

FACULTY OF SCIENCES

SYLLABUS FOR THE BATCH FROM THE YEAR 2023 TO YEAR 2026

Programme Code: BSBT

**Programme Name: B.Sc. Biotechnology
(Semester I-II)**

Examinations: 2023-2026



Department of PG Department of Biotechnology

Khalsa College, Amritsar

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(b) Subject to change in the syllabi at any time.
(c) Please visit the College website time to time.

| S.No. | PROGRAMME OBJECTIVES |
|--------------|--|
| 1. | To improve, broaden, and deepen the knowledge of the students in order to provide students with an adaptable, research-intensive curriculum that meet the needs of both academia and industry. |
| 2. | Enhancing career opportunities in industry, research locally and internationally, or serving as a foundation for further higher education through, cutting-edge laboratory exposures and dissertation-related activities that develop students' global competencies. |
| 3. | Fostering a value system among students in order to promote critical thinking and a thorough understanding of key bioethical concepts. |
| 4. | To inculcate the ability to work as entrepreneurs and technologists with strong ethics and communication abilities. |

| S.No. | PROGRAMME SPECIFIC OUTCOMES (PSOS) |
|--------------|---|
| PSO-1 | To gain knowledge through theory and practical. |
| PSO-2 | To establish a solid foundation at the cellular, molecular, genetic, and metabolic levels. |
| PSO-3 | To make agricultural practices more efficient through the use of plant tissue culture and recombinant DNA technology. |
| PSO-4 | To gain understanding of biomolecules, including their formation and interaction. |
| PSO-5 | To do research on microorganisms and strain improvement for industrial applications. |
| PSO-6 | To instill safe laboratory practices and procedures. |
| PSO-7 | To get knowledge on different techniques and the usage of laboratory instruments. |

| COURSE SCHEME | | | | | | | | | | | |
|---|--|------------------------|----------------|----------|----------|--------------------------|------------------|----------|-----------|--------------|---------------------|
| SEMESTER – I | | | | | | | | | | | |
| Course Code | Course Name | Hours/ Week | Credits | | | Total Credits | Max Marks | | | | Page No. |
| | | | L | T | P | | Th | P | IA | Total | |
| Major Courses | | | | | | | | | | | |
| BT-BTL111 | Biochemistry-I (Biomolecules) | 3 | 3 | - | - | 3 | 56 | - | 19 | 75 | 6-7 |
| BT-BTP111 | Biochemistry-I (Biomolecules) Lab | 4 | - | - | 2 | 2 | - | 37 | 13 | 50 | 8-9 |
| BT-BTL112 | General Microbiology-I | 3 | 3 | - | - | 3 | 56 | - | 19 | 75 | 10-11 |
| BT-BTP112 | General Microbiology-I Lab | 4 | - | - | 2 | 2 | - | 37 | 13 | 50 | 12-13 |
| BT-BTL113 | Cell Biology | 3 | 3 | - | - | 3 | 56 | - | 19 | 75 | 14-15 |
| BT-BTP113 | Cell Biology Lab | 4 | - | - | 2 | 2 | - | 37 | 13 | 50 | 16-17 |
| Minor Courses (If Any) | | | | | | | | | | | |
| CH-BTL114 | Chemistry-I (Inorganic Chemistry) | 3 | 2 | 1 | - | 3 | 56 | - | 19 | 75 | 19-20 |
| CH-BTP114 | Chemistry-I (Inorganic Chemistry) Lab | 2 | - | - | 1 | 1 | - | 19 | 6 | 25 | 21 |
| BO-BTL112 | Botany-I | 3 | 2 | 1 | - | 3 | 56 | - | 19 | 75 | 22-23 |
| BO-BTP112 | Botany-I Lab | 2 | - | - | 1 | 1 | - | 19 | 6 | 25 | 24 |
| Ability Enhancement Courses (Compulsory Courses) | | | | | | | | | | | |
| BCSE-1122 | Communicative English-I | 4 | 4 | - | - | 4 | 75 | - | 25 | 100 | 26-27 |
| BHPB-1101 BPBI-1102 BPHC-1104 | Punjabi Compulsory OR *Basic Punjabi OR **Punjab History & Culture | 4 | 4 | - | - | 4 | 75 | - | 25 | 100 | 28-33 |
| Value Added Courses | | | | | | | | | | | |
| ZDA-111 | ***Drug Abuse: Problem, Management and Prevention | 2 | 2 | 0 | 0 | 2 | | | | | 35-36 |
| Total | | 41 | 23 | 2 | 8 | 33 | 430 | 149 | 196 | 775 | |

Note:

- *Special Paper in lieu of Punjabi Compulsory.
- **For those students who are not domicile of Punjab
- ***This paper marks will not be included in the total marks.
- For theory one credit is equal to 1 hours and for practical one credit is equal to 2 hours.

| SEMESTER – II | | | | | | | | | | | |
|--|--|------------|---------|---|---|---------------|-----------|-----|-----|-------|----------|
| Course Code | Course Name | Hours/Week | Credits | | | Total Credits | Max Marks | | | | Page No. |
| | | | L | T | P | | Th | P | IA | Total | |
| Major Courses | | | | | | | | | | | |
| BT-BTL121 | Biochemistry-II (Bioenergetics and Enzymology) | 3 | 3 | - | - | 3 | 56 | - | 19 | 75 | 38-39 |
| BT-BTP121 | Biochemistry-II (Bioenergetics and Enzymology) Lab | 4 | - | - | 2 | 2 | - | 37 | 13 | 50 | 40-41 |
| BT-BTL122 | General Microbiology-II | 3 | 3 | - | - | 3 | 56 | - | 19 | 75 | 42-43 |
| BT-BTP122 | General Microbiology-II Lab | 4 | - | - | 2 | 2 | - | 37 | 13 | 50 | 44-45 |
| BT-BTL123 | Genetics | 3 | 3 | - | - | 3 | 56 | - | 19 | 75 | 46-47 |
| BT-BTP123 | Genetics Lab | 4 | - | - | 2 | 2 | - | 37 | 13 | 50 | 48-49 |
| Minor Courses (If Any) | | | | | | | | | | | |
| ZO-BTL124 | Zoology-I | 3 | 2 | 1 | - | 3 | 56 | - | 19 | 75 | 51-52 |
| ZO-BTP124 | Zoology-ILab | 2 | - | - | 1 | 1 | - | 19 | 6 | 25 | 53-54 |
| MA-BTL125 | Biomathematics & Biostatistics | 3 | 2 | 1 | - | 3 | 56 | - | 19 | 75 | 55-56 |
| Ability Enhancement Courses (Compulsory Courses) | | | | | | | | | | | |
| BCSE-1222 | Communicative English-I | 4 | 4 | - | - | 4 | 75 | - | 25 | 100 | 58-59 |
| BHPB-1201 BPBI-1202 BPHC-1204 | Punjabi Compulsory OR *Basic Punjabi OR **Punjab History & Culture | 4 | 4 | - | - | 4 | 75 | - | 25 | 100 | 60-65 |
| Value Added Courses | | | | | | | | | | | |
| ZDA-121 | ***Drug Abuse: Problem, Management and Prevention | 2 | 2 | - | - | 2 | | | | | 67-68 |
| Total | | 39 | 23 | 2 | 7 | 32 | 430 | 130 | 190 | 750 | |

Note:

- *Special Paper in lieu of Punjabi Compulsory.
- **For those students who are not domicile of Punjab
- ***This paper marks will not be included in the total marks.
- For theory one credit is equal to 1 hours and for practical one credit is equal to 2 hours.

**B.Sc. (BIO-TECHNOLOGY)
(SEMESTER-I)
Major Core Courses**

B.Sc. (BIO-TECHNOLOGY) (SEMESTER-I)

BT-BTL-113

Biochemistry-I (Biomolecules)

Credit Hours (per week): 3

Maximum Marks: 75

Theory: 56

Internal Assessment: 19

Note for the paper setters/examiners:

The question paper will consist of five sections: A, B, C, D, and E. Section A is compulsory and will consist of 8 short-answer type questions, with each question carrying 2 marks. Candidates are required to attempt six questions from this Section. Sections B, C, D, and E will have two questions from the sections A, B, C and D of the syllabus and carry 11 marks. Candidates are required to attempt one question each from Sections B, C, D, and E of the question paper.

Course objectives: Course contents are designed to enable students to learn:

1. Water as mother liquor of life, its properties, ionisation, relationship between pH and pK_a and cellular buffers.
2. Classification and properties of Carbohydrates, structure and function of disaccharides, Homo and Heteropolysaccharides Polysaccharides.
3. Classification and properties fatty acids, lipids, their structure and function.
4. Classification of amino acids, their chemical reactions, protein classification and structural organization.

