



SHRI VAISHNAV INSTITUTE OF MANAGEMENT & SCIENCE, INDORE

(Autonomous)

Approved by AICTE, New Delhi and Affiliated to DAVV, Indore & RGPV, Bhopal, Madhya Pradesh, India UGC-NAAC Accredited 'A' Grade Institute
ISO 9001:2015 Certified

Syllabus

Bachelor of Science (Biotechnology)

[B. Sc. (BT)]

Year I / Semester I

w.e.f. Session 2025-26



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| Shri Vaishnav Institute of Management & Science, Indore | | | | |
|---|---|------------------|---|--------------|
| B.Sc. (Biotechnology) I Semester | | | | |
| Session : 2025-26 | | | | |
| S.No. | Course Type | Course Code | Subject | Total Credit |
| 1. | Core Course (Major 1) (C-1) | BSCBT-101(T) | Cell and Molecular Biology (Theory) | 4 |
| | | BSCBT-101(P) | Lab Work for Cell and Molecular Biology (Practical) | 2 |
| 2. | Minor 1 (M-1) | BSCBT-102(T) | Fundamental Organic Chemistry (Theory) | 2 |
| | | BSCBT-102(P) | Fundamental Organic Chemistry (Practical) | 2 |
| 3. | Multidisciplinary Course (MDC) | BSCBT-103(T) | Information Technology (Theory) | 2 |
| | | BSCBT-103(P) | Information Technology (Practical) | 1 |
| 4. | Ability Enhancement Course AEC-1 | AEC-101 | Hindi Language & Sanskriti | 2 |
| 5. | Skill Enhancement Course SEC (VOC) - I | SEC-101 | Digital Marketing | 3 |
| 6. | Internship/Apprenticeship/Project Work/Community Engagement | PW/ Ap/ CE - 101 | Project Work | 2 |
| Total Credit | | | | 20 |



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| Part A :Introduction | | | |
|--|--|---|--------------------------------------|
| Programme: B.Sc (Biotechnology) | Class: I Year | Semester: I | Session : July 2025-June 2026 |
| Subject : Biotechnology | | Theory | |
| 1 | Course Code | BSCBT-101(T) | |
| 2 | Course Title | Cell and Molecular Biology | |
| 3 | Course Type (Core Course/DSE/Minor/MD-ID/SEC/VOC) | Major-I (Core Course) | |
| 4 | Pre-requisite (if any) | To study this course, a student must have had the subject Biology in 12th class/Certificate course/Diploma | |
| 5 | Course Objectives | <ol style="list-style-type: none"> 1. To provide students with a fundamental understanding of cell and molecular biology concepts essential for biotechnology. 2. To explain the structure, organization, and functions of cells and their organelles in prokaryotic and eukaryotic organisms. 3. To introduce molecular mechanisms including DNA replication, transcription, translation, and regulation of gene expression. 4. To develop practical knowledge and skills through activities that reinforces theoretical concepts. 5. To prepare students for advanced studies and research by building interdisciplinary insights into cell and molecular biology relevant to biotechnology. | |
| 6 | Course Outcomes (CO's) | <p>On completion of this course, students will be able to:</p> <p>CO1: Understand basics of cell biology.</p> <p>CO2: Understand the importance of having water as a solvent system in Cells.</p> <p>CO3: Go for medical Laboratory Technique Courses, opening opportunities in hospitals and pathological laboratories.</p> <p>CO4: Explain role of different protein/ enzymes involved in cell signalling.</p> <p>CO5: Understand mechanism of genetic damage caused by mutation and role of various repair system in neglecting the effect of these mutation.</p> <p>CO6: Explain mechanism of DNA replication, transcription, translation and other related processes</p> | |
| 7 | Credit Value | 4 Credits | |
| 8 | Total Marks | Max. Marks: 30+70 | Min. Passing Marks : 35 |



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| Part B: Content of the Course | | |
|-------------------------------------|---|-----------------|
| No. of Lectures per week : 06 | | |
| Total No. of Lectures required : 60 | | |
| Unit | Topics | No. of Lectures |
| I | Cell as a Basic Unit of Living Systems: Historical background of the Cell Life: Indian Philosophy and western studies. History of Cell Biology, Cell Structure, Cell Theory, Ultrastructure Structure of Prokaryotic Cell, Bacterial Cell Organelles (Flagella, Pili, Cell wall, Cytoplasmic membrane, Nuclear region, Ribosomes, Vacuoles, Metachromatic granules, Spores and Cysts, Microtubules, Microfilaments, Centriole) Gram's Positive and Gram's Negative Cells. Difference between Prokaryotic and Eukaryotic cells. | 12 |
| | Suggested Activities: Model making of different types of cells. Slide observation of different types of cells organelles. Flow diagrams of cell division. | |
| II | Cell Organelles and Cell Cycle: Ultrastructure of Eukaryotic cell, (Plant and Animal cells). Cell Organelles of Eukaryotic cell - Cell membrane, Mitochondria, Chloroplast, Endoplasmic reticulum, Golgi bodies, Lysosomes, Peroxisomes, Nucleus and Nucleic Acids. Models of Cell Membrane, Active and Passive Transport across the membrane, Cell cycle and Cell division, Apoptosis or Cell death | 12 |
| | Suggested Activities: Discussion on transport through cell membrane. Flow chart of cell death. | |
| III | Genome organization: Anatomy of gene, gene structure of prokaryotes and eukaryotes. Flow of genetic information. Cell signalling: Hormones and their receptors, second messengers, signalling through G protein coupled receptors. Cancer: Oncogenes, Tumor suppressor genes, Cancer and the cell cycle; Apoptosis, Necrosis. | 12 |
| | Suggested Activities: Quiz on genome and gene structure. Benign seminar on cancer survey. | |
| IV | Replication: Prokaryotic and Eukaryotic replication: models for replication, Unit of replication, replication initiation, elongation and termination, replication inhibitors DNA repair: Direct reversal, Excision repair -nucleotide and base excision, Mismatch repair Trans lesion DNA synthesis, Recombination repair, SOS Response. DNA recombination: Models for recombination, Enzymes and proteins involved in recombination, Site-specific recombination. | 12 |
| | Suggested Activities: Comparative analyze of replication of Prokaryotics and Eukaryotics. Group discussion on DNA repair. | |



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| | | |
|---|--|----|
| V | Transcription: Prokaryotic and Eukaryotic transcription: RNA polymerases, General and specific transcription factors, Promoters, insulator, repressor, enhancer. Translation: Prokaryotic and eukaryotic translation: Translation machinery, initiation, elongation and termination factors, translational inhibitors. Regulation of translation. | 12 |
| | Suggested Activities: Project on prokaryotic transcription or Project on regulation of translation. Video link from soft skill on transcription and translation process. | |

| Part – C : Learning Resources |
|--|
| Text Books, Reference Books, Other resources |
| Textbooks 1. Cell and Molecular Biology -P.K. Gupta 2. Cell Biology - P.S. Verma and Agrawal 3. Cell and Molecular Biology - De Roberties 4. Cell Biology -G. Karp, Wiley, 2013, 7 edition 5. Molecular Biotechnology, Channarayappa. 6. Lewin's Gene XII -J. E. Kerb's, Jones and Barlett. 7. Molecular Cell Biology -H. Lodish, et.al., W H Freeman & Co (Sd), 2016, 8" edition 8. Molecular Biology of Cell-B. Alberts and A, Johnson, Garland Sciences, 2014 9. Biotechnology-B.D. Singh 10. Books published by M.P. Hindi Granth Academy, Bhopal |
| Suggestive Digital Platform Web Links: 1. https://epgp.inflibnet.ac.in 2. https://www.eshiksha.mp.gov.in/mpdhe |
| Suggested Equivalent Online Courses: 1. https://pubs.acs.org/Aoi/bichaw (for Biochemistry) 2. https://pubs.acs.org/loi/bipret . https://guides.lib.uh.edu/biotech (for biotechnology) 3. http://www.freebookcentre.net/Biology/BioTechnology-Books.html e books on biotechnology |



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| Part D: Assessment and Evaluation | | |
|---|--|-------------------------|
| Internal Assessment Continuous Comprehensive Evaluation (CCE) | | Total Marks : 30 |
| External Assessment University Exam Section Time: 03.00 hours. | Section (A) : Very Short Questions Section (B) : Short Questions Section (C) : Long Questions | Total Marks : 70 |
| Total Marks | (Internal Assessment + External Assessment) : | 100 |
| Credit Value | 4 | |
| Minimum Passing Marks | 35 | |



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| Part A :Introduction | | | |
|-------------------------------------|------------------------|---|-------------------------|
| Programme- B.Sc. (Biotechnology) | | Class: I Year | Semester: I |
| | | Session : July 2025-June 2026 | |
| Subject : Biotechnology | | Practical | |
| 1 | Course Code | BSCBT-101(P) | |
| 2 | Course Title | Lab Work for Cell and Molecular Biology | |
| 3 | Course Type | Major-I (Core Course) | |
| 4 | Pre-requisite (If any) | To study this course, a student must have had the subject Biology in 12th class/Certificate course/Diploma | |
| 5 | Course Objectives | <ol style="list-style-type: none">1. To provide hands-on experience in studying cell structure of plants and microbes using staining techniques and microscopy.2. To train students in preparing slides to observe various stages of cell division including mitosis and meiosis.3. To develop practical skills in isolating and visualizing genomic and plasmid DNA from different biological sources.4. To perform DNA electrophoresis and quantification using spectrophotometric methods.5. To understand the effects of UV radiation on microbial and plant cells by experimental observation. | |
| 6 | Course Outcomes (CO's) | On completion of this course, students will be able to: CO1. Carry out basic research in Biotechnology, which in turn can be of great help in medical and diagnostic fields. CO2. Go for medical Laboratory Technique Courses, opening opportunities in hospitals and pathological laboratories. CO3. Understand basic knowledge of Biotechnology will also be useful in nutrition and Dietetics. | |
| 6 | Credit Value | 2 Credits | |
| 7 | Total Marks | Max. Marks: 30+70 | Min. Passing Marks : 35 |



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| Part B: Content of the Practical Course | |
|---|--|
| No. of Lectures per week : 03 | |
| Total No. of Lectures required : 30 | |
| | <p>List of Experiments/Exercise/Practicals:</p> <ol style="list-style-type: none">1. To study the plant cell structure using various plant materials.2. To study microbial cell by Monochrome staining and Gram staining.3. To Prepare and study the different stages of Mitosis and Meiosis.4. Prepare slide for study of stomata.5. Isolation of genomic DNA.6. Plasmid DNA isolation.7. Visualization of DNA using EtBr8. Electrophoresis of DNA-linear, circular and super coiled plasmid.9. Isolation of DNA from Tissue/Blood/Microorganism10. Plasmid restriction map.11. Quantification of DNA using UV spectrophotometer12. Effect of UV on microbial/plant cell. |



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| Part C : Learning Resources |
|---|
| Text Books, Reference Books, Other resources |
| Textbooks 1. Laboratory manual of Biotechnology by P.N. Swamy, Rastogi Publication, Merrut. 2. Manual of Experiment in Biotechnology by Leera Lakhaw, Sheeba Khan, Kailash Pustak Sadan Bhopal. 3. Biotechnology -A lab project in molecular biology by Thiel, Bissen, Lyone. TATA Mc Grow Hill. 4. Molecular Biology Principles and practices by Siwach and Singh. 5. Books published by M.P. Hindi Granth Academy, Bhopal. |
| Suggestive Digital Platform Web Links: 1. https://epgp.inflibnet.ac.in 2. https://www.eshiksha.mp.gov.in/mpdhe |
| Suggested Equivalent Online Courses: 1. https://pubs.acs.org/Aoi/bichaw (for Biochemistry, 2. https://pubs.acs.org/loi/bipret . https://guides.lib.uh.edu/biotech (for biotechnology) 3. http://www.freebookcentre.net/Biology/BioTechnology-Books.html e books on biotechnology |



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| Part D : Assessment and Evaluation (Practical) | |
|---|------------------------|
| Scheme of Practical Examination:- | Max. Marks =100 |
| Internal Assessment | Max. Marks- |
| Class Interaction | |
| Quiz | |
| Seminar | |
| Assignments (Charts, Rural Service, Technology Dissemination/ Excursion/ Lab Visit/Industrial Training | |
| External Assessment | Max. Marks =100 |
| Major experiment | 15 |
| Minor Experiment-1 | 5+10 |
| Minor Experiment-2 | 5+10 |
| Spotting | 15 |
| Viva-Voce | 10+10 |
| Practical Record | 10+ 10 |



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| Part A : Introduction | | | |
|---|---|---|---------------------------------------|
| Programme : B.Sc. (Biotechnology) | | Class : I Semester | Year : I |
| | | | Session : July 2025- June 2026 |
| Subject: Chemistry | | Theory | |
| 1 | Course Code | BSCBT-102(T) | |
| 2 | Course Title | Fundamental Organic Chemistry | |
| 3 | Course Type (Core Minor 1 Course/Elective/Generic Elective/Vocational....) | Minor 1 | |
| 4 | Pre-requisite (if any) | To study this course the students must have the subject Chemistry in 12 th Course or equivalent | |
| 5 | Course Objective | To enable students to understand and apply fundamental concepts of organic chemistry and traditional Indian knowledge of chemistry, specifically in the areas of: <ol style="list-style-type: none">1. Understanding traditional Indian chemistry: Familiarize students with Bharatiya Traditional Knowledge of Chemistry in the post-Vedic period.2. Organic chemistry fundamentals: Develop students' understanding of structure, bonding, and mechanisms in organic molecules.3. Stereochemistry and reaction mechanisms: Equip students with knowledge of stereochemistry and mechanisms of various organic reactions4. Hydrocarbon chemistry: Enable students to explain the preparation, properties, and structures of alkanes, cycloalkanes, alkenes, and alkynes. | |
| 6 | Course Outcomes (CO's) | After completing this course, the student will be able to - CO1: Explain Bharatiya Traditional Knowledge of Chemistry in Post vedic period CO2: Explain Structure and bonding in organic Molecules. CO3: Explain Mechanism of different organic Reactions. CO4: Explain Stereochemistry of organic compounds. CO5: Explain preparation properties and structures of alkanes, cycloalkanes, alkenes and alkynes. | |
| 7 | Credit Value | 3 Credits | |



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| 8 | Total Marks | Max. Marks: 30+70 | Min. Passing Marks: 35 |
|-------------------------------------|--|-------------------|------------------------|
| Part B Content of the Course | | | |
| No. of Lectures per week : 3 | | | |
| Total No of Lecture Required: 45 | | | |
| Unit | Topic | No. of Lectures | |
| 1 | Bharatiya Traditional Knowledge of Chemistry in Post vedic period Samkhya, Bhratsamhita, Nyaya and Vaisesikha of Varahmihira, Sushrut sahinta, Rasashala, tradition of chemicals in Time of Charak and Sushrut. Sankhya-Patanjali System, Evolution of Different forms of Matter from the Vedantic view, The Atomic theory of the Buddhists and Jains. Keyword/tags: Samkhya, Bhratsamhita, Arthasastra of Kautilya, Nyaya and Vaisesikha of Varahmihira, Sushrut sahinta, Buddhists and Jains. Activities: 1. Gather information about traditional Indian cosmetics knowledge and traditional Indian drug knowledge. 2. Prepare the Project and Modals related to Ancient Indian Chemistry. 3. Field study of BKS in nearby area. | 9 | |
| 2 | Structure and bonding- Hybridization, shapes of methane, ethane, ethylene, and acetylene. Vander wall interaction, electronic displacement- mesomeric effect, resonance, hyperconjugation, aromaticity, inductive effect. Hydrogen bonding in organic compounds with the special reference to alcohol, phenols, amines and its consequences, dipole moment, organic acids and bases, their relative strength with emphasis on factors affecting pka value. Keyword/tags: Hybridization, Vanderwall interaction, electronic displacement, dipole moment | 9 | |



