Ghosh, Meeta. Business Communication Skills. Pearson Education, 2012.

Suggested e- resources (Websites/e- books)

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1 https://nptel.ac.in/courses/109107121?utm_source

LIST OF PRACTICAL

	Title	CO Mapping
1.	Role Play on Workplace Communication	CO1
2.	Active Listening and Business Conversation Exercise	CO2
3.	Business Email Drafting Practice	CO1,CO2
4.	Resume and Cover Letter Preparation	CO2
5.	LinkedIn Profile Development	CO2, CO4
6.	Report Writing and Executive Summary Preparation	CO2
7.	Group Discussion and Team Communication Activity	CO2
8.	PowerPoint Presentation and Public Speaking	CO2
9.	Mock Interview and HR Interaction	CO2, CO3
10.	Case Study Analysis on Workplace Ethics	CO3
11.	Emotional Intelligence and Stress Management Reflection	CO3
12.	Virtual Meeting and Digital Collaboration Tool Practice	CO4

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcome s	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	1	2	-	-	2	1	-	1	2	3	-	2	2	1	1
CO2	-	2	1	-	2	1	-	1	3	3	2	2	2	2	1
CO3	-	3	2	1	1	2	1	3	2	2	2	3	1	2	2

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