Course content

Section-A

Water and its Properties: Role of water in life, Structure of water molecules, Physico-chemical properties of water, Role of hydrogen bonding and non-covalent interactions in water, Dissociation and association constants, pH and buffers: Lowis concept of acids and bases, ionic product of water, pH scale, weak acids and bases, ionization of weak acids, titration of weak acids by strong base, pI, pK_a, Hasselbach Hendersson equation and its implications.

Section-B

Carbohydrates: Introduction, Monosaccharides: Families of monosaccharides: aldoses and ketoses, trioses, tetroses, pentoses, and hexoses, epimers, and anomers of glucose. Furanose and pyranose forms of glucose and fructose, Mutarotation, Structure and functions of monosaccharide derivatives, Disaccharides; concept of reducing and non-reducing sugars, Haworth projections of Maltose, lactose, and sucrose, Isomaltose. Structural and functional properties of Polysaccharides: storage polysaccharides - starch and glycogen; Structural Polysaccharides - cellulose, and chitin; Heteropolysaccharides: Peptidoglycan, Proteoglycan, glycoproteins

Section-C

Lipids: Classification of lipids and fatty acids. General structure and function of major lipid subclasses, acylglycerols, phosphoglycerides, Sphingolipids, glycosphingolipids and terpenes, sterols, steroids.

Section-D

Proteins: Structure of amino acids, non-protein and rare amino acids and their chemical reactions. Peptide bond, Structural organization of proteins (Primary, Secondary, Tertiary, Quaternary, domain structure), protein classification and function. Forces stabilizing Primary, Secondary and Tertiary protein structures.

Books Recommended

1. David L. Nelson and Michael Cox (2017) Lehninger Principles of Biochemistry, 7th ed, WH Freeman
2. Jeremy M. Berg, Lubert Stryer, John Tymoczko, Gregory Gatto (2019) Biochemistry, 9th Ed., WH Freeman
3. Ferrier (2017) Lippincott's Illustrated Reviews Biochemistry, 7th Ed, Wolters Kluwer India Pvt. Ltd.

Course Outcomes

| Sr. No. | On completing the course, the students will be able to: |
|----------------|--|
| CO-1 | Learn water- a unique element in this universe along with its utility and its role as an elixir of life on the earth. |
| CO-2 | Get knowledge on 'Hydrates of Carbon' as most important energy producing molecules with in the living cell along with their diverse roles |
| CO-3 | Understand the compositional related role of Lipids as group of diverse molecules compiles under single term, present as the most prominent components of the biological membranes along with their physiological roles. |
| CO-4 | Study apprehension about the composition and roles of proteins as biological macromolecular functional units of living cell along with their structural hierarchy. |

B.Sc. (BIO-TECHNOLOGY) (SEMESTER-I)

BT-BTP113

Biochemistry-I (Biomolecules) Lab

Credit Hours : 2

Maximum Marks: 50

Practical: 37

Internal Assessment:13

Note. The question paper will be set by the examiner based on the syllabus

Course objectives

Course contents are designed to enable students to

1. Understand the spectrum of light based upon different wavelengths.
2. Comprehend the laws governing the absorption of light by biomolecules.
3. Perform spectrophotometric investigations.
4. Know inside of the concept of acidity (pH), basicity (pOH) and ionisation insolutions as well as indicators.
5. Learn about the volumetric titrations.

Course content

1. Verification of Beer Lamberts Law for P-nitrophenol or cobalt chloride.
2. Estimation of carbohydrate in given solution by anthrone method.
3. Study the presence of reducing/non-reducing sugar in biological samples.
4. Protein estimation by Lowry's method
5. Protein estimation byBradford method.
6. Protein estimation by Biuret method.
7. The determination of acid value of a fat.
8. The determination of saponification value of a fat

Books Recommended

1. David L. Nelson and Michael Cox (2017) Lehninger Principles of Biochemistry, 7th ed, WH Freeman
2. Jeremy M. Berg, Lubert Stryer, John Tymoczko , Gregory Gatto (2019) Biochemistry, 9th Ed., WH Freeman
3. Ferrier (2017) Lippincott's Illustrated Reviews Biochemistry, 7th Ed, Wolters KluwerIndia Pvt. Ltd.
4. J L Jain , Sunjay Jain , Nitin Jain (2016) Fundamentals of Biochemistry, 7th Ed, S Chand
5. Satyanarayana (2020) Biochemistry, 5th Ed, Elsevier

Course Outcomes

| Sr. No. | On completing the course, the students will be able to: |
|----------------|--|
| CO-1 | Study Spectrophotometric analysis viz. (Ultra violet and Visible) using spectrophotometer and colorimeter. |
| CO-2 | Understand quantitative estimations of Protein by different methods based upon the amino acid composition. |
| CO-3 | Study the carbohydrate content estimations and sample analysis for different types of sugars. |
| CO-4 | Study quality characteristics analysis for fats viz. acid and saponification value. |
| CO-5 | Study acid-base volumetric titrations along with PK determination. |

B.Sc. (BIO-TECHNOLOGY) (SEMESTER-I)

BT-BTL114

General Microbiology-I

Credit Hours : 3

Maximum Marks: 75

Theory: 56

Internal Assessment: 19

Note for the paper setters/examiners:

The question paper will consist of five sections: A, B, C, D, and E. Section A is compulsory and will consist of 8 short-answer type questions, with each question carrying 2 marks. Candidates are required to attempt six questions from this Section. Sections B, C, D, and E will have two questions from the sections A, B, C and D of the syllabus and carry 11 marks. Candidates are required to attempt one question each from Sections B, C, D, and E of the question paper.

Course Objectives

1. To correlate the knowledge of fundamental Science's conceptual approach in the applied fields of Microbiology.
2. To make the pupils aware of the relation between Microbiology and Biotechnology.
3. The students made to learn all the realms of Microbiology (Mycology, Bacteriology, Virology etc.) in a comprehensive way.
4. The theoretical knowledge imparted by regular class work, assignments, class tests etc. will be further strengthened by use and application of ultra-modern instrumentation in world class labs to give first hand practical knowledge of Microbiology.
5. The students will be given exposure to latest happening in world around by arranging workshops, expert lectures by the intelligentsia from research/industry and academia.

Course Content

Section-A

Introduction to Microbiology- Need to study Microbiology. Historical Perspective and Important discoveries related to Microbiology. Relationship between Microbiology and Biotechnology. Tools and ntechniques in Microbiology and their applications in Biotechnology. The Microbial Biotechnology.General Features-Bacteria, Fungi, Neurospora, Yeast and Viruses.Microbes in extreme environments- the thermophiles, halophiles, acidophiles, psychrophiles and alkalophiles.

Section-B

Basic concept of Microbial growth. Concept of growth in batch culture and continuous culture. Microbial growth media and its composition and classification, Sterilization-Basic concept, physical and chemical methods of sterilization. Sterilization-Basic concept, physical and chemical methods of sterilization.Bacterial nutrition-Introduction, Nutritional forms of bacteria, Basic concept of Transport mechanisms of nutrients across microbial cell membranes.

Section-C

Principles and application of bright field, dark field phase contrast, fluorescence & immunofluorescence, electron microscopy. Gram positive and Gram negative bacteria. Nature of the Microbial Cell Surface and Structure and anatomy of bacterial cell walls, Types of bacterial flagella. Different types of bacterial staining.

Section-D

Bacterial Classification: Bacterial classification and taxonomy based on Bergey's Manual of Determinative bacteriology—General outline only. An introduction to Bacterial Serotypes. Microbial culture collection centres, Methods of Microbial preservation. Discovery of penicillin, strain improvement programme of *Penicillium* sp. To obtain higher yield of penicillin.

Books Recommended:

1. Davis, B.D., Dulbecco. R., Eisen, H.N. and Ginsberg, H.S. (1990). Microbiology: 4th Edition, Harper & Row, Publishers, Singapore.
2. Tortora, G.J., Funke, B.R. and Case, C.L. (1994). Microbiology: An introduction: 5th Edition, The Benjamin / Cummings Publishing Company, Inc.
3. Stanier, R.Y. (1995). General microbiology, MacMillan Press, London.
4. Pelczar, M.T. (1995). Microbiology, Tata McGraw Hill Publication, New Delhi.
5. Schlegel. H. G., (1995). General Microbiology 7th Edition, Cambridge Univ. Press.
6. Prescott and Dunn (1999). Industrial Microbiology 4th Edition, By S.K. Jain for CBS Publishers & Distributors.
7. Chander, M. And Puri, P. (2008). A Concise Course in Microbiology. Krishna Brothers Publishers, Old Railway Road, Jalandhar.
8. Postgate. J. (2000). Microbes & Man 4th Edition, Cambridge Univ. Press.
9. Tortora. G.J., Funke. B.R., 2001. Microbiology: An Introduction, Benjamin Cummings.