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| | | |
|---|--|---|
| 3 | Mechanism of organic reactions homolytic and heterolytic bond fission with suitable examples, types of reagents-electrophiles and nucleophiles, types of reactions and their mechanism-addition elimination and substitution, types, shapes and relative stabilities of reactive intermediates- carbocation, carbanion, free radicals, carbenes, nitrenes. Keyword/tags: homolytic and heterolytic bond fission, electrophiles and nucleophiles. | 9 |
| 4 | Stereochemistry of organic compounds- Concept of isomerism, types of isomerism, structural isomerism, stereo isomerism, optical isomerism, elements of symmetry, molecular chirality, enantiomers, optical activity, example of optical isomerism, chiral and achiral molecules, diastereo isomers, threo and erythro isomers, resolution of enantiomers, inversion and retention, geometrical isomerism, E-Z nomenclature, conformational isomerism, Newman projection, Sawhorse projection, Flying wedge formula, Fischer projection, confirmation of ethane, butane and cyclohexane Keyword/tags: isomerism, stereo isomerism, optical isomerism, elements of symmetry | 9 |
| 5 | Alkanes- Open chain and close chain compounds, functional groups, homologous series, classification of aliphatic compounds, nomenclature of aliphatic compounds, IUPAC nomenclature of alkanes, isomerism in alkanes, methods of synthesis -Wurtz synthesis, Kolbe synthesis, Grignard reagent, physical and chemical properties. Cycloalkanes- nomenclature, Bayer strain theory, relative stability of rings, concept of strainless rings. Alkenes- nomenclature, methods of preparation: dehydration of alcohols, dehydrohalogenation of alkyl halides, Saytzeff rule, Hofmann rule, properties of alkene: addition of halogen (electrophilic, free radical, Markovnikov rule), ozonization, polymerization Alkynes- nomenclature, methods of preparation, structure, chemical reactions: electrophilic addition, nucleophilic addition, Ozonisation, oxidation, acidic nature, polymerization and isomerisation. Keyword/tags: functional groups, homologous series, IUPAC nomenclature | 9 |
| | Activities 1. Extraction of Tulsi, Neem, Amla, Haldi 2. Gather data on the processes used to purify zinc both historically and currently. 3. Gather images and records pertaining to the history of two rust- resistant | |



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| | | |
|--|---|--|
| | <p>monuments built in India.</p> <ol style="list-style-type: none">4. Gather information about traditional Indian cosmetics knowledge and traditional Indian drug knowledge.5. Collection of Medicinal plants and their uses from nearby area (Herbarium Preparation)6. Chart preparation of Ancient Indian Scientist in Chemistry and their contribution.7. Field study of BKS in nearby area8. Educational Tour of Industries and Research Institutes9. Prepare the Project and Modals related to Ancient Indian | |
|--|---|--|



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Part C – Learning Resources

Text Books, References Books, Other resources

Suggested Readings:

1. History of Chemistry in ancient and Medieval India: Incorporating the History of Hindu Chemistry, 2014 by Ray Prafulla Charndra Acharya, ISBN-10 8121801540, Publisher Chowkhamba Krishnadas Academy
2. Chemistry and Chemical Techniques in India, Author: B. V. Subbarayappa, Publisher: Centre For Studies In Civilizations, Edition:2004, ISBN:818758601X
3. Chemistry and Chemical Techniques in India: Vol 4 Part 1 (History of Science, Philosophy and Culture in Indian Civilization) 1 January 1999, by B. V. Subbarayappa (Editor), ISBN-10 818758601X, Publisher Centre for Studies in Civilisations
4. Dinesh Atomic Structure, Bonding, General Organic Chemistry & Aliphatic Hydrocarbons for B.Sc. – I (CHEM 101TH) 1 January 2020 by P.N.Kapil (Author), Publisher S. Dinesh & Co.
5. Structure and Bonding, Steven Farmer & Dietmar Kennepohl University of Illinois Springfield, Libre text chemistry,
6. Basics of Organic Chemistry A Textbook for Undergraduate Students, Author: Anshul Bansal, ISBN: 978- 981-5223-23-1 (Print) ISBN: 978-981-5223-22-4 (Online) Year of Publication: 2024
7. March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure, 8th Edition, Michael B. Smith, ISBN: 978-1-119-37180-9. March 2020, Wiley
8. Modern Methods of Organic Synthesis (4th Edition) 4th Edition, by W. Carruthers (Author), Iain Coldham (Author), ISBN-10 0521778301, Publisher Cambridge University Press
9. Reaction Mechanism In Organic Chemistry Paperback 28 June 2016, by Subrata Sen Gupta (Author), SBN-10 019945681X, Publisher Oxford University Press
10. Stereochemistry of Organic Compounds Hardcover -6 September 1994, by Ernest L. Eliel (Author), Samuel H. Wilen (Author), ISBN-10 0471016705, Publisher Wiley-Interscience, Edition 1
11. Nasipuri D_Stereochemistry Of 4ed (499) by D. Nasipuri |1 October 2020, Stereochemistry of Organic Compounds: Principles and Applications by D. Nasipuri | 7 January 2018, Newage International pvt, Ltd
12. Stereochemistry of Organic Compounds, Ernest L. Eliel, Samuel H. Wilen, Lewis N. Mander, Wiley, 28 Sept 1994
13. Organic Chemistry: Hydrocarbons Hardcover -1 December 2007 by Dr M S Yadav (Author), ISBN-10 8189741365, Publisher SBS Publishers
14. Hydrocarbons (Alkanes, Alkenes And Alkynes), Amit Arora, Discovery Publishing House, 2006
15. Textbook of Organic Chemistry (LPSPE) Author : Arun Bahl & BS Bahl ISBN :



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Suggested equivalent online courses

1. Organic Chemistry-I By Dr. B. S. Balaji Jawaharlal Nehru University, New Delhi
https://onlinecourses.swayam2.ac.in/ugc19_ch01/preview
2. Introductory Organic Chemistry I By Prof. Neeraja Dashaputre, Prof. Harinath Chakrapani
| ISER Pune https://onlinecourses.nptel.ac.in/noc20_cy30/preview

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods

Maximum Marks: 100

Continuous Comprehensive Evaluation (CCE) : 30 marks University Exam (UE) 70 marks

| | | |
|--|--|----|
| Internal Assessment: Continuous Comprehensive Evaluation (CCE): 30 | Class Test Assignment/Presentation | 30 |
| External Assessment : | Section(A) : Very Short Questions Section (B) : Short Questions Section (C): Long Questions | 70 |
| Total Marks | (Internal Assessment + External Assessment) : | |
| Credit Value | 3 Credits | |
| Minimum Passing Marks | 35 | |



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| Part A : Introduction | | | |
|--|---|---|---------------------------------------|
| Programme : B.Sc. (Biotechnology) | Class : I Semester | Year : I | Session : July 2025- June 2026 |
| Subject: Chemistry | | Practical | |
| 1 | Course Code | BSCBT-102(P) | |
| 2 | Course Title | Basic Organic Chemistry (Practical) | |
| 3 | Course Type (Core Course/Elective/Generic Elective/Vocational....) | Minor 1 | |
| 4 | Pre-requisite (if any) | To study this course the students must have the subject Chemistry in 12 th Course or equivalent | |
| 5 | Course Outcome | <ol style="list-style-type: none">1. Calibration of Thermometer: Ensure thermometer accuracy.2. Decolourization and Crystallization of Charcoal: Demonstrate charcoal's decolourizing property and crystallization process.3. Stereo chemical Study via Models: Understand 3D structure and stereoisomerism.4. Synthesis of Organic Compounds: Synthesize compounds and apply organic reaction principles. | |
| 6 | Course outcomes (CO's) | By the end of this course students will be able to the following aspects of Laboratory in chemical analysis: CO1: Calibration of Thermometer CO2: Decolourization and Crystallization of Charcoal CO3: Stereo chemical Study of Organic Compounds via Models. CO4: Synthesis of Different Organic Compounds | |
| 7 | Credit Value | 1 Credit | |
| | Total Marks | Max. Marks: 30+70 | Min. Passing Marks:35 |



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| Part B- Content of the Course | | |
|--|---|-----------------|
| No. of Lectures per week :1 | | |
| Total No of Lecture Required: 15 | | |
| Unit | Topics | No. of Lectures |
| 1 | Calibration of Thermometer 03 1. 80-82° (Naphthalene) 2. 113.5-114° (Acetanilide) 3. 132.5-133° (Urea) | 03 |
| 2 | Crystallization Concept of induction of crystallization, Phthalic acid from hot water (using fluted filter paper and steamless funnel), Acetanilide from boiling water. | 03 |
| 3 | Decolorisation and crystallization using charcoal Decolorisation of brown sugar (sucrose) with animal charcoal using gravity filtration. Crystallization and decolorisation of impure naphthalene (100g of naphthalene mixes with 0.3 g of Congo Red using 1g decolorizing carbon) from ethanol. | 03 |
| 4 | Stereochemical Study of Organic Compounds via Models R and S configuration of optical isomers E, Z configuration of geometrical isomers Conformational analysis of cyclohexanes and substituted cyclohexanes | 03 |
| 5 | Synthesis of Organic Compounds a) Acetylation of salicylic acid, aniline, glucose and hydroquinone, Benzoylation of aniline and phenol | 03 |
| Note | Students should visit any chemical industry to learn or observe the process and preparations practically and submit the report of that industrial visit also | |
| Keywords/Tags: Stereochemical Study of Organic Compounds via Models, Calibration of Thermometer, Crystallization, Mixed melting point | | |



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| Part – C : Learning Resources |
|---|
| Textbooks, Reference Books, Other Resources |
| Suggested Readings: Text Books 1. Dr. M.M.N. "Tandon unified practical chemistry" Shiva Lal Agarwal & co. 2. Sudha Goyal (Author), R. P. Singh V. K. Singh (Author), Prashant Singh Ashish Dwivedi (Author) B.Sc. Chemistry Practical I , Krishna Prakashan Media 3. Reinhart Keese. Martin P. Brändle. Trevor P. Toubé Practical Organic Synthesis: A Student's Guide John Wiley & Sons, Inc.. 4. Sudha Goyal B.Sc. Chemistry Practical III Krishna Prakashan Media 5. Furniss, B.S., Hannaford, A.J., Smith, P.W. G., Tatchell, A.R., *Vogel's Text Book of Practical Organic Chemistry", Pearson Education, 2005, 5h Edn. 6. Gurthu, J.N., Kapoor, R., "Advanced Experimental Chemistry", S. Chand and Co., 1987. 7. Sundaram, S., Krishnan, P., Raghavan, P.S., "Practical Chemistry (Part II)", S. Viswanathan Co. Pvt., 1996. 8. Mohd A A, Ramesh K P, Anuradha S, Bassa S, Advanced Laboratory Techniques in Chemistry, Scientific International Publishing house, Tamilnadu, 2024 |
| Reference Books: 1. Furniss, B.S., Hannaford, A.J., Smith, P.W. G., Tatchell, A.R., «Vogel's Text Book of Practical Organic Chemistry", Pearson Education, 2005, 5th Edn. |
| Suggestive Digital Platform Web Links: 1. https://vlab.amrita.edu/?sub=2&brch=190&sim=338&cnt=1 2. http://www.columbia.edu/itc/barnard/biology/biobc2004/edit/experiments/Experiment1-Spec.pdf 3. http://web.pdx.edu/ralfw/uploads/1/0/2/6/10260941/pulse_oximetry_laboratory_guide.pdf 4. https://www.chem.purdue.edu/courses/chm224/Lab-Experiments/expt4_GENESYS_V2.pdf 5. http://lgervind.faculty.mic.edu/biology_101/101_lab/spectrophotometry/4%20Spectrophotometer%20Fa17.pdf 6. https://www.edag.com/w/images/6/6e/EXPO11_The_pH_Electrode_and_Potentiometric_Titrations_PDF.pdf 7. https://www.philadelphia.edu.jo/academics/ajaber/uploads/CHEM%20540-Chapter%202-Potentiometry-061.pdf 8. https://www.tau.ac.il/~advanal/PotentiometricTitrations.htm 9. https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Book%3A_Analytical_Chemistry2.1 |



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(Harvey)/11%3A Electrochemical Methods/11,02%3A Potentiometric Methods

11. <https://www.chem.purdue.edu/courses/chm224/Lab-Experiments/Exp8.pdf>
12. <https://www.shcollege.ac.in/wp-content/uploads/NAAC Documents IV Cycle/Criterion-W/2.3.2/ppt/Dr Ignatious Conductometric Titration.pdf>
13. https://www.analytik.ethz.ch/praktika/phys_anal/POL/Anleitung ENG.pdf
14. <https://nph.onlinelibrary.wiley.com/doi/pdf/10.1111/i.1469-8137.1948.tb05089.x>
15. <http://chemistry.du.ac.in/study material/4103-A/MSC Polarography.pdf>
16. https://fac.ksu.edu.sa/sites/default/files/abbe_experiment.pdf
17. <https://web.mst.edu/~tbone/subjects/tbone/chem224/riproc.pdf>
18. http://www.fbml.ff.vu.lt/sites/default/files/7_4_en.pdf
19. <https://wp.optics.arizona.edu/mnofziger/wp-content/uploads/sites/31/2016/05/OPTI202L-Lab10-0MD2.pdf>
20. Lab10-0MD2.pdf
21. <http://davjalandhar.com/dbt/chemistry/SOP%20LabManuals/B.Sc.%20BT%20SEM620IV.pdf>
22. <https://vlab.amrita.edu/?sub=1&brch=195&sim=545&cnt=1>

Suggested Equivalent Online Courses:

1. <https://www.my-mooc.com/en/mooc/basic-analytical-chemistry/>
2. <https://www.my-mooc.com/en/mooc/principles-electronic-biosensors-purdue-nano535x/>



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Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

| Internal Assessment | Marks | External Assessment | Marks |
|--|-------|------------------------|-------|
| Class Interaction /Quiz | 30 | Viva Voce on Practical | 70 |
| Attendance | | Practical Record File | |
| Assignments (Charts/ Model Seminar / Rural Service/ Technology Dissemination/ Report of Excursion/ Lab Visits/Survey / Industrial visit) | | Table work/Experiments | |
| Total Marks: 100 | | | |



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| PART-A : Introduction | | | |
|--------------------------------------|---|---|------------------------|
| Programme : B.Sc. (Biotechnology) | | Class : I Semester | Year : I |
| | | Session : July 2025- June 2026 | |
| Subject : Information Technology | | Theory | |
| 1. | Course Code | BSCBT-103(T) | |
| 2. | Course Title | Information Technology | |
| 3. | Course Type (Core Course/DSE/Minor/MD-ID/SEC/VOC) | Multidisciplinary | |
| 4. | Pre-Requisite (if any) | No Pre-Requisite | |
| 5. | Course Objectives | 1. To understand and apply IT components and their applications in real-life scenarios. 2. To develop digital literacy, ethical awareness, and cyber hygiene practices among learners. 3. To familiarize learners with IT tools for office work, including the use of Indian languages. 4. To introduce learners to emerging technologies such as Artificial Intelligence (AI) and cloud platforms. | |
| 6. | Course Outcomes (COs) | On completion of this course, learners will be able to: CO 1. Understand IT components & its applications CO 2. Promote digital literacy, ethical awareness, and cyber hygiene. CO 3. Exposure to IT tools for office work including Indian languages CO 4. Encourage healthy and mindful habits through yoga and Indian values. CO 5. Introduce learners to emerging technologies like AI and cloud platforms. | |
| 7. | Credit Value | 2 Credits | |
| 8. | Total Marks | Max. Marks: 100 | Min. Passing Marks: 35 |



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| PART-B :Content of the Course | | |
|--------------------------------------|--|---------------------------------|
| No. of Lectures per week : 02 | | |
| Total No. of Lectures required : 30 | | |
| Unit | Topics | No. of Lectures required |
| I | Fundamentals of Information Technology & Indian Knowledge Systems History of Computing: From Ancient Indian contributions (e.g., binary logic in Pingala's Chandaḥśāstra) to modern IT Overview of Computer Systems: Hardware, Software, I/O Devices, Memory Operating Systems (Windows/Linux), File Management Introduction to Number Systems with Indian numeral history Concept of Digital India and e-Governance initiatives Activity : 1. Visit to a Digital Seva Kendra (Common Service Center) 2. Create a poster on Indian IT innovations (ISRO, Aadhaar, etc.) | 7 |
| II | Office Tools, Language & Communication in IT Word Processing, Spreadsheets, and Presentations Use of local languages in IT (Unicode, Google translation tools, Indic typing tools) English for IT: Email Writing, IT vocabulary, presentation skills Language models and voice-to-text (Google Lens, ChatGPT, AI typing tools) UPI and QR Code : Introduction, Functionality, Challenges and Application in Indian context. Activity : 1. Prepare a bilingual presentation (English + regional language) 2. Draft an email for a job application and create a digital resume | 7 |
| III | Internet, AI Tools & Cyber security Awareness Introduction to Internet, Cloud, and Email Cyber security basics: Phishing, Malware, Identity Theft Digital Ethics and Indian perspectives on "Dharma in Technology" Hands-on: Google Workspace, ChatGPT, Canva, Gemini, Indian AI tools Cybercrime awareness: Government portals (CERT-IN, Cyber Crime Reporting Portal). | 6 |