Course Outcome

| Sr. No. | On completing the course, the students will be able to: |
|----------------|---|
| CO-1 | Study the concepts of microbial biotechnology and general features of various micro-organisms, antibiotics. |
| CO-2 | Study bacterial growth curves and batch cultures |
| CO-3 | Learn the principle, working and design of various microscopes. |
| CO-4 | Gain knowledge on role of microbes in food industry. |
| CO-5 | Get themselves acquainted with microbes and know about fruits and fines coming from microbes. |

B.Sc. (BIO-TECHNOLOGY) (SEMESTER-I)

BT-BTP114

General Microbiology-I Lab

Credit Hours : 2

Maximum Marks: 50

Practical: 37

Internal Assessment:13

Note: The question paper will be set by the examiner based on the syllabus.

Course Objectives

1. To correlate the knowledge of the theoretical fields of Microbiology with practical.
2. To make the pupils aware of the role of Microbiology in daily life.
3. The students made to learn all the general features and identification of various microbessuch as fungi, bacteria, virus etc.
4. To teach them microbiology practicals applicable in dairy, diagnostics and other industries.
5. The students will be given opportunity to perform each and every experiment, get resultsand infer upon their findings.

Course Content

1. Aseptic techniques of sterilization. Do and don't in microbiology lab.
2. Cleaning of glassware.
3. Preparation of media, cotton plugging and sterilization
4. Isolation of micro-organism from air, water and soil samples. Dilution and pour plating, Colony purification by streaking method.
5. Identification of bacteria by simple staining, negative staining and Gram staining.
6. Detection of specific bacteria by Wet mount preparation method and Hanging drop mount method.

Books Recommended:

1. Cappuccino, J.G. and Sherman, N. (1999). Microbiology: A Laboratory Manual 4th Ed: Harlow, Addition-Wesley.
2. Dubey R.C. and Maheshwari (2012) Practical Microbiology 5th edition: S. Chand and company ltd.New Delhi.

Course Outcome

| B.Sc. Biotechnology (Semester-I)BT-BTL111 | |
|--|---|
| Cell | On completing the course, the students will be able to: |
| CO-1 | Become aware of role of microbes in daily life. |
| CO-2 | Learn to maintain proper hygiene in day to day life. |
| CO-3 | Have hands on experience of quality control testing in food, feed, diagnostic and water testing industry. |
| CO-4 | Learn planning and execution of the procedure involved in a systematic way. |
| CO-5 | Learn ethics of working and team spirit. |

Biology

Credit Hours : 3

Maximum Marks: 75

Theory: 56

Internal Assessment: 19

Note for the paper setters/examiners:

The question paper will consist of five sections: A, B, C, D, and E. Section A is compulsory and will consist of 8 short-answer type questions, with each question carrying 2 marks. Candidates are required to attempt six questions from this Section. Sections B, C, D, and E will have two questions from the sections A, B, C and D of the syllabus and carry 11 marks. Candidates are required to attempt one question each from Sections B, C, D, and E of the question paper.

Course Objectives

1. To make students understand the concept of cell as the basic entity of living systems and the level of organization from cell to organism.
2. To elaborate the concept of cell theory. Students will learn the characteristics of different cells: Prokaryotes, bacteria, eukaryotic microbes, plant and animal cells
3. To make students understand the structural organization of cell and function of different organelles.
4. Students will become aware how Cell Division takes place and learn about different stages of Cell Cycle, Cell-cell interaction, Cell locomotion
5. To make students aware of Biological Membranes, their supramolecular architecture, Solute transport; Model membranes and Liposomes.

Course content

Section-A

Cell as a basic unit of living systems. The cell theory Broad Classification of Cell Types: PPLO's, bacteria, eukaryotic microbes, plant and animal cells. A detailed classification of cell types within an organism. Cell, tissue, organ and organism as different levels of organizations of otherwise genetically similar cells.

Section-B

Structure and function of cell organelles, ultrastructure of cell membrane, cytosol, Golgi bodies, endoplasmic reticulum (rough and smooth), ribosomes, cytoskeletal structures (actin, microtubules etc.), Mitochondria, chloroplasts, lysosomes, peroxisomes, nucleus (nuclear membrane, nucleoplasm, nucleolus, chromatin).

Section-C

Cell Division and Cell Cycle: mitosis, meiosis, stages of cell cycle, binary fission, amitosis and its regulation. Cell-cell interaction Cell locomotion (amoeboid, flagellar and ciliar).

Section-D

Biological Membranes: Supramolecular architecture of membranes; Solute transport across membranes; Model membranes and Liposomes.

Books Recommended:

1. De-Robertis, F.D.P. and De-Robertis Jr. E.M.F. (1991) Cell and Molecular Biology, Saunders, Philadelphia.
2. Lodish, H., Baltimore, D., Berk, A., Zipursky, S.L., Matsudaira, P. and Darnell, J. (1995).
3. Molecular Cell Biology 3rd Edition, Scientific American Books Inc.
4. Geoffrey, M. (2000). The Cell: A molecular approach 2nd Edition, ASM Press.

Course Outcome

| Sr. No. | On completing the course, the students will be able to: |
|----------------|---|
| CO-1 | Learn about the Cell and the projections about the origin of the cell along with the key features of The Cell theory. Students will be able to differentiate prokaryotic and eukaryotic cells in details |
| CO-2 | Learn about the structural details and the functional organization of the cell; ultrastructure of cell membranes |
| CO-3 | Learn about the structure and function of cell organelles (cytosol, Golgi bodies, endoplasmic reticulum (rough and smooth), ribosomes, cytoskeletal structures (actin, microtubules etc.), Mitochondria, chloroplasts, lysosomes, peroxysomes, nucleus (nuclear membrane, nucleoplasm, nucleolus, chromatin). |

| | |
|-------------|--|
| CO-4 | Understand the concept of Cell Division and Cell Cycle , Cell-cell interaction Cell locomotion (amoeboid, flagellar and ciliar) |
| CO-5 | Gain knowledge about biological Membranes, supramolecular architecture and solute transport across membranes; Model membranes and Liposomes. |

**B.Sc. Biotechnology (Semester-I)BT-BTP111
Cell Biology Lab**

**Credit Hours : 2
Maximum Marks: 50
Practical: 37
Internal Assessment:13**

Course Objectives

1. To enable students to differentiate Prokaryotic and Eukaryotic cells
2. To enable Students study electron micrographs of various cell organelles
3. To enable students to prepare and study Permanent Slides:
4. To enable students to perform microscopic examination of Buccal Smear, Barr body
5. To enable students prepare Plant Tissue specimens by microtomy

Course content

1. Study of Cells:
 - (a) Prokaryotic cells: Lactobacillus, E. coli. Blue green algae.
 - (b) Eukaryotic cells: Testicular material (for studies of spermatogenesis)
2. Study of electron micrographs of various cell organelles-plasma membrane, Mitochondria, Golgi complex, Lysosomes, Endoplasmic Reticulum (smooth and granular), Cilia, Centrioles, inclusions like glycogen, lipids, etc.
3. Preparation of Permanent Slides: Principles and procedures- Section cutting of tissues and staining of tissues with Haematoxylin/eosin method.
4. Study of permanent slides of various tissues (gut region, liver, lung, spleen, kidney, pancreas, testis, ovary, tongue, skin etc.).
5. Preparation of Buccal Smear for microscopic examination.
6. Barr body observation in human squamous epithelial cells.
7. Microtomy of Plant Tissue specimens (Stem & Root)

Books Recommended:

1. Shah, V.C., Bhatavdekar, J., Chinoy, N.J. and Murthy, S.K. (1988). Essential techniques in Cell Biology. Anand Book Depot, Ahemadabad.
2. Celis, J.E. (1998) Cell Biology: A Laboratory handbook. Vol. 1-3. Academic Press, UK.

Course Outcome

| Sr. No. | On completing the course, the students will be able to: |
|----------------|---|
| CO-1 | Define the characteristics and differentiate Prokaryotic cells (Lactobacillus, E. coli. Blue green algae) from Eukaryotic cells; Testicular material (for studies of spermatogenesis) |
| CO-2 | Identify the electron micrographs of various cell organelles like plasma membrane, Mitochondria, Golgi complex, Lysosomes, Endoplasmic Reticulum (smooth and granular), Cilia, Centrioles, inclusions like glycogen, lipids, etc. |
| CO-3 | Perform section cutting of tissues and learn staining methods (Haematoxylin/eosin method) of tissues for the preparation of permanent slides, identify permanent slides of various tissues (gut region, liver, lung, spleen, kidney, pancreas, testis, ovary, tongue, skin etc.). |
| CO-4 | Handle the preparation and microscopic examination of Buccal Smear, observe Barr body in human squamous epithelial cells. |
| CO-5 | Perform microtomy of Plant Tissue specimens |

Minor Courses

B.Sc. (BIO-TECHNOLOGY) (SEMESTER-I)

CH-BTL115

Chemistry-I (Inorganic Chemistry)

L T

Credit Hours : 2+1=3

Maximum Marks: 75

Theory: 56

Internal Assessment: 19

Note for the paper setters/examiners:

The question paper will consist of five sections: A, B, C, D, and E. Section A is compulsory and will consist of 8 short-answer type questions, with each question carrying 2 marks. Candidates are required to attempt six questions from this Section. Sections B, C, D, and E will have two questions from the sections A, B, C and D of the syllabus and carry 11 marks. Candidates are required to attempt one question each from Sections B, C, D, and E of the question paper.