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| | | |
|----|--|---|
| | Activity : 1. Mock simulation of cybercrime reporting 2. Create a “Stay Safe Online” digital awareness video or poster. | |
| IV | <p>Text and Image Data: Introduction, Storage Formats for pictures, Image compression fundamentals, Image acquisition with Digital Camera. Audio Data: Introduction, Audio Signals, Acquisition and Storage, Compression Video Data: Introduction, Capturing a moving scene with Video Camera, Compression, MPEG compression standard.</p> <p>Activity :</p> <p>1. Understand how digital images are captured, stored in various formats, and compressed, while analyzing the impact of these factors on quality and size.</p> <p>2. Understand how audio and video data are captured, stored, and compressed, and how different formats and compression levels affect quality and file size.</p> | 5 |
| V | <p>IT Profession, Indian Values, Yoga & Social Impacts of Technology</p> <p>Careers in IT: Freelancing, BPO, Data Entry, Web Development, AI</p> <p>Work ethics, time management, and digital wellbeing Indian Values: Satya, Ahimsa, and Seva in Tech Service Yoga for concentration, posture correction, and stress management for IT users Social implications: Digital divide, screen addiction, misinformation.</p> <p>Activity : 1. Daily 5-minute yoga for eyes and back (Demonstration & practice)</p> <p>2. Conduct a debate: “Has Technology made us more connected or more isolated?”</p> | 5 |



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Part – C : Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings:

- Introduction to Information Technology By RAJARAMAN V., PHI Learning Pvt. Ltd. (Fourteenth Printing, Third Edition, January 2018)
- “Fundamentals of Information Technology” – Alexis Leon & Mathews Leon
- Vedic Mathematics 2005, Sterling Publishers Pvt. Ltd. ISBN 978-81-7963-001-3 Reprint 2006, 2009
- “Digital Literacy Curriculum” – MeitY (Govt. of India)

Suggestive Digital Platform Web Links:

- National Digital Library of India (NDLI)
en.wikipedia.orgswayam.gov.in.
- SWAYAM “Fundamentals of Information Technology” (AMU)
swayam.gov.in+11onlinecourses.swayam2.ac.in+11classcentral.com+11.
<https://www.nielit.gov.in/content/digital-literacy-courses>

Suggested Equivalent Online Courses:

- Diksha Portal, NPTEL, Cyber Surakshit Bharat
- MyGov Cyber Safety Module
- AI Tools Practice : ChatGPT, Bard/Gemini, Canva, Grammarly, Scratch/Python IDEs
- **SWAYAM – Fundamentals of IT (AMU) –**
Comprehensive coverage of Module I, including history, hardware, OS, memory, number systems, and an intro to cybersecurity onlinecourses.swayam2.ac.in+15onlinecourses.swayam2.ac.in+15testbook.com+15.
- **SWAYAM – Course in Information Technology (Savitribai Phule Pune Univ.)**
– A 30-module, 8-week program with cloud introduction, Google Workspace, e-Governance concepts and basic security onlinecourses.swayam2.ac.in+1swayam.gov.in+1.
- **IIT Madras C Programming & Assembly Language (SWAYAM) –**
Ideal for Module IV: hands-on programming, logical thinking, algorithms, flowcharts, and connection to hardware fundamentals



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| Part D: Assessment and Evaluation | | |
|--|---|--------------------------|
| Internal Assessment Continuous Comprehensive Evaluation (CCE): 30 Marks | | Total Marks : 100 |
| External Assessment Time :03:00 Hours | Section (A): Very Short Questions Section (B): Short Questions Section (C): Long Questions | Marks : 70 Marks |
| Total Marks | (Internal Assessment + External Assessment) : 30+70= 100 Marks | |
| Credit Value | 2 Credits | |
| Minimum Passing Marks | 35 Marks | |



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| Part A Introduction | | | |
|--------------------------------------|--|---|--------------------------------|
| Programme : B.Sc. (Biotechnology) | | Class : I Semester | Year : I |
| | | | Session : July 2025- June 2026 |
| Subject: Information Technology | | Practical | |
| 1. | Course Code | BSCBT-103(P) | |
| 2. | Course Title | Information Technology | |
| 3. | Course Type (Core Course/ Discipline Specific Elective/ Elective/Generic Elective /Vocational/) | Multi Disciplinary Course | |
| 4. | Pre-requisite(if any) | No Pre-requisite | |
| 5. | Course Objectives | 1. To familiarize students with basic computer hardware components and their functionality. 2. To develop skills in using office productivity software (word processor, spreadsheet, presentation software). 3. To introduce students to basic networking concepts and internet applications. 4. To develop practical skills in using IT tools for documentation, data analysis, and presentation. 5. To familiarize students with cyber hygiene practices and online safety measures. | |
| 5. | Course Outcomes (CO's) | On successful completion of this course, students will be able to- CO1. Assemble, disassemble, and identify computer hardware components. CO2. Proficient in using office software (word processor, spreadsheet, presentation software) to create documents, reports, and presentations. CO3. Understand basic networking concepts and be able to configure and troubleshoot simple networks. CO4. Apply IT tools for data analysis, documentation, and presentation in real-world scenarios. CO5. Demonstrate awareness and practices of cyber hygiene, online safety, and digital citizenship. | |
| | Credit Value | 2 Credit | |
| 7. | Total Marks | Max Marks 30+70 | Min Passing Marks: 35 |



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| Part B –Contents of the Course | | |
|------------------------------------|--|------------------|
| No. of Lectures per week: 2 | | |
| Total No. of Lectures Required: 30 | | |
| S.No. | Name of the Exercise | No. of Lab Hours |
| 1. | <p>1. Identify and List Computer System Components Open a PC, identify hardware parts (RAM, HDD, motherboard, I/O devices), and create a labelled diagram.</p> <p>2. Install and Compare OS (Windows vs Linux) Dual-boot or virtual install Linux (Ubuntu), compare file systems, UI, and commands.</p> <p>3. File Management Operations Create folders, copy/move/delete files, use command-line (Windows CMD or Linux terminal).</p> <p>4. Number System Converter Using Spreadsheet Convert between Decimal, Binary, Octal, and Hexadecimal.</p> <p>5. Explore Digital India Portals Navigate portals like UMANG, MyGov, or eDistrict and note their services.</p> <p>6. Create a Document with Word Processor Prepare a report with headings, bullet points, image insertion, and page formatting.</p> <p>7. Use Spreadsheets for Budget/Attendance Calculation Formulas, charts, conditional formatting, and data filtering.</p> <p>8. Prepare a Presentation with Animations Slides with images, transitions, and speaker notes (topic: e-Governance or AI in India).</p> <p>9. Type a Paragraph in Hindi or Your Local Language Using Google Input Tools or Indic Keyboard with Unicode support.</p> <p>10. Translate a Passage Using Google Translate Translate English to any Indian language, check accuracy, and voice pronunciation.</p> <p>11. Practice Email Writing & IT Vocabulary Compose a formal IT-related email; identify 20 IT-specific terms.</p> <p>12. Test Voice-to-Text Using Google Lens or ChatGPT Speak a paragraph and convert it to digital text. Analyze accuracy and limitations.</p> <p>13. QR Code Scanner & UPI Demo (Mock Activity) Generate a QR code using a tool, and simulate UPI-based payments (no real transactions).</p> <p>14. Create and Share a Document Using Google Workspace Collaborate on Google Docs or Sheets with comments and version history.</p> <p>15. Visit CERT-IN and Cybercrime Portals Explore the Government's cybercrime reporting portal and note key features.</p> | 30 |



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| Part C- Learning Resources | | |
|---|--|--|
| Text Books, Reference Books, Other resources | | |
| Suggested Reading: | | |
| Suggested equivalent digital platforms/websites/online courses: | | |
| | <p>16. Hands-on with AI Tools (ChatGPT, Gemini, etc.) Ask an AI to generate a bio, convert text to summary, or translate content. Document outputs.</p> <p>17. Capture an image, audio, and video using a smartphone or digital camera. Department of Higher Education, Madhya Pradesh Information Technology 6 Save each file in multiple formats (e.g., JPEG, PNG, WAV, MP3, MP4) and record file sizes. Compare quality and size across formats to understand storage and compression.</p> <p>18. Record audio and video clips and compress them using Audacity and Hand Brake tools. Analyze quality differences and calculate compression ratios.</p> <p>19. Draw a Flowchart for a Real-Life Task E.g., Making tea, submitting an online form.</p> <p>20. Daily Yoga Routine for Digital Wellness Follow a 15-min yoga/stretch session for posture & stress relief. Log benefits weekly.</p> | |



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Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

| Internal Assessment | Marks | External Assessment | Marks |
|--|-------|-------------------------|-------|
| Class Interaction/Quiz | 10 | Viva Voce Practical | 10 |
| Attendance | 10 | Practical Record File | 10 |
| Assessments (Charts/Model/Seminar/Rural Service/ Technology/ Dissemination/Report of Excursion/ Lab Visits/ Survey/ Industrial Visit) | 10 | Table work/ Experiments | 50 |
| Total Marks : 100 | | | |



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आधार पाठ्यक्रम प्रथम प्रश्न पत्र - हिन्दी भाषा और संस्कृति (भाग - अ) परिचय

| | | |
|--|--|----------------------|
| कार्यक्रम : यूजी लेवल प्रमाण पत्र | कक्षा : बी.सी.ए (प्रथम सेमिस्टर) | जुलाई-दिसंबर 2025 |
| विषय | Ability Enhancement Course (AEC) | |
| पाठ्यक्रम कोड | AEC-101 | |
| पाठ्यक्रम का शीर्षक: पाठ्यक्रम का प्रकार | हिन्दी भाषा और संस्कृति Ability Enhancement Course (AEC) | |
| पाठ्यक्रम अपेक्षित | कक्षा 12 उत्तीर्ण किसी भी विषय समूह से प्रमाण पत्र किया हो, पात्र है। | |
| पाठ्यक्रम अध्ययन के उद्देश्य (लर्निंग ऑब्जेक्टिव) | 1. विद्यार्थियों को भारतीय ज्ञान परंपरा से परिचित कराना तथा इससे लाभान्वित करना। 2. हिन्दी के प्रमुख रचनाकारों एवं उनकी महत्वपूर्ण रचनाओं का अध्ययन कर विद्यार्थियों का साहित्यिक ज्ञान बढ़ाना। 3. पाठ्य सामग्री के माध्यम से देश की संस्कृति, चेतना, संस्कार एवं राष्ट्रीय भावना से परिचित कराना। 4. व्याकरण और भाषा ज्ञान की मूलभूत समझ विकसित करना। 5. सामान्य और विशेष शब्दावली के अध्ययन द्वारा भाषा और संस्कृति की समझ को बढ़ावा देना। | |



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| | | |
|---|--|--|
| | 6.विशेष शब्दावली (बीज शब्द) के माध्यम से विद्यार्थियों के बोध एवं शब्द ज्ञान का स्तर बढ़ाना। 7.विद्यार्थियों को प्रतियोगी परीक्षाओं की तैयारी हेतु आवश्यक भाषा ज्ञान एवं साहित्यिक दक्षता प्रदान करना। | |
| पाठ्यक्रम अध्ययन की उपलब्धि (लर्निंग आउटकम) CLO | 1. भारतीय ज्ञान परम्परा से विद्यार्थियों को अवगत एवं लाभान्वित करवाना। 2. इस पाठ्यक्रम के अध्ययन से विद्यार्थी हिन्दी के प्रसिद्ध रचनाकारों एवं उनकी रचनाओं से परिचित हो सकेंगे। 3. पठित रचनाओं के माध्यम से विद्यार्थी देश की संस्कृति चेतना, संस्कार एवं राष्ट्रीय भावना से परिचित हो सकेंगे। 4. व्याकरण एवं भाषा ज्ञान का बोध। 5. सामान्य शब्दावली और विशेष शब्दावली के अध्ययन द्वारा भाषा एवं संस्कृति बोध का विकास करना। 6.विशेष शब्दावली (बीज शब्द / की वर्ड) से परिचित करवाते हुए बोध के स्तर को विकसित करना। 7. प्रतियोगी परीक्षाओं हेतु तैयार करना। | |
| क्रेडिट | 02 क्रेडिट | |
| कुल अंक | 100 अंक | |
| उत्तीर्ण अंक | 35 अंक | |



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(भाग- ब) कोर्स सामग्री

व्याख्यान की कुल संख्या : वर्ष में अधिकतम 30 घंटे

| इकाई | विषय | व्याख्यान की संख्या |
|---------|---|---------------------|
| इकाई -1 | 1 भारतीय ज्ञान परम्परा एक परिचय 2 भारतीय ज्ञान परम्परा और हिन्दी भाषा 3 महर्षि पाणिनि जीवन एवं दर्शन गतिविधियाँ - भारतीय ज्ञान परंपरा पर आधारित पोस्टर सृजन भारतीय ज्ञान परंपरा से संबंधित ग्रंथों / पुस्तकों का अवलोकन | 6 घंटे |
| इकाई -2 | 1 मैथिलीशरण गुप्त : परिचय पाठ: मातृभूमि (कविता) 2 सूर्यकांत त्रिपाठी 'निराला' : परिचय पाठ: भारत वंदना (कविता) 3 प्रेमचन्द : परिचय पाठ : शतरंज के खिलाडी (कहानी) गतिविधियाँ - कविता का सस्वर वाचन कहानी वाचन | 6 घंटे |
| इकाई -3 | 1 वैचारिक - भारतीय भाषाओं में राम 2 आचार्य रामचन्द्र शुक्ल : परिचय पाठ : उत्साह (भावमूलक निबन्ध) 3 रामधारी सिंह दिनकर : परिचय पाठ : भारत एक है (संस्कृति) लेख 4 शरद जोशी : परिचय | 6 घंटे |



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| | | |
|---------|--|--------|
| | पाठ : अफसर (व्यंग्य) गतिविधियाँ - निबंध लेखन का अभ्यास भारतीय संस्कृति पर आलेख लेखन | |
| इकाई -4 | हिन्दी व्याकरण 1 शब्द रचना : उपसर्ग एवं प्रत्यय 2 शब्द प्रकार : तत्सम, तद्भव, देशज, विदेशी संकर नव निर्मित शब्द 3 पर्यायवाची, विलोमार्थी, अनेक शब्द के लिए एक शब्द गतिविधियाँ - शब्द रचना संबंधी समूह चर्चा देशज-विदेशी शब्द सूची बनाना | 6 घंटे |
| इकाई -5 | हिन्दी व्याकरण 1. हिन्दी के प्रमुख विराम चिह्न 2. संक्षेपण 3. बीज शब्द - धर्म, अद्वैत, भाषा, अवधारणा गतिविधियाँ - अनुच्छेद / श्रुतलेख के माध्यम से विराम चिह्नों का अभ्यास संक्षेपण का अभ्यास | 6 घंटे |



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| | | | |
|--|--|---|--|
| | सार विन्दु (की वर्ड) / टैग | | |
| | सर्च करे: | | |
| | मैथिलीशरण गुप्त: | मैथिलीशरण गुप्त की कविता - मातृभूमि | |
| | सूर्यकांत त्रिपाठी 'निराला': भारत वंदना | सूर्यकांत त्रिपाठी निराला : भारत वंदना | |
| | प्रेमचन्द | प्रेमचन्द - शतरंज के खिलाडी | |
| | रामधारी सिंह 'दिनकर' | भारत एक है। | |
| | आचार्य रामचन्द्र शुक्ल | उत्साह निबन्ध | |
| | भारतीय ज्ञान परम्परा | भारतीय ज्ञान परम्परा और हिन्दी भाषा | |
| | धर्म क्या है ? | | |
| | शब्द रचना, शब्द प्रकार पर्यायवाची शब्द | | |
| | विलोम शब्द अनेक शब्द के लिए एक शब्द | | |
| | विराम चिह्न | | |
| | संक्षेपण | | |



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| (भाग- स) | |
|---|---|
| अनुशंसित अध्ययन संसाधन | |
| पाठ्य पुस्तके, सन्दर्भ पुस्तके, अन्य संसाधन | |
| 1. | प्रेमचन्द्र - मानसरोवर, खण्ड - 3 |
| 2. | आचार्य रामचन्द्र शुक्ल - चिन्तामणि, भाग -1 |
| 3. | शरद जोशी - "कहा जाता है" (व्यंग्य संग्रह) |
| 4. | डॉ. वासुदेव नन्दन प्रसाद : आधुनिक हिन्दी व्याकरण और रचना, भारती भवन, ठाकुर बाड़ी रोड, पटना, बिहार |
| 5. | डॉ. राजेश्वर चतुर्वेदी, हिन्दी व्याकरण - उपकार प्रकाशन, आगरा, उ.प्र. |
| 6. | भारतीय ज्ञान परम्परा - विविध आयाम सम्पादक प्रो. सरोज शर्मा, शिप्रा प्रकाशन - नई दिल्ली |
| 7. | प्राचीन भारतीय ज्ञान परम्परा लेखक - डॉ. अश्विन कुमार राठौर, प्रकाशक श्री साँईनाथ, प्रकाशन- नागपुर |
| 8. | हिन्दी ज्ञान कोश |
| 9. | इन्टरनेट सामग्री - टैग में उल्लेखित |

भाग - द



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| अनुशंसित मूल्यांकन विधि | | |
|--|--|--------------|
| अधिकतम अंक - 100 | | |
| केवल बाह्य मूल्यांकन | | |
| आकलन: अनुभाग विश्वविद्यालय परीक्षा समय - 2 घण्टे | (अ) तीन अतिलघु प्रश्न (प्रत्येक 50 शब्द) | 03 X 04 = 12 |
| | (ब) चार लघु प्रश्न (प्रत्येक 200 शब्द) | 04 X 13 = 52 |
| | (स) दो दीर्घ प्रश्न (प्रत्येक 500 शब्द) | 02 X 18 = 36 |
| | कुल अंक 100 | |



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| PART-A : Introduction | | | |
|--------------------------------------|------------------------|--|--------------------------------|
| Programme : B.Sc. (Biotechnology) | Class : I Semester | Year : I | Session : July 2025- June 2026 |
| Subject : Digital Marketing | | Theory | |
| 1. | Course Code | SEC-101 | |
| 2. | Course Title | Digital Marketing | |
| 3. | Course Type | SEC | |
| 4. | Pre-Requisite | NIL | |
| 5. | Course Objectives | 1. To develop a comprehensive understanding of digital marketing concepts and tools. 2. To Integrate Indian cultural and traditional insights into digital marketing strategies. 3. To design and execute a real digital marketing campaign. | |
| 6. | Course Outcomes (CO's) | On successful completion of this course, the students will be able to: CO1: Explain the concepts and tools of digital marketing. CO2: Apply digital marketing strategies using Indian cultural and traditional insights. CO3: Design and execute a digital marketing campaign. CO4: Analyze the legal frame work and ethical responsibilities involved in digital marketing. | |
| 7. | Credit Value | 3 Credits | |
| 8. | Total Marks | Max.Marks:100 | Min. Passing Marks:35 |



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| PART B: Content of the Course (Theory) | | |
|--|---|-----------------|
| No. of Lectures per week : 03 | | |
| Total No. of Lectures required :45 | | |
| Unit | Topics | No. of Lectures |
| I | <p>Introduction to Digital Marketing: Meaning, scope, and significance of digital marketing; Difference between digital and traditional marketing; Overview of digital marketing channels: SEO, SEM, Social Media, Email; Career opportunities in digital marketing.</p> <p>Practical Activities-</p> <ul style="list-style-type: none">• Students analyze different digital marketing channels(e.g., social media, search engines, email, display ads) and identify their advantages and disadvantages.• Students debate ethical issues in digital marketing,• Students will analyze Indian brands (e.g., Amul, Tanishq, Paper Boat, Fab India) that integrate traditional values with modern marketing approaches.• Group presentation or written report based on selected case. | 18 |
| II | <p>Customer Research: Digital Consumer Behavior: Characteristics and factors affecting; Digital Marketing Strategy and Campaign Planning: Segmentation and targeting in the digital environment;</p> <p>Practical Activity-</p> <ul style="list-style-type: none">• List out various e-commerce apps/platforms.• Students will explore campaigns (e.g., Surf Excel's "Daag Acche Hain-Holi", Cadbury's Diwali campaigns) to study targeting, emotions, platform use, and outcomes. Comparative analysis and class discussion to be encouraged.• Choose a marketing-related topic (e.g., influencer marketing, consumer behaviour trends, and sustainability in branding).• Create engaging and informative content using simple tools like Canva or Google Docs. | 15 |



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| | | |
|---|---|----|
| III | <p>Legal & Ethical Issues in Digital Marketing: Meaning of ethics in digital marketing, Importance of ethical behavior for brand image and customer trust; Data Protection Laws in India</p> <p>Practical Activity-</p> <ul style="list-style-type: none">• Students examine real or hypothetical digital ads and identify potential legal or ethical violations.• Role-play a scenario where a marketing team debates whether to use consumer data without consent. | 12 |
| Keywords/Tags: Digital Marketing, Content Marketing, Legal & Ethical Issues, Customer Research, Strategy, Technology | | |



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Part C-Learning Resources

Text Books, Reference Books, Other resources

- Mathur, Vibha & Arora, Saloni. (2020). Digital Marketing. PHI Learning.
- Babu KG Raja Sabarish, Anbazhagan B, Meenakumari S. (2023). Digital Marketing. Sultan Chand & Sons.
- Swaminathan T. N. & Karthik Kumar. (2019). Digital Marketing: From Fundamentals to Future. Cengage India.
- Chaffey, D. (2022). Digital marketing: Strategy, implementation and practice (8th ed.). Pearson.
- Deiss, R., & Henneberry, R. (2020). Digital marketing for dummies (2nd ed.). Wiley.
- Mahadevan, B. (2022). Textbook on Indian knowledge systems. Indian Institute of Management Bangalore.
- The Readers Paradise. (2025). Indian knowledge system: Principles and practices.

Suggestive digital platforms weblinks:

SWAYAM Course: Digital Marketing

https://onlinecourses.swayam2.ac.in/ugc19_hs26/preview



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| Part D- Assessment and Evaluation | | |
|---|--|----------|
| Suggested Continuous Evaluation Methods: | | |
| Internal Assessment: No Internal Assessment | Class Test Assignment/Presentation | Nil |
| External Assessment: Time : 03.00 Hours | Section (A): Objective Type Questions | 10 Marks |
| | Section (B): Short Questions (200 Words Each) | 40 Marks |
| | Section (C): Long Questions (500 Words Each) | 50 Marks |
| Total Marks | (Internal Assessment + External Assessment) : 30+70=100 | |
| Credit Value | 3 | |
| Minimum Passing Marks | 35 | |



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| PART – A: Introduction | | | |
|-------------------------------------|--|--|---------------------------------------|
| Program: BBA/ BCA/ B. Sc. | Class: I Year | Semester: I | Session : July 2025- June 2026 |
| Subject: Project Work | | Theory / Practical: Practical | |
| 1 | Course Code | PW/ Ap/ CE - 101 | |
| 2 | Course Title | Project Work | |
| 3 | Course Type (Core Course/DSE/Minor/MD-ID/SEC/VOC) | Project Work (PW) PW/Ap/ CE | |
| 4 | Pre-Requisite (if any) | Open for all | |
| 5 | Course Objectives (CO) | 1: To develop practical understanding of basic management and business concepts. 2: To enhance analytical and problem-solving skills through field or desk research. 3: To improve teamwork, communication, and presentation skills. 4: To familiarize students with local business practices and entrepreneurship. 5: To cultivate data collection, interpretation, and reporting skills. | |
| 6 | Course Outcomes (COs) | CO1: Students will be able to apply theoretical concepts to real-world business scenarios. CO2: Students will be able to demonstrate improved research and analytical skills using surveys, interviews, or observation. CO3: Students will be able to enhance team coordination and professional communication. CO4: Students will be able to gain exposure to local industries, markets, and entrepreneurial challenges. CO5: Students will be able to prepare structured reports and presentations effectively. | |
| 7 | Credit Value | 02 | |
| 8 | Total Marks | Max. Marks: 100 | Min. Passing Marks: 35 |



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| PART – B: Content of the Course | |
|---|-----------------|
| No. of Lectures per week: Theory (02 Hours per week) | |
| Total No. of Lectures required: P: 60 Hours | |
| Topics | No. of Lectures |
| <p>As part of the Skill Based Activity students are required to undertake Project Work. It is designed to provide practical exposure, industry orientation and application of classroom learning in real business scenarios. For this, students are required to:</p> <ol style="list-style-type: none">1. Select an Industry/Organization - Identify a suitable industry or organization for undertaking the project work.2. Observe Operations - Visit the organization to observe its operations, processes, and overall working environment.3. Understand Organizational Structure - Interact with employees at various levels to comprehend the hierarchy and organizational structure.4. Choose a Functional Area - Select a specific functional area (e.g. Marketing or Human Resources or Operations or Finance) for detailed study.5. Collect and Analyze Data - Gather and analyze data related to the chosen area using both primary sources (interviews, discussions, surveys) and secondary sources (reports, websites, manuals).6. Prepare and Present Report - Compile a comprehensive project report that includes the company profile, observations, data analysis, key learnings, and actionable recommendations. | 60 |



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| Part C: Assessment and Evaluation | |
|---|-------|
| Suggested Continuous Evaluation Method: | |
| External Assessment | Marks |
| Viva Voce on Practical (20 Marks) | 100 |
| Practical Record File (20 Marks) | |
| Table Work/Exercise Assigned (60 Marks) | |
| Total Marks: 100 | |



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Syllabus

Bachelor of Science (Biotechnology)

[B. Sc. (BT)]

Year I / Semester II

w.e.f. Session 2025 -2026



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| B.Sc. (Biotechnology) II Semester | | | | |
|-----------------------------------|----------------------------|-----------------|--|--------------|
| Session: January - June 2026 | | | | |
| S. No. | Course Type | Course Code | Subject | Total Credit |
| 1. | Major II (Core Course) | BSCBT - 201 (T) | Biochemistry (Theory) | 4 |
| | | BSCBT - 201 (P) | Lab Work for Biochemistry (Practical) | 2 |
| 2. | Major III (Core Course) | BSCBT - 202 (T) | Microbiology and Immunology (Theory) | 4 |
| | | BSCBT - 202 (P) | Lab Work for Microbiology and Immunology (Practical) | 2 |
| 3. | Minor II | BSCBT - 203 (T) | Applied Chemistry (Theory) | 3 |
| | | BSCBT - 203 (P) | Applied Chemistry (Practical) | 1 |
| 4. | Ability Enhancement Course | AEC - 201 | English Language & Indian Culture | 2 |
| 5. | Value Added Course | VAC - 201 | भारत बोध (Understanding India) | 2 |
| Total Credits | | | | 20 |



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| Part A: Introduction | | |
|---|---|-----------------------------------|
| Programme: B.Sc. (Biotechnology) Class: I Year Semester: II Session: January- June 2026 | | |
| Subject: Biotechnology | | Theory/ Practical : Theory |
| 1. Course Code | BSCBT – 201(T) | |
| 2. Course Title | Biochemistry (Theory) | |
| 3. Course Type (Core Course/DSE/Minor/MD-ID/SEC/VOC) | Major-II (Core Course) | |
| 4. Pre-requisite(if any) | To study this course, a student must have the subject Biology in XII class/Certificate course/Diploma | |
| 5. Course Objectives | <ol style="list-style-type: none"> 1. To develop a strong foundational understanding of core concepts in physical, chemical, and biological sciences that forms the basis of modern biotechnology. 2. To equip students with essential knowledge and technical skills required to pursue careers in biotechnology research, academia, and industry. 3. To promote interdisciplinary learning and problem-solving abilities by integrating principles from multiple scientific domains relevant to biotechnology. 4. To familiarize students with current technological advancements and industrial applications in biotechnology, preparing them for real-world professional environments. 5. To familiarize students with current technological advancements and industrial applications in biotechnology, preparing them for real-world professional environments. | |
| 6. Course Outcomes (COs) | <p>On completion of this course, learners will be able to:</p> <p>CO1: Identify career opportunities in biotechnology, including medical laboratory technician roles in hospitals, diagnostic centers, and pathological laboratories.</p> <p>CO2: Apply biochemical concepts to analyze metabolic pathways, molecular interactions, and cellular responses related to human health and disease.</p> <p>CO3: Explain the biochemical roles, structures, and regulatory functions of proteins and enzymes involved in major cell-signaling pathways.</p> <p>CO4: Describe the biochemical basis of genetic mutations and evaluate the enzymatic repair mechanisms that maintain DNA stability and prevent cellular damage.</p> <p>CO5: Illustrate the biochemical mechanisms underlying DNA replication, transcription, translation, and the regulation of gene expression.</p> | |



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| | | |
|----|---|--|
| 7. | Expected Job Role & Career Opportunities | <ul style="list-style-type: none">• Medical Laboratory Technician• Molecular Biology Research Assistant• Molecular Diagnostic Technologist• Quality Control (QC) Analyst• Enzymologist |
| 8. | Credit Value | Theory - 4 Credits |
| 9. | Total Marks | Max.Marks:30+70 Min. Passing Marks: 35 |



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| Part B:Content of the Course | | |
|---------------------------------------|---|------------------------|
| Total No. of Lectures required:60 hrs | | |
| Unit | Topics | No. of Lectures |
| I | Chemistry of Water Properties of Water, Interaction of Water, Role of Water in Bio molecular Structure, Acid and Bases, Buffer solutions. Basic characteristics of small molecules: Nomenclature and Classification of Inorganic Compounds (Oxides, Salts Acids, Bases, Ionic Molecular and Coordination Compounds). Nomenclature and Classification of Organic Compounds (Alkynes, Cyclic Hydrocarbons, Aromatic Compounds Alcohols, Ethers, Aldehydes, Ketones, Amines. Amides) | 12 |
| | Suggested Activities: I. Collection of water from different sources and its analysis. II. Chart on classification of organic and inorganic compounds III. Collection of different type of acid and base nature of fruit juice and others. | |
| II | Carbohydrates: Sources, Structures, Characteristics, Nomenclature. Classification and Functions. Metabolism. | 12 |
| | Suggested Activities: I. Group discussion on biochemistry of glucose metabolism. II. Questionnaire preparation on sources of carbohydrates and their function. | |
| III | Proteins: Sources, Structures, Characteristics, Nomenclature, Classification, and Functions. | 12 |
| | Suggested Activities: I. Discussion on different source of functional proteins. II. Model making of 3D structure of protein. | |
| IV | Lipids: Sources, Structures, Characteristics, Nomenclature, Classification, and Functions. Metabolism. | 12 |
| | Suggested Activities: I. Quiz on types of lipids and fats. II. Assignment on metabolism of fat. III. Poster making on structure of lipids. | |
| V | Nucleic Acid: Sources, Structures, Characteristics, Nomenclature, Classification and Functions. | 12 |
| | Suggested Activities Activity- I. Model making of Watson and Crick .Model of DNA II. Project on forms of DNA from different organisms. III. Counseling of genetic related disorder. | |

Note: One activity from every Unit is must for students.