Course objectives

1. Coordination complexes, werner theory, optical geometrical isomerism.
2. Valence bond theory based formation of complexes. Factors affecting stability of metal complexes, crown ethers, cryptands, podants like macrocyclic ligands.
3. Crystal field theory, high spin, low spin complexes, CFSE calculation, determination of term symbols of metal complexes.

Course content

Section-A

Introduction, Werner's coordination theory, naming of co-ordinate complexes. Co-ordination numbers 1-12. Factors affecting co-ordination numbers and stereo-chemistry, Isomerism in coordination compounds.

Section-B

Valence bond theory for co-ordinate complexes, inner and outer orbital complexes, electro-neutrality and back bonding, limitations of V.B. theory.

Section-C

Stability of co-ordination compounds, Introduction Factors affecting the stability of metal ion complexes with general ligands, Alkali metal and alkaline earth metal chelators : Definition and few examples of macrocyclic ligands, macrocyclic effect, crown ethers & cryptands.

Section-D

Crystal field theory- Splitting of d-orbitals in octahedral, tetrahedral, cubic and square planer fields of ligands, calculations of C.F.S.E. in high spin and low spin octahedral and high spin tetrahedral complexes, factors affecting the $10 Dq$ value. Spectroscopic terms for d^1 - d^2 electronic configurations.

Books Recommended

1. G.L. Eichorn, Inorganic Biochemistry, Vol. I Elsevier,
2. J.E. Huheey, E.A. Keiter, R.L. Keiter, Inorganic Chemistry, 4th ed. Pearson Education, Singapore, 1999.
3. D.F.C Shriver, P.W. Atkins and C.H. Langford, Inorganic Chemistry, ELBS Oxford, 1991.
4. Cowan, J.A. (1997) – Inorganic Biochemistry – An Introduction, Wiley- VCH

Course outcomes

| Sr. No. | On completing the course, the students will be able to: |
|----------------|---|
| CO-1 | Learn about Werner's theory, isomerism in coordination compounds, valence bond theory of transition metal complexes. |
| CO-2 | Learn about various theories like VBT, CFT for explain the bonding in coordination complexes. |
| CO-3 | Understand the splitting pattern of d-orbitals under different geometries and factor effecting splitting of orbitals. |
| CO-4 | Derive spectroscopic terms of various configurations |
| CO-5 | Learn about crown ethers, cryptands, macrocyclic ligands and their applications |

**CH-BTP115
Chemistry-I (Inorganic Chemistry) Lab**

**Credit Hours : 1
Maximum Marks: 25
Theory: 19
Internal Assessment: 06**

Note. The question paper will be set by the examiner based on the syllabus

Course objectives

Students will understand

1. How to calculate normality, strength of unknown solutions through volumetric titration, and determine hardness of water by performing complexometric titration,
2. Able to find out Acid, Basic radicals or Cation and Anion from the mixture of Inorganic salts.

Course content

Volumetric Analysis:

Iodimetry, Iodometry, Redox titrations using $K_2Cr_2O_7$ and $KMnO_4$.

Complexometric titration using EDTA Ca^{2+} , Mg^{2+} : in context with study of hardness of water. Inorganic qualitative analysis:

Four ions (Two cations two anions).

A. Preliminary tests: Physical examination, Dry heating test, charcoal cavity test, $Co(NO_3)_2$ test, flame test, borax bead test.

B. Acid radical analysis: metal ions

Course outcomes

| Sr. No. | On completing the course, the students will be able to: |
|----------------|---|
| CO-1 | Perform volumetric analysis through, iodometric and redox titrations and study their utility. |
| CO-2 | Carry out water analysis for its hardness and amount of dispositive ion present. |
| CO-3 | Perform the preliminary analysis on the mixture of two salts. |
| CO-4 | Learn to identify cations and anions in the mixture |

B.Sc (BIOTECHNOLOGY) SEMESTER-I

BO-BTL112

Botany-I

L T

Credit Hours : 2+1=3

Maximum Marks: 75

Theory: 56

Internal Assessment: 19

Note for the paper setters/examiners:

The question paper will consist of five sections: A, B, C, D, and E. Section A is compulsory and will consist of 8 short-answer type questions, with each question carrying 2 marks. Candidates are required to attempt six questions from this Section. Sections B, C, D, and E will have two questions from the sections A, B, C and D of the syllabus and carry 11 marks. Candidates are required to attempt one question each from Sections B, C, D, and E of the question paper.

Course Objectives

1. To study the plant diversification and their different groups.
2. To study the internal structure (anatomy) of plants (root, stem and leaf).
3. The study the concept of reproduction (vegetative and sexual) in flowering plants.
4. To study the plant identification, botanical descriptions and classification of flowering plants

Section-A

Diversity in plants: General characters of Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms. Concepts of species and hierarchical taxa, biological nomenclature.

Section-B

Anatomy of flowering plants: Meristems, simple and complex permanent tissues, internal structure of stem, root and leaf, secondary growth in stem and root of *Helianthus*.

Section-C

Reproduction in flowering plants: Structure and development of anther and male gametophyte, Structure and development of ovule and female gametophyte; Pollination (self and cross) and fertilization; structure and function of endosperm and embryo (dicot and monocot), polyembryony, self-incompatibility.

Section-D

Taxonomy of flowering plants: Artificial (Linnaeus), natural (Bentham & Hooker) and phylogenetic (Engler and Prantl) systems of classification; Terminology pertaining to floral description, General characteristics (including economic importance) of following families of angiosperms; giving examples of few important genera: Solanaceae: *Solanum/Petunia*, Rutaceae: *Citrus, Murraya*, Cruciferae- *Brassica*, Apiaceae (Umbelliferae) – *Coriander*,

Asteraceae - *Helianthus*, Leguminosae –*Cassia/Acacia/Sweet pea*, Poaceae (Graminae)-*Triticum*

Books Recommended

1. Dickison, W.C. (2000). Integrative Plant Anatomy. Academic Press, California, USA.
2. Raven, P.H., Evert, R.F. and Eichhorn, S.E. (1999). Biology of Plants, 5th edition. W.H.Freeman and Co., Worth Publishers, New York.
3. Rudall, P. J. (2007). Anatomy of Flowering Plants: An Introduction to Structure and Development (3rd Edition). Cambridge University Press, UK.
4. Bhojwani, S.S. and Bhatnagar, S.P. (2000). The Embryology of Angiosperms, 4th revised and enlarged edition. Vikas Publishing House, Delhi.
5. Hartmann, H.T. and Kestler, D.E. (1976). Plant Propagation: Principles and Practices, 3rd edition, Prentice Hall of India Pvt. Ltd., New Delhi.
6. Vashistha, P. C. (2016). Botany for degree students. S. Chand and Company, New Delhi

Course Outcomes

| Sr. No. | On completing the course, the students will be able to: |
|----------------|---|
| CO-1 | Understand the diversity of plant kingdom |
| CO-2 | Learn morphology and anatomy of plants |
| CO-3 | Understand the process of reproduction and the development of reproductive organs in flowering plants |
| CO-4 | Learn different systems of classification of plants |
| CO-5 | Learn different terminologies pertaining to floral description |
| CO-6 | Understand the economic importance of plants belonging to different families |

B.Sc (BIOTECHNOLOGY) SEMESTER-I
BO-BTP-112
Botany –I Lab

Credit Hours : 1
Maximum Marks: 25
Practical: 19
Internal Assessment: 6

Note. The question paper will be set by the examiner based on the syllabus

Course objectives

1. To study micro and megasporogenesis and female gametophytes and endosperms.
2. To study the internal structure (anatomy) of plants (root, stem and leaf).
3. The study floral diagram and floral formula of different flowers.
4. To study botanical descriptions and classification of flowering plants

Course content

Plant Anatomy: Anatomical studies of stem, root and leaf in *Helianthus* and maize plant.

Embryology: Study of the permanent slides pertaining to micro and megasporogenesis and female gametophytes and endosperms.