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| Part–C: Learning Resources |
|---|
| Text Books, Reference Books, Other resources |
| Textbooks <ol style="list-style-type: none">1. Text book of Biochemistry-S P Singh2. Experimental Biochemistry Beedu Rao and Vijay Deshpandey3. Biochemistry a Lab Manual Farrel and Taylor4. Introductory practical Biochemistry-Sashemy and Singh5. Laboratory Manual and Practical Biochemistry T.N.Pattabirarman-All India Publishers & Distribution.6. Lab Manual for Biochemistry-Shivnenja Shankar-Jaypee Publication |
| Suggestive Digital Platform WebLinks: <ol style="list-style-type: none">1. https://epgp.inflibnet.ac.in2. https://www.eshiksha.mp.gov.in/mpdhe |
| Suggested Equivalent Online Courses: <ol style="list-style-type: none">1. https://sbs.acs.org/los/bichaw(forBiochemistry).2. https://pubs.acs.org/loi/bipes,tutps://guideslihoedu/biotech(forbiotechnology)3. http://www.freebookcentre.net/Biology/BioTechnology-Books.html e books on biotechnology https://www.phindia.com/Books/ShoweBooks/MTExNA/Biotechnologyebooksonbiotechnology4. https://bookauthority.org/tsooks/best-biotechnology-cbooksebooksonbiotechnology5. http://www.mphindigranthacademy.org |



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| Part D:Assessment and Evaluation | | |
|---|--|-----|
| Suggested Continuous Evaluation Methods: | | |
| Maximum Marks: | | 100 |
| Continuous Comprehensive Evaluation (CCE) : | | 30 |
| University Exam (UE) : | | 70 |
| Time : 03:00 hours | | |
| Internal Assessment Continuous Comprehensive Evaluation(CCE) | Class Test | 15 |
| | Assignment/Presentation | 15 |
| | Total | 30 |
| External Assessment University Exam Section | Section(A): Very Short Questions Section(B): Short Questions Section(C): Long Questions | 70 |



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| Part A: Introduction | | |
|---|------------------------------|---|
| Programme- B.Sc.(Biotechnology) Class: I Year Semester: II Session: January-June 2026 | | |
| Subject: Biotechnology Theory/Practical: Practical | | |
| 1. | Course Code | BSCBT – 201(P) |
| 2. | Course Title | Lab Work for Biochemistry (Practical) |
| 3. | Course Type | Major- II (Core Course) |
| 4. | Pre-requisite(If any) | To study this course, a student must have the subject Biology in XII class. |
| 5. | Course Objectives | <ol style="list-style-type: none">1. To establish a strong foundational understanding of biotechnology by integrating core concepts from physical, chemical, and biological sciences.2. To develop interdisciplinary scientific skills needed to meet the growing work force demands in biotechnology research, academia, and industry.3. To introduce students to modern technological advancements and their applications in various areas of biotechnology.4. To equip students with fundamental knowledge and practical skills essential for engaging in industrial processes, laboratory work, and research activities.5. To cultivate analytical thinking and scientific aptitude necessary for contributing to innovation and supporting the ongoing biotechnology revolution. |
| 6. | Course Outcomes (COs) | <p>On completion of this course, learners will be able to:</p> <p>CO1. Perform fundamental biochemical experiments with accuracy, including preparation of buffers, estimation of biomolecules, and analysis of enzyme activity using standard laboratory techniques.</p> <p>CO2. Apply appropriate laboratory instruments and analytical methods to generate, record, and interpret biochemical data effectively.</p> <p>CO3. Demonstrate good laboratory practices, including safety procedures, documentation, team work, and the ability to analyze experimental results to understand underlying biochemical principles.</p> |



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| | | |
|----|---|--|
| 7. | Expected Job Role & Career Opportunities | <ul style="list-style-type: none">• Medical Laboratory Technician• Molecular Biology Research Assistant• Molecular Diagnostic Technologist• Quality Control (QC) Analyst• Enzymologist |
| 8. | Credit Value | Practical -2 Credits |
| 9. | Total Marks | Max.Marks:100 Min. Passing Marks:35 |



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| Part B:Content of the Practical Course | |
|--|---|
| Total No. of Lectures required:30 | |
| S.No. | List of Experiments/Exercise/Practicals |
| 1. | Determining the pH of various fruit juices. |
| 2. | Preparing physiological buffers. |
| 3. | Quantitative analysis of carbohydrates. |
| 4. | Quantitative analysis of proteins by Lowry method |
| 5. | Quantitative analysis of lipids. |
| 6. | Determining the saponification value of lipids. |
| 7. | Separation of plant dyes by paper chromatography. |
| 8. | Separation of amino acids by TLC. |



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| Part C: Learning Resources |
|---|
| Text Books, Reference Books, Other resources |
| Textbooks <ol style="list-style-type: none">1. Biochemistry-Bhatia and Kohli, R. D. Publishers2. Biochemistry-Dr. Vijay Kumar, Mahendra Prasad, J.P.B.Publishers3. Test book of Biochemistry-S.P.Singh4. Experimental Biochemistry-Beedu Rao and Vijay Deshpandey5. Biochemistry-A Lab Manual-Farrel and Taylor6. Introductory Practical Biochemistry-Sawhemy and Singh7. Laboratory Manual and Practical Biochemistry-T.N.Pattabiraman-All India Publishers & Distribution8. Lab Manual for Biochemistry-Shivnenja Shankar-Jaypee Publications |
| Suggestive Digital Platform WebLinks: <ol style="list-style-type: none">1. https://epgp.inflibnet.ac.in2. https://www.eshiksha.mp.gov.in/mpdhe |
| Suggested Equivalent Online Courses: <p>https://sbs.acs.org/los/bichaw(forBiochemistry). https://pubs.acs.org/loi/bipes, tutps://guides lih oh edu/biotech (for biotechnology) http://www.freebookcentre.net/Biology/BioTechnology-Books.html e books on biotechnology https://www.phindia.com/Books/ShoweBooks/MTEExNA/Biotechnologyebooksonbiotechnology https://bookauthority.org/tsooks/best-biotechnology-cbooksebooksonbiotechnology http://www.mphindigranthacademy.org</p> |



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| Part D: Assessment and Evaluation (Practical) | |
|--|------------------------|
| Scheme of Practical Examination:- | Max. Marks:100 |
| Internal Assessment | |
| Class Interaction | |
| Quiz | |
| Seminar | |
| Assignments(Charts, Rural Service, Technology Dissemination/Excursion/Lab Visit/Industrial Training | |
| External Assessment | Max. Marks: 100 |
| Major Experiment | 15 |
| Minor Experiment-1 | 5+10 |
| Minor Experiment-2 | 5+10 |
| Spotting | 15 |
| Viva-Voce | 10+10 |
| Practical Record | 10+10 |



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| Part A : Introduction | | |
|---|--|-----------------------------------|
| Programme: B.Sc. (Biotechnology) Class: I Year Semester: II Session: January- June 2026 | | |
| Subject: Biotechnology | | Theory/ Practical : Theory |
| 1. Course Code | BSCBT – 202 (T) | |
| 2. Course Title | Microbiology and Immunology (Theory) | |
| 3. Course Type (Core Course/DSE/Minor/MD-ID/SEC/VOC) | Major-III (Core Course) | |
| 4. Pre-requisite (if any) | To study this course, a student must have the subject Biology in XII class/Certificate course/Diploma | |
| 5. Course Objectives | <ol style="list-style-type: none"> 1. To provide foundational knowledge of microorganisms—their structure, physiology, classification, and roles in the environment, industry, and human health. 2. To introduce students to the principles of immunology, including components of the immune system and mechanisms of immune responses against pathogens. 3. To develop practical skills in microbiological techniques, such as culturing, staining, isolation, identification, and handling of microbes under aseptic conditions. 4. To explain host–pathogen interactions, microbial pathogenesis, and the immunological basis of infectious and immune-mediated diseases. 5. To familiarize students with applications of microbiology and immunology in clinical diagnostics, vaccines, antimicrobial therapy, biotechnology, and public health. | |



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| | | |
|-----------|---|---|
| 6. | Course Outcomes (COs) | <p>On completion of this course, learners will be able to:</p> <p>CO1: Describe the structural, physiological, and genetic characteristics of microorganisms and explain their roles in health, disease, and the environment.</p> <p>CO2: Demonstrate proficiency in essential microbiological techniques, including culturing, staining, isolation, identification, and safe handling of microbes.</p> <p>CO3: Explain the components and functions of the immune system, including innate and adaptive immune responses to pathogens.</p> <p>CO4: Analyze the mechanisms of microbial pathogenicity and evaluate host–pathogen interactions and immune defense strategies.</p> <p>CO5: Apply microbiological and immunological concepts to real-world applications such as diagnostics, antimicrobial therapy, vaccination, biotechnology, and public health.</p> |
| 7. | Expected Job Role/Career Opportunities | <ul style="list-style-type: none"> • Clinical Microbiologist • Biomedical Scientist • Immunologist • Research Scientist • Biosafety Officer |
| 8. | Credit Value | Theory - 4 Credits |
| 9. | Total Marks | Max. Marks: 30+70 Min. Passing Marks: 35 |



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| Part B: Content of the Course | | |
|--|--|-----------------|
| Total No. of Lectures required: 60 hrs | | |
| Unit | Topics | No. of Lectures |
| I | History, Basic concepts of Microbiology and Culture Media preparation Sukshmjeevanu Vigyan (Microbiology) in Vedas History, Basic Concepts of Microbiology: Fundamental, History and evolution of microbiology, Development of microbiology, Application of microbiology in human welfare. Classification, General characteristic and structure of Bacteria, Fungi and Viruses. Media Preparation: Methods and Types: Culture, Minimal, Selective, differential, Transport media. Synchronous, Batch and Continuous culture. | 12 |
| | Suggested Activities: I. Assignment on evolution of prokaryotes and their diversity. II. Collection of photographs of different microbes of India. III. Chart preparation of different types of culture media | |
| II | Microbial Growth and Growth measurement: Microbial Growth: Definition of growth, Mathematical expression of growth, Growth Curve, Generation time, Growth yield, Effect of nutrients on growth. Factor affecting growth: Nutrient, Temperature, Oxygen, pH, Osmotic pressure. Growth Measurement: Measurement of Growth (Direct and Indirect methods): cell number, Cell Mass and Cell Activity, Cell Count: Turbidometric method, Plate count method, Membrane count method, Dry weight and Wet method by measurement of cellular activity. | 12 |
| | Suggested Activities: I. Discussion on nutrient needs of microorganism. II. Video making on nutritional growth. III. Diagrammatic view of spectrophotometer and microscope | |
| III | Basics of Immunology: Basics of Immunology the ayurvedic concept of Immunity Vyadhikshamatva A historical Perspective of immunology in context of Indian knowledge system- Acharya Charka and Susruta. Basic of Immunology: Concept of Innate and Acquired immunity, Phagocytosis complement and Inflammatory responses. Immune cells and organs : Structure, Function and Properties of immune cells – Stem cell, T-cell, B-cell, NK-cell, Macrophagus, Neutrophil, Eosinophil, Basophil, Mastcell, Dendritic cell. Immune organ: Bone marrow, Thymus, Lymph Node, Spleen, Lymphatic System. | 12 |



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| | | |
|-----------|---|----|
| | Suggested Activities: I. Question making on Ayurvedic concept of immunity. II. Model preparation of immune cells. III. Report making on immune organs. | |
| IV | Immunoglobulins and Immune response: Immunoglobulins Antigens : Characteristics of an antigen : Foreignness, Molecular size, Chemical Composition and Heterogeneity, Antigen Adjuvants, Epitopes, Haptens. Antibodies: Structure, Types, Functions and Properties of antibodies Antigenic determinant on antibodies (Isotypic, Allotypic, Idiotypic) Monoclonal, Polyclonal and Chimeric antibody. Immune response : Generation of immune response: Primary and Secondary immune response, generation of Humoral response (Plasma and Memory Cell) cell activation, Co-stimulatory signals), Killing Mechanisms by CTL and NK cells. Introduction to tolerance. | 12 |
| | Suggested Activities: I. Survey of immuno diagnostics methods. II. Poster on antigen-antibody interaction and blood profiling. | |
| V | Microbial, Immunological Techniques and Vaccination: Microbial Techniques: Principle, Working and applications of instruments-Laminar airflow, Autoclave, Hot air oven Immunological techniques: RIA, ELISA, ELISPOT, Western blotting, Principles of Precipitation, Agglutination, Immuno diffusion, Immunoelectrophoresis. Vaccination: Vaccines and vaccination: Rubella, Varicella (Chickenpox), Polio, Diphtheria, Hepatitis vaccine. | 12 |
| | Suggested Activities Activity- I. Poster making on mechanism of types of ELISA II. Question on different types of vaccines. III. Video making of Lab microbial instrument. | |

Note: One activity from every Unit is must for students.



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| Part-C: Learning Resources |
|---|
| Text Books, Reference Books, Other resources |
| Text books <ol style="list-style-type: none">1. Fundamentals of microbiology and immunology; A.K. Banerjee and Nirmalaya2. Banerjee, New Central Book Agency, New Delhi3. Modern concepts of microbiology; H.D. Kumar and Swati Kumar., Vikas Publishing4. House Pvt Ltd., 2nd Edition.5. Microbiology; M.J. Pelczar, E.C.S. Chan and N.R. Krieg, McGraw Hill Book company.6. 1993, 5h edition.7. A text book of microbiology; R.C. Dubey and D.K. Maheshwari, S Chand and Company Ltd 2004, 1st edition.8. Microbiology; P.D. Sharma, Rastogi Publication, Meerut.9. General Microbiology Vol I and II; C.B. Powar and H.F. Dagniwala, Himalaya10. Microbiology Fundamental and Applications; S.S. Purohit, Agrobios, 7h Edition.11. Immunology; K.R. Joshi, Agrobios, 5h edition. |
| Suggestive Digital Platform WebLinks: <ol style="list-style-type: none">1. https://epgp.inflibnet.ac.in2. https://www.eshiksha.mp.gov.in/mpdhe |
| Suggested Equivalent Online Courses: <ol style="list-style-type: none">1 http://www.freebookcentre.net >...free microbiology books download Ebooks online Textbooks2 http://open.oregonstate.education >.General Microbiology- Open Textbook-Open Textbooks3 http://www.freebookcentre.net >...Immune System and Immunology (PDF63P)\ldownload book |



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| Part D:Assessment and Evaluation | | |
|---|--|-----|
| Suggested Continuous Evaluation Methods: | | |
| Maximum Marks: | | 100 |
| Continuous Comprehensive Evaluation (CCE) : | | 30 |
| University Exam (UE) : | | 70 |
| Time : 03:00 hours | | |
| Internal Assessment Continuous Comprehensive Evaluation(CCE) | Class Test | 15 |
| | Assignment/Presentation | 15 |
| | Total | 30 |
| External Assessment University Exam Section | Section(A): Very Short Questions Section(B): Short Questions Section(C): Long Questions | 70 |



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| Part A: Introduction | | |
|--|---|--|
| Programme- B.Sc.(Biotechnology) | | Class: I Year Semester: II Session: January - June 2026 |
| Subject: Biotechnology | | Theory / Practical : Practical |
| 1. Course Code | BSCBT – 202 (P) | |
| 2. Course Title | Lab Work for Microbiology and Immunology (Practical) | |
| 3. Course Type | Major- II (Core Course) | |
| 4. Pre-requisite (If any) | To study this course, a student must have the subject Biology in XII class. | |
| 5. Course Objectives | <ol style="list-style-type: none"> 1. To develop fundamental laboratory skills in microbiology, including aseptic techniques, cultivation, isolation, and identification of microorganisms using standard microbiological procedures. 2. To provide hands-on experience in immunology-based experimental methods, such as antigen–antibody interactions, serological assays, and diagnostic immunological techniques. 3. To train students in the safe handling, observation, and characterization of pathogenic and non-pathogenic microbes, following biosafety guidelines and good laboratory practices (GLP). 4. To enable students to analyze, interpret, and document experimental data, integrating microbiological and immunological concepts to understand host–pathogen interactions and immune responses. 5. To cultivate scientific thinking, problem-solving ability, and research-oriented skills, preparing students for advanced studies and professional roles in clinical laboratories, biotechnology, healthcare, and research institutions | |
| 6. Course Outcomes (COs) | <p>On completion of this course, learners will be able to:</p> <p>CO1. Perform essential microbiological techniques—including aseptic handling, culturing, staining, and identification of microorganisms with accuracy and adherence to laboratory safety standards.</p> <p>CO2. Demonstrate the ability to conduct immunology- based assays such as agglutination, precipitation, and ELISA, and interpret antigen–antibody interactions for diagnostic or analytical purposes.</p> | |



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| | | |
|----|---|---|
| | | CO3. Apply analytical and observational skills to evaluate microbial growth, immune responses, and experimental results, integrating microbiological and immunological concepts to understand host–pathogen dynamics. |
| 7. | Expected Job Role/Career Opportunities | <ul style="list-style-type: none"> • Clinical Microbiologist • Biomedical Scientist • Immunologist • Research Scientist • Biosafety Officer |
| 8. | Credit Value | Practical - 2 Credits |
| 9. | Total Marks | Max. Marks: 100 Min. Passing Marks: 35 |



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| Part B:Content of the Practical Course | |
|--|--|
| Total No. of Lectures required: 30 hrs | |
| S.No. | List of Experiments / Exercise/ Practicals: |
| 1. | Perform Aseptic technique, Cleaning of glassware's, preparation of Cotton Plugging and Sterilization. |
| 2. | To Prepare Bacterial and Fungal media. |
| 3. | To isolate microbes from Air, Water and Soil. |
| 4. | To Study Dilution and plating by Pour Plate, Spread Plate methods. |
| 5. | To Study microorganism by Staining method —Simple staining, Gram staining, Endospore staining, Fungal staining, Algal staining, Negative staining. |
| 6. | To identify bacteria based on staining, Shape and Size. |
| 7. | To enumerate microorganism—Total and Viable count. |
| 8. | To isolate Antibiotic sensitivity of microbes by the use of antibiotic discs. |
| 9. | To isolate and identify pathogenic bacteria from sewage and wastewater. |
| 10. | To Determine growth curve and generation time of E.coli. |
| 11. | To identify human blood groups. |
| 12. | To enumerate total WBC of the given blood sample by hemocytometer. |
| 13. | To enumerate differential Leukocyte of the given blood sample. |
| 14. | To enumerate total RBC of the given blood sample by hemocytometer. |
| 15. | To isolate and identify aquatic Fungi from Local water body. |



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| Part C: Learning Resources |
|---|
| Text Books, Reference Books, Other resources |
| Text books <ol style="list-style-type: none">1. Laboratory Techniques in Modern Biology: N. Swarup, S.C. Pathak, S. Arora, Kalyani Publication, New Delhi.2. Integrated Methodologies in Biology: Shashi Shrivastava, P. Banejee, Arun Prakashan, Gwalior.3. Experiment in Microbiology Plant Pathology and Biotechnology: K.R. Aneja, New Age International, New Delhi, 2007.4. Laboratory Manual of Biotechnology; P.N. Swamy, Rastogi Publication, Meerut.5. Practical Microbiology: R.C. Dubey, D.K. Maheshwari, S. Chand & Company, Delhi.6. Manual of Experiments in Biotechnology: Leena Lakhani, Sheeba Khan, Kailash Pustak Sadan, Bhopal. |
| Suggestive Digital Platform WebLinks: <ol style="list-style-type: none">1. ..ebooksMicrobiology">http://1ioguides.unhsc.edu>..ebooksMicrobiology Immunology & Biochemistry2. .Microbiology eBook">http://bookauthorityv.org;>.Microbiology eBook |
| Suggested Equivalent Online Courses: <ul style="list-style-type: none">• https://www.coursera.org/specializations/immunology• https://www.edx.org/learn/microbiology• https://onlinecourses.nptel.ac.in/noc21_bt36/preview• https://www.ibiology.org/online-biology-courses/immunology-flipped-course/• https://www.open.edu/openlearn/health-sports-psychology/infection-and-immunity |



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| Part D:Assessment and Evaluation (Practical) | |
|---|-------------------------|
| Scheme of Practical Examination:- | Max. Marks :100 |
| Internal Assessment | |
| Class Interaction | |
| Quiz | |
| Seminar | |
| Assignments(Charts, Rural Service, Technology Dissemination/Excursion/Lab Visit/ Industrial Training | |
| External Assessment | Max. Marks : 100 |
| Major Experiment | 15 |
| Minor Experiment-1 | 5+10 |
| Minor Experiment-2 | 5+10 |
| Spotting | 15 |
| Viva-Voce | 10+10 |
| Practical Record | 10+10 |



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| Part A : Introduction | | | |
|---|--|---|------------------------|
| Programme: B.Sc. (Biotechnology) Class : I Year Semester: II Session: January - June 2026 | | | |
| Subject: Chemistry | | Theory/ Practical: Theory | |
| 1. | Course Code | BSCBT – 203 (T) | |
| 2. | Course Title | Applied Chemistry (Theory) | |
| 3. | Course Type (Core Course/Elective/Generic Elective/Vocational) | Minor II | |
| 4. | Pre-requisite (if any) | To study this course the students must have the subject Chemistry in XII Course or equivalent | |
| 5. | Course Objectives | 1. To analyze ancient engineering in urban drainage, metallurgy, and brick-making. 2. To classify drugs by their therapeutic action and identify chemical causes of diseases. 3. To identify chemical pollutants and evaluate scientific methods for their prevention and control. 4. To explain the biochemical functions of food components (nutrients) in body metabolism. 5. To understand the chemical processes behind paper pulping and the structure of textile fibers. | |
| 6. | Course Outcomes (COs) | On completing this course, the learners will be able to : CO1. Understand Indigenous Technology in Harappan Period. CO2. Understand Chemistry of medicines, common diseases and their causes. CO3. Understand Pollution, its causes, prevention and control CO4. Acquire knowledge of various components of food and their role in the body CO5. Understand chemistry of paper and textiles | |
| 7. | Expected Job role/ Career Opportunity | Pharmaceuticals: Pharmacologist, Drug Inspector. Environmental: Pollution Control Officer Food Science: Food Technologist, Nutritionist, Quality Safety Officer. Industrial: Textile Chemist, Lab Analyst. | |
| 8. | Credit Value | Theory –3 credit | |
| 9. | Total Marks | Max. Marks: 30+70 | Min. Passing Marks: 35 |



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| Part B Content of the Course | | |
|------------------------------|---|-----------------|
| Total No. of lectures: 45 | | |
| Unit | Topic | No. of Lectures |
| 1 | Indigenous Technology in Harappan Period Introduction, Indus or Harappan Civilization, Later Pottery, Knowledge of metallurgy after & during the Harappans, weight measurement, medical science, Jewell making, Dyeing, Pigments, Philosophers Stone, Wootz Steel, Gold, Silver, Mercury, Tin, Lead, Gun Powder, Glass making, Paints, Perfumes. Keywords/Tags: Indus and Harappan Civilization, Later Pottery, Wootz Steel, Glass making, Paints, Perfumes Activities: 1. Gather data on the processes used to purify zinc both historically and currently. 2. Gather images and records pertaining to the history of two rust-resistant monuments built in India. 3. Prepare the Project and Modals related to Ancient Indian Chemistry 4. Educational Tour of Industries and Research Institutes | 9 |
| 2 | Chemistry of medicine Common diseases and their causes, concept of analgesic, antibiotics, anti depressant, antihypertensive, antipyretics and anticoagulants. Concept of bronchodilators, vaccines, anta acids and diuretics, drug metabolism-absorption, distribution, metabolism and excretion (ADME) Keywords/Tags: analgesic, antibiotics, anti depressant, antihypertensive, antipyretics, anticoagulants | 9 |
| 3 | Pollution and its causes Air pollution- causes, effect and prevention Water pollution- sources and effect of water pollution Soil pollution- sources and effect of soil pollution Noise pollution- causes and effect of noise pollution, prevention e-waste pollution- causes and effect of e-waste pollution, prevention. Radioactive pollution- causes and effects of radioactive pollution, prevention, nuclear weapons, nuclear power plants, Chernobyl disaster Keywords/Tags: Air pollution, Water pollution, Soil pollution, Noise pollution, e-waste pollution | 9 |
| 4 | Components of food and their role in the body Carbohydrates- simple sugar- glucose, fructose and their chemical properties. Complex carbohydrates- starch, cellulose and their digestion. Proteins- amino acids as building blocks of proteins, protein structure-primary, secondary, tertiary and quarternary, denaturation of protein and its application in cooking. Lipids/ fats- triglyceride, phospholipids, cholesterol, mono saturated and poly saturated fatty acids, role of fats in cell membrane and hormone production | 9 |



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| | | |
|---|--|---|
| | <p>Vitamins- classification of vitamins, water soluble and fat soluble, chemical structure and function of key vitamins- vitamin C, vitamin A, vitamin D, vitamin B complex.</p> <p>Minerals- essential minerals- calcium, iron, sodium, potassium etc. mineral bioavailability and factors affecting absorption</p> <p>Keywords/Tags: Carbohydrates, Proteins, Lipids/ fats, Vitamins, Minerals</p> | |
| 5 | <p>Chemistry of paper and textile</p> <p>Fiber Chemistry: Classification of natural and synthetic fibers (cotton, wool, silk, polyester, nylon, acrylic), Chemical structure of fibers and their relation to properties</p> <p>Textile Wet Processing, introduction to dyes, identification of fibers and dyes</p> <p>Paper making chemistry- Pulping, Kraft process, Sulfite process, Bleaching, Additives and fillers</p> <p>Keywords/Tags: natural and synthetic fibers, Wet Processing, dyes, Pulping, Bleaching</p> | 9 |
| | <p>Activities:</p> <ol style="list-style-type: none"> 1. Extraction of Tulsi, Neem, Amla, Haldi 2. Gather data on the processes used to purify zinc both historically and currently. 3. Gather images and records pertaining to the history of two rust-resistant monuments built in India. 4. Gather information about traditional Indian cosmetics knowledge and traditional Indian drug knowledge 5. Collection of Medicinal plants and their uses from nearby area (Herbarium Preparation) 6. Chart preparation of Ancient Indian Scientist in Chemistry and their contribution 7. Field study of BKS in nearby area 8. Educational Tour of Industries and Research Institutes 9. Prepare the Project and Modals related to Ancient Indian chemistry | |



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Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Traditional Systems of Medicine Hardcover -30 January 2006 by M.Z. Abdin (Author), Y.P. Abrol (Author), ISBN-10 8173197075, Publisher Narosa Publishing House
2. Traditional System of Herbal Drugs Used for Various Aliments Paperback- 19 November 2024 by Priya V (Author), Ragavi K K (Author), Publisher LAP Lambert Academic Publishing
3. TEXTBOOK OF MEDICINAL CHEMISTRY 4ED VOL 1 (PB 2022) by ALAGARSAMY V. | 1 January 2022, Publisher: CBS Publishers & Distributors Pvt. Ltd
4. Textbook Of Medicinal Chemistry Part-I Authors: Dr. Amit G. Nerkar, Dr. Narendra M. Gowekar, Mrs. Trupti Somnath Kajale (shahane), ISBN-13 978-93-95581-67-7 Mahi publication
5. Pollution: Causes, Effects and Control, Roy M. Harrison, Royal Society of Chemistry, 2001
6. A Primer on Earth Pollution: Pollution Types and Disposal, Editors: J. Senthil Kumar, P. Ponmurugan, A. Vinoth Kanna, ISBN: 978-981-14-7653-2 (Print) ISBN: 978-981-14-7655-6 (Online), Year of Publication: 2020
7. Food: The Chemistry of its Components, By Tom Coultate, ISBN: 978-1-83916-814-7, Publication date: 11 Oct 2023, Royal Society of Chemistry
8. Chemical and Functional Properties of Food Components, 4th Edition, Edited By Hanna Staroszczyk, Zdzislaw E. Sikorski, December 19, 2024
9. Textile and Paper Chemistry and Technology, 1 January 1978 by Jett C. Arthur (Editor), Publisher American Chemical Society
10. Historic Textile and Paper Materials: Conservation and Characterization (Advances in Chemistry Series) Hardcover - Import, 1 February 1986 by Howard L. Needles (Editor), Publisher Amer Chemical Society

Suggested equivalent online courses:

1. Medicinal Chemistry By Prof. Harinath Chakrapani ISER Pune
https://onlinecourses.nptel.ac.in/noc20_cv16/
- 2, Air Pollution and Control By Prof. Bhola Ram Gurjar IIT Roorkee
https://onlinecourses.nptel.ac.in/noc23_ce14/



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| Part D-Assessment and Evaluation | | |
|--|--|-----|
| Suggested Continuous Evaluation Methods: | | |
| Maximum Marks: | | 100 |
| Continuous Comprehensive Evaluation (CCE): | | 30 |
| University Exam (UE): | | 70 |
| Time: 03.00 Hours | | |
| Internal Assessment: Continuous Comprehensive Evaluation (CCE): | Class Test | 15 |
| | Assignment/Presentation | 15 |
| | Total | 30 |
| External Assessment: University Exam Section | Section(A): Short Questions | 70 |
| | Section (B): Very Short Questions | |
| | Section (C) : Long Question | |



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| Part A : Introduction | | | |
|---------------------------------|--|---|------------------------|
| Programme: B.Sc (Biotechnology) | | Class : I Year | Semester: II |
| Session: January - June 2026 | | | |
| Subject: Chemistry | | Theory/Practical: Practical | |
| 1. | Course Code | BSCBT – 203 (P) | |
| 2. | Course Title | Applied Chemistry (Practical) | |
| 3. | Course Type (Core Course/Elective/Generic Elective/Vocational) | Minor II | |
| 4. | Pre-requisite (if any) | To study this course the students must have the subject Chemistry in XII Course or equivalent | |
| 5. | Course Objectives | <ul style="list-style-type: none"> To prepare talcum Powder To prepare shampoo To prepare enamels To estimate different compounds To Synthesis different Drugs To determine Optical Activity To separate and estimate by Solvent extraction | |
| 6. | Course Outcomes (COs) | On completion of this course, learners will be able to: CO1. Prepare talcum Powder CO2. Prepare shampoo CO3. Prepare enamels CO4. Estimate different compounds CO5. Synthesis of Different Drugs CO6. Determine Optical Activity CO7. Separate and Estimate Components by Solvent extraction | |
| 7. | Expected Job Role/ Career Opportunity | <ul style="list-style-type: none"> Cosmetic Scientist Paint & Coating Chemist Pharmaceutical Scientist Analytical Chemist Extraction Specialist Quality Assurance Manager | |
| 8. | Credit Value | Practical – 1 credit | |
| 9. | Total Marks | Max. Marks: 30+70 | Min. Passing Marks: 35 |



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| Part B- Content of the Course | | |
|--|---|-----------------|
| Total No. of Lectures- 15 hrs. | | |
| S.No. | Topics | No. of Lectures |
| 1. | Preparations 1. Preparation of Talcum Powder 2. Preparation of Shampoo 3. Preparation of Enamels | 03 |
| 2. | Estimations 1. Estimation of Iodine from salt 2. Estimation of sweeteners | 03 |
| 3. | Synthesis of Drug 1. Paracetamol 2. Sulphanilamide | 03 |
| 4. | Colloids To prepare arsenious sulphide sol and compare the precipitating power of mono-, bi- and trivalent cations. Optical Activity 1. Determination of refractive index and specific refraction of given liquids. [Any two liquids from, CCl ₄ , CHCl ₃ , benzene, xylene, toluene, ethyl alcohol] | 03 |
| 5 | Solvent Extraction 1. Separation and estimation of Mg(II) and Fe(III) Ion Exchange Method 1. Separation and estimation of Mg(II) and Zn(II) | 03 |
| Note | Students should visit any chemical industry to learn or observe the process and preparations practically and submit the report of that industrial visit also | |
| Keywords/Tags: Solvent Extraction, Colloids, Synthesis of drug, Preparation and Estimations | | |



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Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

Text Books

1. Timir Tripathi Chromatography and Centrifugation Methods Daya Publishing House
2. Prof. Sarin A. Chavhan, Prof. Sushilkumar A. Shinde A Guide to Chromatography Techniques Notion Press
3. Vinay Prabha Sharma Practical Organic Chemistry Pragati Prakashan
5. Dr. M.M.N. "Tandon unified practical chemistry" Shiva Lal Agarwal & co.
6. Sudha Goyal (Author), R. P. Singh V. K. Singh (Author), Prashant Singh Ashish Dwivedi (Author) B.Sc. Chemistry Practical I, Krishna Prakashan Media
7. Reinhart Keese, Martin P. Brändle, Trevor P. Toubé Practical Organic Synthesis: A Student's Guide John Wiley & Sons, Inc.,
8. Sudha Goyal B.Sc. Chemistry Practical III Krishna Prakashan Media
9. Furniss, B.S., Hannaford, A.J., Smith, P.W. G., Tatchell, A.R., "Vogel's Text Book of Practical Organic Chemistry", Pearson Education, 2005, 5h Edn.
10. Gurthu, J.N., Kapoor, R., "Advanced Experimental Chemistry", S. Chand and Co., 1987.
11. Sundaram, S., Krishnan, P., Raghavan, P.S., "Practical Chemistry (Part I)", S. Viswanathan Co. Pvt., 1996.
12. Mohd A A, Ranmesh K P, Anuradha S, Bassa S, Advanced Laboratory Techniques in Chemistry, Scientific International Publishing house, Tamilnadu, 2024

Reference Books

13. Furniss, B.S., Hannaford, A.J., Smith, P.W. G., Tatchell, A.R., "Vogel's Text Book of Practical Organic Chemistry", Pearson Education, 2005, 5h Edn.