Taxonomy:

- a) Description of flowers including floral diagram, floral formula, V.S. of flower of the representative genera of families mentioned in syllabus.
- b) Identification and short morphological economic note on the specimens included in Unit IV of the theory paper

Course Outcomes

| Sr. No. | On completing the course, the students will be able to: |
|----------------|--|
| CO-1 | Learn different terminologies pertaining to description of flowers |
| CO-2 | Learn anatomy of plants |
| CO-3 | Understand the process of micro and megaspore genesis and female gametophytes and endosperms |

Ability Enhancement Courses

**B.Sc. (BIO-TECHNOLOGY) (SEMESTER-I)
BCSE-1122 COMMUNICATION
SKILLS IN ENGLISH-I**

| L | T | P | Credits |
|---|---|---|---------|
| 3 | 0 | 1 | 4 |

Time: 3 Hours

100

Max. Marks:

Theory: 60

Practical: 15

Internal Assessment: 25

Suggested Pattern of Question Paper:

The question paper will be divided into two sections. Section A will consist of Twelve (12) questions of One (1) mark each. Section B will consist of Six questions of Eight (8) marks each. There will be internal choice wherever possible.

Section A

1. Do as directed
Articles, Conjunctions and Prepositions (12X1=12 Marks)

Section B

1. Reading Skills: Reading Tactics and strategies; Reading purposes–kinds of purposes; Reading for direct meanings.
2. Comprehension questions of an unseen passage
3. Personal letter and Official/Business letters
4. Writing notices/agenda/minutes for public circulation on topics of professional interest.
5. Writing resume or converting a biographical note into resume
6. Translation from English to Vernacular (Punjabi/ Hindi) (Isolated Sentences) (6X8=48 Marks)

Course Objectives:

- I: To develop competence in written communication.
- II: To inculcate innovative and critical thinking among the students.
- III: To enable them to grasp the application of communication theories.
- IV: To acquire knowledge of the latest technology related to communication skills.
- V: To provide knowledge of multifarious opportunities in the field of this programme.

Course Contents:

1. Reading Skills: Reading tactics and strategies; Reading purposes–kinds of purposes and associated comprehension; Reading for direct meanings; Reading for understanding concepts, details, coherence, logical progression and meanings of phrases/ expressions.

Activities:

- a) Active reading of passages on general topics
 - b) Reading newspaper, articles, editorials etc.
 - c) Short questions based on content and development of ideas of a given paragraph.
- 2. Writing Skills:** Guidelines for effective writing; writing styles for application, resume, personal letter, official/ business letter, memo, notices etc.

Activities:

- a) Personal and business letters.
- b) Converting a biographical note into a sequenced resume.
- c) Writing notices for circulation/ boards.
- d) Making notes of given passage with headings and sub-headings
- e) Writing newspaper reports based on given heading.

Recommended Books:

- 1. *Oxford Guide to Effective Writing and Speaking* by John Seely.
- 2. *The Written Word* by Vandana R Singh, Oxford University Press.
- 3. *Murphy's English Grammar* (by Raymond Murphy) CUP.

Course Outcomes:

The completion of this course enables students to:

- 1. Identify common errors in language and rectify them.
- 2. Develop and expand writing skills through controlled and guided activities.
- 3. Develop coherence, cohesion and competence in written discourse through intelligible pronunciation.
- 4. Develop the ability to handle the interview process confidently and learn the subtle nuances of an effective group discourse.
- 5. Communicate contextually in specific and professional situations with courtesy.

PRACTICAL (Marks: 15)

Course Contents:-

- 1. Reading dialogues (5 Marks)
- 2. Rapid reading (5 Marks)

3. Project File (5 Marks)

B. Sc. Hons. (Physics, Chemistry, Maths), B. Sc. Bio Tech./ IT/ Fashion Designing/ Food Sc., B. A. JMC, BCA, B.Sc. in Computational Statistics and Data Analytics, B.Sc. Artificial Intelligence and Data Science, Bachelor of Vocational (B.Voc.) (Software Development, Theatre and Stage Craft, Food Processing, Textile Design & Apparel Technology, Renewable Energy Techology)

Semester-I

Compulsory Course

ਲਾਜ਼ਮੀ ਪੰਜਾਬੀ

Credit & Marks Distribution, Eligibility and Pre-Requisites of the Course

| Course title & Code | Total Teaching Hours | Total Credits/ Hours per week | Credit distribution | | | Total Marks 100 | | Time Allowed in Exam | Eligibility criteria | Pre-requisite of the course (if any) |
|--------------------------------|----------------------|-------------------------------|---------------------|---|---|-----------------|----|----------------------|-------------------------------|--------------------------------------|
| | | | L | T | P | Theory | IA | | | |
| ਲਾਜ਼ਮੀ ਪੰਜਾਬੀ BHPB-1101 | 60 | 4 | 4 | 0 | 0 | 75 | 25 | 3 Hours | Class 12th pass in any stream | Studied Punjabi up to 10th Standard |

| | |
|--|---|
| <p>ਕੋਰਸ ਦਾ ਉਦੇਸ਼ Course Objective</p> <ul style="list-style-type: none"> ਵਿਦਿਆਰਥੀਆਂ ਵਿਚ ਸਾਹਿਤਕ ਰੁਚੀਆਂ ਪੈਦਾ ਕਰਨਾ। ਆਲੋਚਨਾਤਮਕ ਰੁਚੀਆਂ ਵਿਕਸਤ ਕਰਨਾ। ਮਾਤ ਭਾਸ਼ਾ ਦੀ ਸਮਝ ਨੂੰ ਵਿਕਸਤ ਕਰਨਾ। | <p>ਪਾਠ-ਕ੍ਰਮ ਨਤੀਜੇ Course Outcomes (COs)</p> <ul style="list-style-type: none"> ਉਸ ਵਿਚ ਸਾਹਿਤ ਰੁਚੀਆਂ ਵਿਕਸਤ ਹੋਣਗੀਆਂ। ਉਸ ਵਿਚ ਸਾਹਿਤ ਸਿਰਜਣਾ ਦੀ ਸੰਭਾਵਨਾ ਵਧੇਗੀ। ਉਸ ਵਿਚ ਕਿਸੇ ਵੀ ਵਿਸ਼ੇ ਦਾ ਗਹਿਨ ਅਧਿਐਨ ਕਰਨ ਦਾ ਬੋਧ ਹੋਵੇਗਾ। ਉਹ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੇ ਨਿਕਾਸ ਤੇ ਵਿਕਾਸ ਬਾਰੇ ਗਿਆਨ ਹਾਸਲ ਕਰਨਗੇ |
|--|---|

ਅੰਕ-ਵੰਡ ਅਤੇ ਪ੍ਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

ਸਿਲੇਬਸ ਦੇ ਚਾਰ ਭਾਗ ਹਨ ਪਰ ਪ੍ਰਸ਼ਨ-ਪੱਤਰ ਦੇ ਪੰਜ ਭਾਗ ਹੋਣਗੇ। ਪਹਿਲੇ ਭਾਗ ਵਿਚ 1.5-1.5 (ਡੇਢ-ਡੇਢ) ਅੰਕ ਦੇ ਅਤਿ-ਸੰਖੇਪ (Objective Type) 10 ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ ਜੋ ਕਿ ਸਾਰੇ ਸਿਲੇਬਸ ਵਿਚੋਂ ਹੋਣਗੇ ਅਤੇ ਸਾਰੇ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰਨੇ ਲਾਜ਼ਮੀ ਹੋਣਗੇ। ਸਿਲੇਬਸ ਦੇ ਬਾਕੀ ਚਾਰ ਭਾਗਾਂ ਵਿਚ 02-02 ਲੇਖ ਨੁਮਾ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਹਰੇਕ ਭਾਗ ਵਿਚੋਂ 01-01 ਪ੍ਰਸ਼ਨ ਕਰਨਾ ਲਾਜ਼ਮੀ ਹੋਵੇਗਾ। ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ 15 ਅੰਕ ਹੋਣਗੇ। ਪੇਪਰ ਸੈੱਟਰ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਨੋਟ: ਇੰਟਰਨਲ ਅਸੈਸਮੈਂਟ 25 ਅੰਕਾਂ ਦੀ ਹੈ। ਇਸ ਪੇਪਰ ਦੇ ਕੁੱਲ ਅੰਕ 75+25=100 ਹਨ।

ਪਾਠ-ਕ੍ਰਮ

ਭਾਗ-ਪਹਿਲਾ

ਸਾਹਿਤ ਦੇ ਰੰਗ, ਡਾ. ਮਹਿਲ ਸਿੰਘ (ਸੰਪਾ.), ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।

ਭਾਗ ਪਹਿਲਾ - ਕਵਿਤਾ ਅਤੇ ਕਹਾਣੀ, ਡਾ. ਮਹਿਲ ਸਿੰਘ ਅਤੇ ਡਾ. ਆਤਮ ਰੰਧਾਵਾ (ਸਹਿ ਸੰਪਾ.)