Suggestive digital platforms web links

14. <https://vlab.amrita.edu/?sub=2&brch=190&sim=338&cnt=1>
15. <http://www.columbia.edu/itc/barnard/biology/biobc2004/edit/experiments/Experiment1-Spec.pdf>
16. http://web.pdx.edu/~ralfw/uploads/1/0/2/6/10260941/pulse_oximetry_laboratory_guide.pdf
17. https://www.chem.purdue.edu/courses/chm224/Lab-Experiments/expt4_GENESYS_V2.pdf
18. http://lgervind.faculty.mic.edu/biology_101/101_lab/spectrophotometry/4%20Spectrophotometer%20Fa17.pdf
19. https://www.edag.com/w/images/6/6e/EXPO11_The_pH_Electrode_and_Potentiometric_Titrations_PDF.pdf
20. <https://www.philadelphia.edu.jo/academics/ajaber/uploads/CHEM%20540-Chapter%202-Potentiometry-061.pdf>
21. <https://www.tau.ac.il/~advanal/PotentiometricTitrations.htm>
22. [https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Book%3A_Analytical_Chemistry_2e_\(Harvey\)/11%3A_Electrochemical_Methods/11.02%3A_Potentiometric_Methods](https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Book%3A_Analytical_Chemistry_2e_(Harvey)/11%3A_Electrochemical_Methods/11.02%3A_Potentiometric_Methods)
23. <https://www.chem.purdue.edu/courses/chm224/Lab-Experiments/Exp8.pdf>
24. https://www.shcollege.ac.in/wp-content/uploads/NAAC_Documents_IV_Cycle/Criterion-I/2.3.2/ppt/Dr_Ignatious_ConductometricTitration.pdf
25. https://www.analytik.ethz.ch/praktika/phys_anal/POL/Anleitung_ENG.pdf
26. <https://nph.onlinelibrary.wiley.com/doi/pdf/10.1111/1469-8137.1948.tb05089.xation>
27. http://lchemistry.du.ac.in/study_material/4103-A/MSc_Polarography.pdf
28. https://fac.ksu.edu.sa/sites/default/files/abbe_experiment.pdf



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29. <https://web.mst.edu/~tbone/subjects/tbone/chem224/riproc.pdf>
30. <http://www.fbml.ff.vu.lt/sites/default/files/74en.pdf>
31. <https://wp.optics.arizona.edu/mnofziger/wp-content/uploads/sites/31/2016/05/OPTI202L-Lab10-0MD2.pdf>
32. <http://davjalandhar.com/dbt/chemistry/SOP%20LabManuals/B.Sc.%20BT%20SEM%20V.pdf>
33. <https://vlab.amrita.edu/?sub=1&brch=195&sim=5458cnt=1>

Suggested equivalent online courses:

1. <https://www.my-mooc.com/en/mooc/basic-analytical-chemistry/>
2. <https://www.my-mooc.com/en/mooc/principles-electronic-biosensors-purdue-nano535x/>

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

| | |
|---|-----|
| Maximum Marks: | 100 |
| Continuous Comprehensive Evaluation (CCE) | 30 |
| University Exam (UE) | 70 |

| Internal Assessment | Marks | External Assessment | Marks |
|---|-------|-------------------------|-------|
| Continuous Comprehensive Evaluation (CCE) : 30 | | | |
| Class Interaction/Quiz | 10 | Viva Voce Practical | 10 |
| Attendance | | Practical Record File | |
| Assessments (Charts/Model/Seminar/Rural Service/ Technology/ Dissemination/Report of Excursion/ Lab Visits/ Survey/Industrial Visit) | 10 | Table work/ Experiments | 10 |
| | 10 | | 50 |
| Total Marks:100 | | | |



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| PART-A : Introduction | | | |
|---|---|--|-------------------------------|
| Programme : B.Sc./BCA/BBA /BBA FT/BBA HA | | | |
| Class : I Year | | Semester : II | |
| Session : January - June 2026 | | | |
| Subject : Ability Enhancement Course | | Theory / Practical: Theory | |
| 1. | Course Code | AEC – 201 | |
| 2. | Course Title | English Language and Indian Culture | |
| 3. | Course Type | Ability Enhancement Course | |
| 4. | Pre-Requisite | Not Required | |
| 5. | Course Objectives | <ol style="list-style-type: none"> To imbibe values which make students aware of national heritage and making them responsible citizens. To critically read texts to identify main ideas, infer meanings, and assess the author's purpose. To use grammar and vocabulary effectively for communication. To write appropriate correspondence and reports for various professional and social contexts. To prepare students for various competitive exams by developing English Language competence. | |
| 6. | Course Outcomes (COs) | <p>On completion of this course, learners will be able to:</p> <p>CO1. Imbibe values which make them aware of national heritage and making them responsible citizens.</p> <p>CO2. Critically read texts to identify main ideas, infer meanings, and assess the author's purpose.</p> <p>CO3. Use grammar and vocabulary effectively for communication.</p> <p>CO4. Write appropriate correspondence and reports for various professional and social contexts.</p> <p>CO5. Prepare for various competitive exams by developing their English Language competence.</p> | |
| 7. | Expected Job Role/career opportunities | <ul style="list-style-type: none"> Content Writer Copy Editor Proofreader Corporate Communication Executive Customer Relationship Executive | |
| 8. | Credit Value | Theory – 2 Credits | |
| 9. | Total Marks | Max. Marks: 100 | Min. Passing Marks: 35 |



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PART B: Content of the Course (Theory)

Total No. of Lectures: 30 Hrs.

| Unit | Topics | No. of Lectures |
|------|---|-----------------|
| I | <p>Understanding Indian Culture</p> <ol style="list-style-type: none">1. Rabindranath Tagore "Where the mind is without fear"2. Swami Vivekananda - "Chicago Speech (1893)"3. R. K. Narayan - "Astrologer's Day"4. Introduction to Sundarkand of Valmiki's Ramayan5. A.L Basham: "The wonder that was India" (an excerpt) <p>Keywords: Heritage, Diversity, Pluralism, Values, Patriotism, Spirituality, Humanism, Social Harmony, Tradition, Modernity.</p> <p>Activity:</p> <ul style="list-style-type: none">• Group Discussion on theme - "fearless thinking & nationalism" (Tagore), "religious harmony & tolerance" (Vivekananda), "social observations" (R.K. Narayan).• Creative Expression-Poster or Collage on "What Indian culture means to me,"• A short presentation on a specific cultural aspect of the students' home state (e.g., a festival, a craft, a local custom). | 12 |
| II | <p>Comprehension Skills</p> <ol style="list-style-type: none">1. Reading Techniques: Skimming, Scanning2. Identifying the Main Idea and Theme3. Making Inferences and Drawing Conclusions4. Analysing unseen passages on Indian history, society, and art. <p>Keywords - Inference, Main Idea, Theme, Tone, Purpose, Context Clues, Summary, Paraphrasing, Critical Reading</p> <p>Activity:</p> <ul style="list-style-type: none">• Worksheets with unseen passages followed by questions on comprehension, vocabulary, and inference.• Summarizing articles from newspapers or magazines on cultural or social issues in India. | 02 |



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| | | |
|-----|---|----|
| III | <p>Basic Language Skills</p> <p>Grammar:</p> <ol style="list-style-type: none"> 1. Parts of Speech 2. Articles 3. Subject-Verb Agreement 4. Tenses and their application <p>Vocabulary:</p> <ol style="list-style-type: none"> 1. Synonyms, Antonyms, Homonyms, and Homophones 2. One-word substitutes 3. Word formation: Suffixes and Prefixes <p>Keywords-Tense, Agreement, Clause, Phrase, Synonym, Antonym, Prefix, Suffix.</p> <p>Activity:</p> <ul style="list-style-type: none"> • Grammar exercises (fill-in-the-blanks, error correction, sentence transformation). • Vocabulary-building games and quizzes. | 08 |
| IV | <p>Writing Skills</p> <ol style="list-style-type: none"> 1. The Writing Process: Pre-writing, Drafting, Revising, and Editing 2. Paragraph Writing: Structure, Topic Sentence, and Coherence. 3. Letter writing: Formal/Informal <p>Keywords: Cohesion, Coherence, Topic Sentence, Drafting, Revising, Editing</p> <p>Activity:</p> <ul style="list-style-type: none"> • Paragraph on given topics (e.g., "My Favourite Indian Festival," or "The Importance of Technology in Modern India"). • Letter/Application writing exercises • Essay Writing on contemporary relevant issues. | 04 |
| V | <p>Situational Conversation-Context, Audience, Purpose, Type, Register</p> <ol style="list-style-type: none"> 1. Meeting/Greeting - Introducing Self, Introducing people to one another 2. Apologies/Responses 3. Enquiring about a Course/ Requesting Information 4. Agreeing/Disagreeing (with a Proposal) <p>Keywords - Register, Tone, Style, Audience, Purpose,-Context, Etiquette, Persuasion.</p> | 04 |



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| | | |
|--|---|--|
| | Activity: <ul style="list-style-type: none">Introducing and Greeting (e.g., formal business meeting, college orientation, conference with a guest speaker, informal club gathering).Debate-Agreeing & Disagreeing with Proposals - such as: "The college should make attendance optional for lectures." | |
|--|---|--|

Part C-Learning Resources

Text Books, Reference Books, Other resources

1. Tagore, R (1912). Gitanjali (Song Offerings). London: Macmillan. "Where the Mind is Without Fear" is Poem No. 35 in this collection.
2. Complete Works of Swami Vivekananda. Vol. 1. Advaita Ashrama (Publication Department of Ramakrishna Math, Belur Math, Kolkata).
3. Swami Tapasyananda, Sundarkandam of Srimad Valmiki Ramayana, Sri ram Krishna Math, Madras
4. Narayan, R.K. Malgudi Days. Indian Thought Publications; 1st edition (11 December 2019); ISBN-10: 9788185986173
5. Cultural Heritage of India by S. Radhakrishnan & Haridas Bhattacharyya (ed.)
6. A Course in English Grammar and Composition by Geetha Nagaraj
7. Functional English by Dr. P. Kiranmai Duit & Geetha Rajeevan (Foundation Books/Cambridge India)
8. Communicative English by E. Suresh Kumar, P. Srechari, and J. Savithri (Orient Black Swan)
9. Practical English Usage by Michael Swan (Oxford)
10. Modern English Grammar by N. Krishnaswamy, Macmillan Publication
11. Developing Reading Skills: A Practical Guide to Reading Comprehension Exercises" by Francoise Grellet (Cambridge)
12. Writing Skills by Norman Coe, Robin Rycroft & Pauline Ernest (Cambridge)

Suggested Equivalent Online Course

1. NPTEL Course-"Communication Skills" (by IIT Kharagpur)
<https://nptel.ac.in/courses/109/106/109106175/>
2. Swayam Course - "English Language for Competitive
https://onlinecourses.nptel.ac.in/noc23_hs51/preview Exargs" (by IIT Madras)
3. British Council India - "Learn English: Speaking and Writing Skills"
<https://www.britishcouncil.in/english/courses-adults/learnonline>
4. Coursera "Write Professional Emails in English" (by Georgia Tech)
<https://www.coursera.org/learn/professional-emails-english>



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Part D- Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks : 100 Marks

| | | |
|---|---|---------|
| External Assessment: University Exam Section: Time : 03.00 Hours | Section (A): Very Short Questions (50 Words) | 5*4=20 |
| | Section (B): Short Questions (200 Words) | 5*10=50 |
| | Section (C): Long Questions (500 Words) | 2*15=30 |



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| PART – A: Introduction | | | |
|--|---|--|-------------------------------|
| Programme: B.Sc./BCA/BBA /BBA FT/BBA HA | | | |
| Class: I Year | | Semester: II | |
| Subject: Value Added Course (VAC) | | Theory / Practical: Theory | |
| 1. | Course Code | VAC – 201 | |
| 2. | Course Title | भारत बोध (Understanding India) | |
| 3. | Course Type (Core Course/DSE/Minor/M D-ID/SEC/VOC) | VAC | |
| 4. | Pre-Requisite (if any) | Class 12 th Pass | |
| 5. | Course Objectives | <ol style="list-style-type: none"> To develop a fundamental understanding of India's historical, cultural, and Constitutional Nature (Sanvidhanik Swaroop). To develop awareness among students towards the Indian education system, the tradition of knowledge, and national values. To help students understand the India's independence movement, democratic development, and global role. To make students responsible citizens by providing knowledge of the rights and duties enshrined in the Constitution. | |
| 6. | Course Outcomes (COs) | <p>On completion of the course, learners will be able to:</p> <p>CO1. Develop a fundamental understanding of India's historical, cultural, and social diversity.</p> <p>CO2. Develop awareness towards the Indian knowledge tradition and national values.</p> <p>CO3. Understand the India's independence movement, development journey, and global role.</p> <p>CO4. Become responsible citizens by acquiring knowledge of the rights and duties enshrined in the Constitution.</p> | |
| 7. | Expected Job Role / Career Opportunities | <ul style="list-style-type: none"> Civil service candidates Social workers Journalists/media professionals Counselors/motivational trainers Legal assistants | |
| 8. | Credit Value | 2 Credits | |
| 9. | Total Marks | Max. Marks: 100 | Min. Passing Marks: 35 |



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| PART – B: Content of the Course | | |
|--|---|-----------------|
| No. of Lectures per week: 02 Hours per week) | | |
| Total No. of Lectures Required: T: 30 Hours | | |
| Unit | Topics | No. of Lectures |
| I | <p>Indian History and Cultural Heritage Characteristics of the Sindhu, Vedic, and Classical periods Indian concepts of co-existence and diversity Cultural Symbols: Religious architecture, music, dance and folk traditions Modern relevance of texts such as “Vasudhaiva Kutumbakam” and “Sarve Bhavantu Sukhinah”</p> <p>Activity: The program "Dialogue with the People"-discussion and note-taking about traditional lifestyle-values and knowledge from an elder of the family or community</p> <p>Assignment: Write a short essay (about 500 words) with pictures on any cultural heritage/festival/folk art of your village or town.</p> | 06 |
| II | <p>Indian Constitution and Civic Duties The Vedic Concept of State Duties(Vedic Rajdharma) and the modern Constitution Fundamental Rights and Duties: Dharma-Kartavya-Naitikta Youth citizens and their democratic participation Role of Education to Nation-Building</p> <p>Activity: “Public Policy Dialogue” – Organizing a Mock Constituent Assembly among students, where the fundamental values of India are presented and discussed.</p> <p>Assignment 1: Analyze any one fundamental right and its related duty from a Vedic/classical perspective.</p> <p>Assignment 2: Write an essay (400 words) on the role of youth in Indian democracy, from the perspective of “From Swaraj to Suraj”.</p> | 06 |



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| | | |
|-----|---|----|
| III | <p>Indian Knowledge Tradition and Educational Perspective Sources of Indian knowledge: Vedas, Upanishads, Philosophy, Smriti, Folk literature Gurukul Tradition: Student-centered learning, oral tradition, and memory-based learning Purpose of Education: Self-realization (Atmokaarsha) and social welfare (Lokaangraha) Role of the Teacher: “Acharya Devo Bhava”- character building and contribution to social reconstruction</p> <p>Activity 1: Knowledge-sharing session: Demonstration of traditional teaching methods (dialogue, memorization-based learning).</p> <p>Activity 2: Recreation of Shlokas and meaning- based discussion - Especially from Shikshavalli and Bhagavad Gita etc.</p> <p>Assignment 1: Explain the objectives of Indian education based on any Vedic hymn or Upanishadic statement.</p> <p>Assignment 2: Write a short essay on examples of Guru–Shishya tradition or life values observed in your school, village, or family.</p> | 06 |
|-----|---|----|