(ਕਵਿਤਾ ਭਾਗ ਵਿਚੋਂ ਪ੍ਰਸੰਗ ਸਹਿਤ ਵਿਆਖਿਆ/ਵਿਸ਼ਾ-ਵਸਤੂ। ਕਹਾਣੀ ਭਾਗ ਵਿਚੋਂ ਸਾਰ/ਵਿਸ਼ਾ-ਵਸਤੂ)

ਭਾਗ-ਦੂਜਾ

ਪੰਜਾਬ ਦੇ ਮਹਾਨ ਕਲਾਕਾਰ (ਸੰਪਾ. ਬਲਵੰਤ ਗਾਰਗੀ)

ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।

(ਅੰਮ੍ਰਿਤਾ ਸ਼ੇਰਗਿੱਲ ਤੋਂ ਭਾਈ ਸਮੁੰਦ ਸਿੰਘ ਤਕ)

(ਵਿਸ਼ਾ-ਵਸਤੂ/ਸਾਰ/ਨਾਇਕ ਬਿੰਬ)

ਭਾਗ-ਤੀਜਾ

(ੳ) ਪੈਰੂਾ ਰਚਨਾ (ਤਿੰਨਾਂ ਵਿਚੋਂ ਇਕ)

(ਅ) ਪੈਰੂਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ

ਭਾਗ-ਚੌਥਾ

- (ੳ) ਭਾਸ਼ਾ ਵੰਨਗੀਆਂ: ਭਾਸ਼ਾ ਦਾ ਟਕਸਾਲੀ ਰੂਪ, ਭਾਸ਼ਾ ਅਤੇ ਉਪ-ਭਾਸ਼ਾ ਵਿਚਲਾ ਅੰਤਰ,
ਪੰਜਾਬੀ ਉਪ-ਭਾਸ਼ਾਵਾਂ ਦੇ ਪਛਾਣ-ਚਿੰਨ੍ਹ।
(ਅ) ਪੰਜਾਬੀ ਭਾਸ਼ਾ: ਨਿਕਾਸ ਤੇ ਵਿਕਾਸ।

B. Sc. Hons. (Physics, Chemistry, Maths), B. Sc. Bio Tech./ IT/ Fashion Designing/ Food Sc., B. A. JMC, BCA, B.Sc. in Computational Statistics and Data Analytics, B.Sc. Artificial Intelligence and Data Science, Bachelor of Vocational (B.Voc.) (Software Development, Theatre and Stage Craft, Food Processing, Textile Design & Apparel Technology, Renewable Energy Techology)

Semester-I

Compulsory Course

ਮੁਢਲੀ ਪੰਜਾਬੀ

(In Lieu of Compulsory Punjabi)

Credit & Marks Distribution, Eligibility and Pre-Requisites of the Course

| Course title & Code | Total Teaching Hours | Total Credits/ Hours per week | Credit distribution | | | Total Marks 100 | | Time Allowed in Exam | Eligibility criteria | Pre-requisite of the course (if any) |
|-------------------------------|----------------------|-------------------------------|---------------------|---|---|-----------------|----|----------------------|-------------------------------|---|
| | | | L | T | P | Theory | IA | | | |
| ਮੁਢਲੀ ਪੰਜਾਬੀ BPBI-1102 | 60 | 4 | 4 | 0 | 0 | 75 | 25 | 3 Hours | Class 12th pass in any stream | NOT Studied Punjabi up to 10th Standard |

| ਕੋਰਸ ਦਾ ਉਦੇਸ਼ Course Objective | ਪਾਠ-ਕ੍ਰਮ ਨਤੀਜੇ Course Outcomes (COs) |
|---|--|
| <ul style="list-style-type: none"> ਵਿਦਿਆਰਥੀ ਨੂੰ ਗੁਰਮੁਖੀ ਲਿਪੀ ਤੋਂ ਜਾਣੂ ਕਰਾਉਣਾ। ਵਿਦਿਆਰਥੀ ਨੂੰ ਸ਼ੁੱਧ ਪੰਜਾਬੀ ਪੜ੍ਹਨਾ-ਲਿਖਣਾ ਸਿਖਾਉਣਾ। ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀਆਂ ਵਿਆਕਰਨਕ ਬਾਰੀਕੀਆਂ ਤੋਂ ਜਾਣੂ ਕਰਾਉਣਾ। ਸ਼ੁੱਧ ਸੰਚਾਰ ਨੂੰ ਵਿਕਸਤ ਕਰਨਾ। | <ul style="list-style-type: none"> ਵਿਦਿਆਰਥੀ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਅਤੇ ਗੁਰਮੁਖੀ ਲਿਪੀ ਦੀ ਸਿਖਲਾਈ ਵਿਚ ਮੁਹਾਰਤ ਹਾਸਲ ਕਰਨਗੇ। ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਵਿਚ ਮੁਹਾਰਨੀ, ਲਗਾਂ-ਮਾਤਰਾਂ, ਸਵਰ ਅਤੇ ਵਿਅੰਜਨ ਅੱਖਰਾਂ ਦੀ ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ ਸੰਬੰਧੀ ਸਮਝ ਵਿਕਸਿਤ ਹੋਵੇਗੀ। ਵਿਦਿਆਰਥੀ ਸ਼ੁੱਧ ਪੰਜਾਬੀ ਲਿਖਣ-ਪੜ੍ਹਨ ਦੇ ਸਮਰੱਥ ਹੋਣਗੇ। ਉਹ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੇ ਸ਼ੁੱਧ ਰੂਪਾਂ ਦੀ ਜਾਣਕਾਰੀ ਹਾਸਲ ਕਰਨਗੇ। |

ਅੰਕ-ਵੰਡ ਅਤੇ ਪ੍ਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

ਸਿਲੇਬਸ ਦੇ ਚਾਰ ਭਾਗ ਹਨ ਪਰ ਪ੍ਰਸ਼ਨ-ਪੱਤਰ ਦੇ ਪੰਜ ਭਾਗ ਹੋਣਗੇ। ਪਹਿਲੇ ਭਾਗ ਵਿਚ 01-01 ਅੰਕ ਦੇ ਅਤਿ-ਸੰਖੇਪ ਉੱਤਰ ਵਾਲੇ (Objective Type) 11 ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ ਜੋ ਕਿ ਸਾਰੇ ਸਿਲੇਬਸ ਵਿਚੋਂ ਹੋਣਗੇ ਅਤੇ ਸਾਰੇ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰਨੇ ਲਾਜ਼ਮੀ ਹੋਣਗੇ। ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਦੂਸਰੇ ਭਾਗ ਵਿਚ, ਸਿਲੇਬਸ ਦੇ ਪਹਿਲੇ ਭਾਗ ਵਿਚੋਂ ਤਿੰਨ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਜਿੰਨ੍ਹਾਂ ਵਿਚੋਂ ਕੋਈ ਦੋ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰਨੇ ਹੋਣਗੇ। ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ 8-8 ਅੰਕ ਹੋਣਗੇ। ਇਸੇ ਤਰ੍ਹਾਂ ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਤੀਸਰੇ ਭਾਗ ਵਿਚ ਤਿੰਨ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ ਜਿੰਨ੍ਹਾਂ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰਨੇ ਹੋਣਗੇ। ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ 8-8 ਅੰਕ ਹੋਣਗੇ। ਚੌਥੇ ਵਿਚ ਪੰਜ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਜਿੰਨ੍ਹਾਂ ਵਿਚੋਂ ਚਾਰ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰਨੇ ਹੋਣਗੇ। ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ 4-4 ਅੰਕ ਹੋਣਗੇ। ਭਾਗ ਪੰਜਵੇਂ ਵਿਚ ਦਸ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਜਿੰਨ੍ਹਾਂ ਵਿਚੋਂ 8 ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਲਾਜ਼ਮੀ ਹੋਣਗੇ। ਹਰ ਪ੍ਰਸ਼ਨ ਦੇ 2-2 ਅੰਕ ਹੋਣਗੇ।

ਨੋਟ: ਇੰਟਰਨਲ ਅਸੈਸਮੈਂਟ 25 ਅੰਕਾਂ ਦੀ ਹੈ। ਇਸ ਪੇਪਰ ਦੇ ਕੁੱਲ ਅੰਕ 75+25=100 ਹਨ।

ਪਾਠ-ਕ੍ਰਮ

ਭਾਗ-ਪਹਿਲਾ

(ੳ) ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਤੇ ਗੁਰਮੁਖੀ ਲਿਪੀ:

ਨਾਮਕਰਣ ਤੇ ਸੰਖੇਪ ਜਾਣ-ਪਛਾਣ: ਗੁਰਮੁਖੀ ਵਰਣਮਾਲਾ, ਅੱਖਰ ਕ੍ਰਮ, ਸਵਰ ਵਾਹਕ (ੳ, ਅ, ਈ), ਲਗਾਂ-ਮਾਤਰਾਂ, ਪੈਰ ਵਿਚ ਬਿੰਦੀ ਵਾਲੇ ਵਰਨ, ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਨ, ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ

(ਅ) ਸਿਖਲਾਈ ਤੇ ਅਭਿਆਸ

ਭਾਗ-ਦੂਜਾ

ਗੁਰਮੁਖੀ ਆਰਥੋਗਰਾਫੀ ਅਤੇ ਉਚਾਰਨ:

ਸਵਰ, ਵਿਅੰਜਨ: ਮੁਢਲੀ ਜਾਣ-ਪਛਾਣ ਅਤੇ ਉਚਾਰਨ, ਮੁਹਾਰਨੀ, ਲਗਾਂ-ਮਾਤਰਾਂ ਦੀ ਪਛਾਣ

ਭਾਗ-ਤੀਜਾ

ਪੰਜਾਬੀ ਸ਼ਬਦ-ਜੋੜ: ਮੁਕਤਾ (ਦੋ ਅੱਖਰਾਂ ਵਾਲੇ ਸ਼ਬਦ, ਤਿੰਨ ਅੱਖਰਾਂ ਵਾਲੇ ਸ਼ਬਦ), ਸਿਹਾਰੀ ਵਾਲੇ ਸ਼ਬਦ, ਬਿਹਾਰੀ ਵਾਲੇ ਸ਼ਬਦ, ਔਂਕੜ ਵਾਲੇ ਸ਼ਬਦ, ਦੁਲੈਂਕੜ ਵਾਲੇ ਸ਼ਬਦ, ਲਾਂ ਵਾਲੇ ਸ਼ਬਦ, ਦੁਲਾਵਾਂ ਵਾਲੇ ਸ਼ਬਦ, ਹੋੜੇ ਵਾਲੇ ਸ਼ਬਦ, ਕਨੋੜੇ ਵਾਲੇ ਸ਼ਬਦ, ਲਗਾਖਰ (ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ) ਵਾਲੇ ਸ਼ਬਦ

ਭਾਗ-ਚੌਥਾ

ਸੁੱਧ-ਅਸੁੱਧ ਸ਼ਬਦ

SEMESTER-I
PUNJAB HISTORY & CULTURE (From Earliest Times to C 320 BC)
(Special Paper in lieu of Punjabi compulsory)
(For those students who are not domicile of Punjab)
Course Code: BPHC-1104

Credit: 04

L- T- P

04-0-0

Time: 3 Hours

Total Marks: 100

Theory: 75

Internal Assessment: 25

Instructions for the Paper Setters:

Question paper should consist of two sections—Section A and Section B. The paper setter must ensure that questions in Section–A do not cover more than one point, and questions in Section–B should cover at least 50 per cent of the theme.

Section–A: The examiner will set 15 objective type questions out of which the candidate shall attempt any 10 questions, each carrying 1½ marks. The total weightage of this section will be 15 marks. Answer to each question should be in approximately one to two sentences.

Section–B: The examiner will set 8 questions, two from each Unit. The candidate will attempt 4 questions selecting one from each Unit in about 1000 words. Each question will carry 15 marks. The total weightage of this section will be 60 marks.

Note: The examiner is to set the question paper in two languages: English & Hindi.

Course Objectives: The main objective of this course is to educate the history and culture of the Ancient Punjab to the students who are not domicile of the Punjab. It aims to familiarize these students with the physical features of ancient Punjab and its impact on its history and culture. It also provides them information about the different sources to construct the history and culture of the ancient Punjab. The course intends to provide knowledge of social, economic, religious life of the Harappan civilization, Indo-Aryans, teachings and impact of Jainism and Buddhism in the Punjab.

Unit-I

1. Physical features of the Punjab and impact on history.
2. Sources of the ancient history of Punjab.

Unit-II

3. Harappan Civilization: Town planning; social, economic and

- religious life of the Indus Valley People.
4. The Indo-Aryans: Original home and settlement in Punjab.

Unit-III

5. Social, Religious and Economic life during Rig Vedic Age.
6. Social, Religious and Economic life during later Vedic Age.

Unit-IV

7. Teachings and impact of Buddhism.
8. Jainism in the Punjab.

Suggested Readings:-

L. Joshi (ed), *History and Culture of the Punjab*, Art-I, Patiala, 1989 (3rd edition)

L.M. Joshi and Fauja Singh (ed), *History of Punjab*, Vol. I, Patiala 1977.

Budha Parkash, *Glimpses of Ancient Punjab*, Patiala, 1983.

B.N. Sharma, *Life in Northern India*, Delhi. 1966.

Course Outcomes:

On Completing the Course, the Students will be able to:

- CO-1** Learn the history and culture of the Ancient Punjab.
- CO-2** Study the physical features of ancient Punjab.
- CO-3** Understand about the sources of the history of the Punjab.
- CO-4** Analyse the social, economic, religious life of the Harappan civilization and Vedic-Aryans.
- CO-5** Learn the teachings and impact of Jainism and Buddhism in the Punjab.

Value Added Courses

SEMESTER-I

Course Code: ZDA111

Course Title- Drug Abuse: Problem, Management and Prevention

PROBLEM OF DRUG ABUSE

(Compulsory for all Under Graduate Classes)

Time: 3 Hours

Credit hrs./wk.:2

Max. Marks: 50

Instructions for the Paper Setters:

- 1) There will be a total of 9 questions of which 5 are to be attempted.
- 2) Question 1 is compulsory and having 10 short answer type questions (1 mark each).
- 3) The remaining 8 questions (10 marks each) shall include 2 questions from each unit. Candidates shall be required to attempt 4 questions, one from each unit. Preferably, the question should not be split into more than two sub-parts.

Course Objectives- The course aims to:

| | |
|-------|--|
| CO-1. | Generate the awareness against drug abuse. |
| CO-2. | Describe a variety of models and theories of addiction and other problems related to substance abuse. |
| CO-3. | Describe the behavioral, psychological, physical health and social impact of psychoactive substances. |
| CO-4. | Provide culturally relevant formal and informal education programs that raise awareness and support for substance abuse prevention and the recovery process. |
| CO-5. | Describe factors that increase likelihood for an individual, community or group to be at risk of substance use disorders. |

UNIT-I

- **Meaning of Drug Abuse**
Meaning of drug abuse
Nature and Extent of Drug Abuse: State and National Scenario

UNIT-II

- **Consequences of Drug Abuse for**
Individual: Education, Employment, Income.
Family : Violence.
Society : Crime.
Nation : Law and Order problem.

UNIT-III

- **Management of Drug Abuse**
Medical Management: Medication for treatment of different types of drug abuses.
Medication to reduce withdrawal effects.

UNIT-IV

- Psychiatric Management: Counseling, Behavioral and Cognitive therapy.
- Social Management: Family, Group therapy and Environmental Intervention.

References:

1. Ahuja, Ram (2003), Social Problems in India, Rawat Publication, Jaipur.
2. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
3. Inciardi, J.A. 1981. The Drug Crime Connection. Beverly Hills: Sage Publications. 23
4. Jasjit Kaur Randhawa & Samreet Randhawa, “Drug Abuse-Problem, Management & Prevention”, KLS, ISBN No. 978-81-936570-6-5, (2018).
5. Jasjit Kaur Randhawa & Samreet Randhawa, “Drug Abuse Problem, Management & Prevention”, KLS, ISBN No. 978-81-936570-8-9, (2019).
6. Jasjit Kaur Randhawa & Samreet Randhawa, “voZrI d[otos'A^(BPky'oh) ;wZf;nk, gqpzXB ns/o'eEkw”, KLS, ISBN No. 978-81-936570-7-1, (2018).
7. Jasjit Kaur Randhawa, “Drug Abuse -Management & Prevention”, KLS, ISBN No. 978-93-81278-80-2, (2018).
8. Kapoor. T. (1985) Drug epidemic among Indian Youth, New Delhi: Mittal Pub.
9. Modi, Ishwar and Modi, Shalini (1997) Drugs: Addiction and Prevention, Jaipur: Rawat Publication.
10. National Household Survey of Alcohol and Drug abuse. (2003) New Delhi, Clinical Epidemiological Unit, All India Institute of Medical Sciences, 2004.
11. Rama Gandotra & Jasjit Kaur Randhawa, “voZrI d[otos'A^(BPky'oh) gqpzXB ns/ o'eEkw”, KLS, ISBN No. 978-93-81278-87-1, (2018).
12. Sain, Bhim 1991, Drug Addiction Alcoholism, Smoking obscenity New Delhi: Mittal Publications.
13. Sandhu, Ranvinder Singh, 2009, Drug Addiction in Punjab: A Sociological Study. Amritsar. Guru Nanak Dev University.
14. Singh, C. P. 2000. Alcohol and Dependence among Industrial Workers: Delhi: Shipra.
15. Sussman, S and Ames, S.L. (2008). Drug Abuse: Concepts, Prevention and Cessation, Cambridge University Press.
16. World Drug Report 2010, United Nations office of Drug and Crime.
17. World Drug Report 2011, United Nations office of Drug and Crime.