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| IV | <p>India's Philosophy of Life and the Concept of a Sustainable Future Indian Life Perspective: Purusharth Chatushtaya, Ashrama system, Duty-Based Ethics Harmony with Nature: Yagya, Panchamahabhutas, ecological cycle and environmental balance Indian Economic Thought: Arthashastra, Swadeshi, labour culture, and public sector enterprises Indian Concept of Sustainable development and environmental balance</p> <p>Activity 1: Poster or slogan writing on "Simple Living, High Thinking"</p> <p>Activity2: Group presentation on Indian environmental traditions (yagya, tree worship, river, festivals, etc.)</p> <p>Assignment 1: Panchamahabhutas and Indian life perspective</p> <p>Assignment 2: Journey from 'Swadeshi' to 'Atmanirbhar Bharat' (Self-reliant India)</p> | 06 |
| V | <p>Contemporary India and Global Role Role of Religious, Cultural, and Intellectual Leadership in the Indian independence movement India's contributions: Space science, Yoga, diplomacy, peace philosophy Atmanirbhar Bharat: Integration of tradition and innovation India's soft power in the global context and its role in a multipolar world</p> <p>Activity 1: Student presentation on policy alternatives (Indian Model vs Western Model)</p> <p>Activity 2: Essay writing on the theme "<i>India @ 2047</i>"</p> <p>Assignment 1: Global India and Possibilities of Cultural Leadership</p> <p>Assignment 2: Technology and Ethics: Exploring the Indian Model of Integration</p> | 06 |



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| Part – C: Learning Resources |
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| Textbooks, Reference Books, Other Resources |
| Suggested Readings: <ol style="list-style-type: none">1. Katdre, Indumati – Bharatiya Shiksha: Sankalpana evam Swaroop/ Punarsrijan, Prakashan Seva trust, Ahmedabad2. Kumar, Krishan – PrachinBharatiya Shiksha Paddhati, Shri Saraswati Sadan, Delhi3. Saluja, Chand Kiran (2023) – Shiksha: BharatiyaPariprekshya Sanskrit Samvardhan Pratishthan, New Delhi4. Kapoor, Kapil & Singh, Avdhesh Kumar (Editor), (2005) – Indian Knowledge Systems (Khand 1-2) Indian Institution of Advance Study, Shimla; D.K. Printworld, New Delhi |
| Textbooks: <ol style="list-style-type: none">1. Swaroop, Devendra – Sanskriti: Ek Naam – Roop, Anek Pratiman Pratibha Prakashan, New Delhi2. Swaroop, Devendra (Editor), (2010) – Rashtriya Shiksha Andolan ka Itihas (Hindi Sanskaran) Prabhat Pratisthan, New Delhi3. Agrawal, Vasudev Sharan (Editor), (2023) – Rashtra, Dharma aur Sanskriti (Nibandh Sanchayan). Prabhat Prakashan, New Delhi |
| Reference Books: <ol style="list-style-type: none">1. Mishra, Rameshwar Pankaj (2024) – Advitiya samajshastra, Prabhat Prakashan, New Delhi2. Pandey, Om Prakash (Editor) (2023) – Bharat Vaibhav, Rashtriya Pustak Nyas (NBT) , New Delhi3. Subbarayappa, B.V. – Bhartiya Vigyan Parampara, Rashtriya Pustak Nyas (NBT) , New Delhi |
| Suggestive Digital Platform Web Links: <ul style="list-style-type: none">● https://www.youtube.com/watch?v=VUOyldPx8h4● https://www.youtube.com/watch?v=1livkUGjeFA&list=PLfGFNxUDX0eholQwKZ2ekqaxY3PDtoDq-&index=4● https://www.youtube.com/watch?v=SuMnvLxc9ic● https://www.youtube.com/watch?v=iPuRqFlmoSc● https://www.youtube.com/watch?v=YZQeUq5d48Q&list=PL_a1TI5CC9RG8wPaNNDOK6VjSdhe0K3HE&index=6● https://www.youtube.com/watch?v=9PLs_N6WbxE |



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| Part – D: Assessment and Evaluation | | |
|---|--------------------------------------|------------------|
| Only External Assessment | | Total Marks: 100 |
| External Assessment End Semester Exams Time: 03 Hours | (A) Five Short Answer Type Questions | Total Marks: 100 |
| | (B) Five Long Answer Type Questions | |
| Total Marks | 100 | |
| Credit Value | 02 | |
| Minimum Passing Marks | 35 | |



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| भाग अ : परिचय | | |
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| कार्यक्रम : बी.एस.सी./बी.सी.ए/बी.बी.ए./बी.बी.ए. एफ. टी./बी.बी.ए. एच.ए. | | |
| कक्षा : I वर्ष | सेमेस्टर: II | सत्र: जनवरी – जून 2026 |
| विषय: Value Added Course (VAC) | | Theory/ Practical: Theory |
| 1. | पाठ्यक्रम कोड | VAC – 201 |
| 2. | पाठ्यक्रम शीर्षक | भारत बोध (Understanding India) |
| 3. | पाठ्यक्रम प्रकार (कोर कोर्स/वोकेशनल) डीएसई/ माइनर /एमडी-आईडी/एसईसी/वीओ सी) | VAC |
| 4. | पूर्वापेक्षा (यदि कोई हो) | कक्षा 12 वी उत्तीर्ण |
| 5. | पाठ्यक्रम का उद्देश्य | <ol style="list-style-type: none">1. भारत के ऐतिहासिक, सांस्कृतिक और सवैधानिक स्वरूप की मूलभूत समझ विकसित करना।2. भारत शिक्षा पद्धति, ज्ञान परंपरा और राष्ट्रीय मूल्यों के प्रति छात्रों में संवेदनशीलता उत्पन्न करना।3. भारत की स्वतंत्रता संग्राम, लोकतांत्रिक विकास और वैश्विक भूमिका को समझने में सहायता करना।4. संविधान में निहित दायित्वों एवं अधिकारों की जानकारी देकर छात्रों को जिम्मेदार नागरिक बनाना। |
| 6. | पाठ्यक्रम अध्ययन की उपलब्धियां (कोर्स लर्निंग आउटकम) | <p>इस कोर्स का अध्ययन करने के बाद विद्यार्थी में,</p> <ol style="list-style-type: none">1. विद्यार्थी भारत की ऐतिहासिक, सांस्कृतिक और सामाजिक विविधता की मूलभूत समझ विकसित कर सकेंगे।2. विद्यार्थी भारतीय ज्ञान परंपरा और राष्ट्रीय मूल्यों के प्रति संवेदनशीलता विकसित कर सकेंगे।3. विद्यार्थी भारत के स्वतंत्रता संग्राम, विकास यात्रा और वैश्विक भूमिका को समझ सकेंगे।4. विद्यार्थी संविधान में निहित अधिकारों एवं कर्तव्यों का ज्ञान प्राप्त कर जिम्मेदार नागरिक बन सकेंगे। |
| 7. | संभावित नौकरी भूमिकाएँ/ करियर अवसर | <ul style="list-style-type: none">• सिविल सेवा अभ्यर्थी• सामाजिक कार्यकर्ता• पत्रकार / मीडिया प्रोफेशनल• काउंसलर / मोटिवेशनल ट्रेनर• कानून से जुड़े सहायक कार्य |



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| 8. | क्रेडिट मान | 02 | |
| 9. | कुल अंक | अधिकतम अंक: 100 | न्यूनतम अंक: 35 |

| भाग ब-पाठ्यक्रम सामग्री | |
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| प्रति सप्ताह कक्षाओं की संख्या: 2 घंटे प्रति सप्ताह | |
| आवश्यक व्याख्यानों की कुल संख्या : थ्योरी (T) 30 घंटे | |
| ईकाई | विषय |
| I | <p>भारतीय इतिहास और सांस्कृतिक विरासत</p> <ul style="list-style-type: none">• सिन्धु, वैदिक, और शास्त्रीय काल की विशेषताएँ• सह-अस्तित्व और बहुलता की भारतीय अवधारणा• सांस्कृतिक प्रतीक : धर्म स्थापत्य, संगीत, नाट्य, लोकाचार• 'वसुधैव कुटुम्बकम्', 'सर्वे भवन्तु सुखिनः' जैसे सूत्रों की आधुनिक प्रासंगिकता <p>गतिविधियाँ :</p> <ul style="list-style-type: none">• 'लोक से संवाद' कार्यक्रम-परिवार या समुदाय के किसी बुजुर्ग से पारंपरिक जीवन-मूल्य एवं ज्ञान पर चर्चा, और उसका लेखा-जोखा। <p>असाइनमेंट विषय:</p> <ul style="list-style-type: none">• अपने गाँव या नगर की किसी स्थानीय सांस्कृतिक धरोहर/पर्व/लोककलाओं का लघु लेख चित्रों सहित तैयार करें (500 शब्द)। |
| II | <p>भारतीय संविधान और नागरिक दायित्व</p> <ul style="list-style-type: none">• वैदिक राजधर्म और आधुनिक संविधान• मूल अधिकार और कर्तव्य : धर्म-कर्तव्य – नैतिकता• युवा नागरिक और लोकतांत्रिक भागीदारी• शिक्षा का राष्ट्रनिर्माण में योगदान <p>गतिविधियाँ:</p> <ul style="list-style-type: none">• 'जननीति संवाद'-छात्रों के बीच मॉक संविधान सभा या युवा संसद का आयोजन, जिसमें भारत के मूल मूल्य प्रस्तुत करें। <p>असाइनमेंट विषय:</p> <ul style="list-style-type: none">• किसी एक मौलिक अधिकार और उससे जुड़े कर्तव्य का वैदिक/शास्त्रीय दृष्टिकोण से विश्लेषण करें।• भारतीय लोकतंत्र में युवाओं की भूमिका पर 'स्वराज से सुराज तक' दृष्टिकोण में निबंध (400 शब्द) |



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| III | <p>भारतीय ज्ञान परंपरा और शिक्षा दृष्टिकोण</p> <ul style="list-style-type: none">● भारतीय ज्ञान के स्रोत : वेद, उपनिषद, दर्शन, स्मृति, लोक साहित्य● गुरुकुल परंपरा: शिष्य-केंद्रित शिक्षण, वाचिक परंपरा और स्मृति आधारित अधिगम● शिक्षा का उद्देश्य : आत्मोत्कर्ष एवं लोकसंग्रह● शिक्षक की भूमिका 'आचार्य देवो भवः' चरित्र निर्माण, सामाजिक पुनर्निर्माण में योगदान <p>गतिविधियाँ:</p> <ul style="list-style-type: none">● ज्ञानवार्ता गोष्ठी-शास्त्रीय शिक्षा पर आधारित शिक्षण पद्धति (उदाहरण: संवाद, स्मृति आधारित अभ्यास) का डेमो प्रस्तुत करना।● श्लोक-गायन और उसका अर्थार्थ संवाद-विशेष रूप से शिक्षावल्ली (तैत्तिरीयोपनिषद), गीता आदि से। <p>असाइनमेंट विषय:</p> <ul style="list-style-type: none">● किसी वैदिक ऋचा या उपनिषद वाक्य के आधार पर भारतीय शिक्षा के उद्देश्य का विवेचन करें।● अपने विद्यालय/ग्राम/परिवार में देखे गए गुरु-शिष्य परंपरा या जीवन-परमार्थ के उदाहरण पर लघु लेख। |
| IV | <p>भारत का जीवन – दर्शन और सतत भविष्य की अवधारणा</p> <ul style="list-style-type: none">● भारतीय जीवन –दृष्टि: पुरुषार्थ चतुष्टय, आश्रम व्यवस्था और कर्तव्य आधारित नैतिकता● प्रकृति के साथ सामंजस्य: यज्ञ, पंचमहाभूत ऋतुचक्र और पर्यावरण संतुलन● भारतीय अर्थदर्शन: अर्थशास्त्र , स्वदेशी , श्रम-संस्कृति और लोक-उद्यम● सतत विकास और पर्यावरणीय न्याय की भारतीय अवधारणा <p>गतिविधियाँ:</p> <ul style="list-style-type: none">● 'सादा जीवन उच्च विचार' विषय पर पोस्टर या स्लोगन लेखन● भारतीय पर्यावरणीय परंपराओं (जैसे यज्ञ, वृक्ष-पूजन, नदी महोत्सव आदि) पर समूह प्रस्तुति <p>असाइनमेंट विषय:</p> <ul style="list-style-type: none">● पंचमहाभूत और भारतीय जीवन-दृष्टि● स्वदेशी से 'आत्मनिर्भर भारत' तक की यात्रा |



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| V | <p>समकालीन भारत और वैश्विक भूमिका</p> <ul style="list-style-type: none">स्वतंत्रता संग्राम में धार्मिक, सांस्कृतिक और बौद्धिक नेतृत्व की भूमिकाभारत का योगदान: अंतरिक्ष विज्ञान, योग, कूटनीति, शांति दर्शन'आत्मनिर्भर भारत' परंपरा और नवाचार का समन्वयवैश्विक परिप्रेक्ष्य में भारत 'सॉफ्ट पावर', बहुध्रुवीय विश्व में भूमिका <p>गतिविधियाँ:</p> <ul style="list-style-type: none">छात्रों द्वारा नीति – विकल्प प्रस्तुत करना (Indian Model vs Western Model)"भारत @ 2047" विषय पर निबंध <p>असाइनमेंट विषय:</p> <ul style="list-style-type: none">"ग्लोबल भारत और सांस्कृतिक नेतृत्व की संभावना""तकनीक और नैतिकता : भारतीय समन्वय की खोज" |
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| भाग-स: अध्ययन संसाधन |
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| पाठ्यपुस्तकें, संदर्भ पुस्तकें, अन्य संसाधन |
| <p>अनुशंसित पाठ्यसामग्री</p> <ol style="list-style-type: none">काटदरे, इंदुमति। भारतीय शिक्षा : संकल्पना एवं स्वरूप/ पुनरुत्थान प्रकाशन सेवा ट्रस्ट, अहमदाबाद।कुमार, कृष्ण। प्राचीन भारतीय शिक्षा पद्धति। श्री सरस्वती सदन, दिल्ली।सलूजा, चंद किरण (2023)। शिक्षा: भारतीय परिप्रेक्ष्य। संस्कृत संवर्धन प्रतिष्ठान, नई दिल्ली।कपूर, कपिल एवं सिंह, अवधेश कुमार(संपादक)। (2005)। Indian Knowledge Systems (खंड 1-2)। इंडियन इंस्टिट्यूट ऑफ एडवांस्ड स्टडी, शिमला; डी.के. प्रिंटवर्ल्ड, नई दिल्ली। |
| <p>पाठ्यपुस्तकें:</p> <ol style="list-style-type: none">स्वरूप, देवेद्र। संस्कृति एक: नाम-रूप अनेक प्रतिभा प्रकाशन, नई दिल्ली।स्वरूप, देवेद्र। (संपादक)। (2010)। राष्ट्रीय शिक्षा आंदोलन का इतिहास (हिंदी संस्करण)। प्रभात प्रतिष्ठान, नई दिल्ली।अग्रवाल, वासुदेव शरण (संपादक)। (2023)। राष्ट्र, धर्म और संस्कृति (निबंध संचयन)। प्रभात प्रकाशन, नई दिल्ली। |
| <p>संदर्भपुस्तकें:</p> <ol style="list-style-type: none">मिश्र, रामेश्वर 'पंकज' (2024)। अद्वितीय समाजशास्त्र। प्रभात प्रकाशन, नई दिल्ली।पाण्डेय, ओम प्रकाश (संपादक)। (2023)। भारत वैभव। राष्ट्रीय पुस्तक न्यास (एनबीटी), नई दिल्ली।सुब्बारायप्पा, बी.वी.। भारतीय विज्ञान परंपरा। राष्ट्रीय पुस्तक न्यास (एनबीटी), नई दिल्ली। |



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अनुशंसित डिजिटल प्लेटफॉर्म वेब लिंक:

- <https://www.youtube.com/watch?v=VUOyldPx8h4>
- <https://www.youtube.com/watch?v=1livkUGjeFA&list=PLfGFNxUDX0eholQwKZ2ekqaxY3PDtoDq-&index=4>
- <https://www.youtube.com/watch?v=SuMnvLxc9ic>
- <https://www.youtube.com/watch?v=iPuRqFlmoSc>
- https://www.youtube.com/watch?v=YZQeUq5d48Q&list=PL_a1TI5CC9RG8wPaNNDOk6VjSdhe0K3HE&index=6
- https://www.youtube.com/watch?v=9PLs_N6WbxE

| भाग-द: आकलन एवं मूल्यांकन | | |
|---|--|--------------|
| केवल बाह्य मूल्यांकन | | कुल अंक: 100 |
| बाह्य मूल्यांकन अंतिम सेमेस्टर परीक्षा समय: 03 घंटे | (अ) पांच लघु प्रश्न (ब) पांच दीर्घ उत्तरीय प्रश्न | कुल अंक: 100 |
| अधिकतम अंक | 100 | |
| क्रेडिट मान | 02 | |
| न्यूनतम उत्तीर्ण अंक | 35 | |