Course Outcomes:

The students will be able:

| | |
|-------|---|
| CO-1. | To describe issues of cultural identity, ethnic background, age and gender in prevention, treatment and recovery. |
| CO-2. | To describe warning sign, symptoms, and the course of substance use disorders. |
| CO-3. | To describe principles and philosophy of prevention, treatment and recovery. |
| CO-4. | To describe current and evidenced-based approaches practiced in the field of drug addiction. |

**B.Sc. (BIO-TECHNOLOGY)
(SEMESTER-II)**

Major Core Courses

B.Sc. (BIO-TECHNOLOGY) (SEMESTER-II)
BT-BTL121
Biochemistry-II (Bioenergetics and Enzymology)

Credit Hours: 3
Maximum Marks: 75
Theory: 56
Internal Assessment: 19

Note for the paper setters/examiners:

The question paper will consist of five sections: A, B, C, D, and E. Section A is compulsory and will consist of 8 short-answer type questions, with each question carrying 2 marks. Candidates are required to attempt six questions from this Section. Sections B, C, D, and E will have two questions from the sections A, B, C and D of the syllabus and carry 11 marks. Candidates are required to attempt one question each from Sections B, C, D, and E of the question paper.

Course objectives

Course contents are designed to enable students to

1. Understand the laws governing energy relationships in metabolic conversions with in the living cells.
2. Learn roles of phosphorylated nucleotides and other compounds as universal energy carriers in biological reactions.
3. Gain knowledge Classification, nomenclature, regulation of enzymes, coenzymes, enzymatic reaction mechanisms.
4. Acquire understanding enzymatic reaction energetics in terms of mathematical relationships along with various inhibition mechanisms.

Course content

Section-A

Introduction to metabolism, catabolism, anabolism, Laws of Thermodynamics and living system, Free energy change and direction of metabolism, Endergonic and exergonic reactions, Characteristics of Metabolic pathways, Compartmentation and Interorganmetabolism, Regulation & evolution of metabolic pathways

Section-B

ATP: Structure, Free energy change, High group transfer potential, energy coupling with ATP (Creatinine phosphokinase, NDP kinase, Adenylate kinase), metabolic roles of ATP; Biological applications of ATP, Experimental methods for studying metabolism, Energy rich metabolites, biological oxidation – Reduction reactions

Section-C

Introduction to Enzymes: Nomenclature, Classification and Characteristics of enzymes, Cofactors, Co-enzyme and Prosthetic group, Zymogen, Mechanism of Enzyme Action: Nature of active site, enzyme substrate complex, Factors responsible for catalytic efficiency of enzymes., Covalent catalysis, Acid base catalysis, Strain and distortion theory, Induced fit hypothesis.

Section-D

Enzyme Kinetics: A brief overview of enzyme energetics, Michaelis Menten equation. Derivation of Michaelis Menten equation and determination of K_m and V_{max} values
Enzyme inhibition: Reversible and Irreversible inhibition, Regulation of enzyme activity
Isozymes (LDH) and their importance

Course Outcomes:

| Sr. No. | On completing the course, the students will be able to: |
|----------------|---|
| CO-1 | Learn about types of biochemical reactions involved in the cellular metabolism along with their regulatory mechanisms as well as evolutionary aspects of metabolic pathways |
| CO-2 | Understand the overall bioenergetics involved in coupled metabolic pathways along with involvement of energy rich compounds. |
| CO-3 | Acquire understanding on basic enzymology of cellular metabolism along with catalytic reactions. |
| CO-4 | Learn about kinetics of the enzymatic reactions along with different types of regulation and inhibition mechanisms. |

B.Sc. (BIO-TECHNOLOGY) (SEMESTER-II)
BT-BTP123
Biochemistry-II (Bioenergetics and Enzymology) Lab

Credit Hours : 3
Maximum Marks: 50
Practical: 37

Internal Assessment: 5

Note. The question paper will be set by the examiner based on the syllabus.

Course Objectives

Course contents are designed to enable students to

1. Understand the basics of enzyme catalysed biological reactions.
2. Learn the energetics and other factors affecting the enzymatic activity.
3. Comprehend the metabolically important enzymes catalyzing the hydrolysis of phosphate esters.
4. Know inside out of the processes of the enzyme inhibition.

Course content

1. Estimation of Alpha-amylase activity from saliva.
2. Assay of acid phosphatase activity.
3. Effect of temperature on enzyme activity.
4. Effect of pH on enzyme activity
5. Determination of K_m for acid phosphatase.
6. Determination of pK_a value of P-nitrophenol.

Books Recommended

1. David L. Nelson and Michael Cox (2017) Lehninger Principles of Biochemistry, 7th ed, WH Freeman
2. Jeremy M. Berg, Lubert Stryer, John Tymoczko , Gregory Gatto (2019) Biochemistry, 9th Ed., WH Freeman
3. Ferrier (2017) Lippincott's Illustrated Reviews Biochemistry, 7th Ed, Wolters Kluwer India Pvt. Ltd.
4. J L Jain , Sunjay Jain , Nitin Jain (2016) Fundamentals of Biochemistry, 7th Ed, S Chand
Satyanarayana (2020) Biochemistry, 5th Ed, Elsevier

Course Outcomes:

| Sr. No. | On completing the course, the students will be able to: |
|----------------|---|
| CO-1 | Study hydrolysis of glycosidic linkage in polysaccharides. |
| CO-2 | Study pH dependent phosphate esters hydrolysis by the action of phosphomonoesterase enzyme. |
| CO-3 | Study the determination of the temperature as well as pHoptima of enzymatic reactions. |
| CO-4 | Study the significance of substrate concentration in estimating the velocity of the enzyme catalyzed reactions. |
| CO-5 | Demonstrate major types of the enzymeinhibitions |

**B.Sc. (BIO-TECHNOLOGY) (SEMESTER-II)
BT-BTL124
General Microbiology-II**

**Credit Hours: 3
Maximum Marks: 75
Theory: 56
Internal Assessment: 19**

Note for the paper setters/examiners:

The question paper will consist of five sections: A, B, C, D, and E. Section A is compulsory and will consist of 8 short-answer type questions, with each question carrying 2 marks. Candidates are required to attempt six questions from this Section. Sections B, C, D, and E will have two questions from the sections A, B, C and D of the syllabus and carry 11 marks. Candidates are required to attempt one question each from Sections B, C, D, and E of the question paper.

Course Objectives

1. To correlate the knowledge of fundamental Science's to explore modelling of microbial growth.
2: To make the pupils aware of the viral, fungal, bacterial and general disease.
- 3: The students made to learn all the techniques of diagnostics of disease casing microbes, prophylactic and preventive microbiology and remedy available for treatment of these diseases.
- 4: The theoretical knowledge along with the practical work further strengthened by use and application of ultra-modern instrumentation in world class labs to give first hand practical knowledge of Microbiology.
- 5: The students will be given knowledge about industrial, medical, environmental microbiology, so that they may become clear about their future job prospects.

Course content

SECTION-A

Factors affecting Microbial Growth: Temperature, pH, provision of gases. Concept of pure and auxenic culture. Introduction to concept of microbial growth in batch and continuous bioreactor system. Bacterial generation, doubling time and specific growth rate. Monoauxic, diauxic and synchronised growth curve. Sporulation and regeneration of bacteria.

SECTION-B

Viruses-Introduction, Plant and animal viruses-structure and composition, Classification based on differences in their transcription process. Cultivation of plant and animal viruses by culturing in chicken egg only. Life cycle Tobacco Mosaic Virus, Herpes simplex and Bacteriophages (Lysogenic and Lytic cycle)

SECTION-C

Pathogenic microorganisms- Factors contributing towards microbial pathogenicity (Adhesion, Invasiveness and toxigenicity), Natural resistance and Non-specific defense mechanism against microorganisms. Introduction, mechanism of action, diagnosis and treatment for viral diseases- Influenza, AIDS and Hepatitis. Bacterial diseases-Diphtheria, Tuberculosis, Typhoid. Fungal diseases- Aspergillosis and Candidiasis.

SECTION-D

Introduction to Industrial Microbiology. Microbes involved in Food (Pickles, Saurkraut, Sausage), Single cell protein (Yeast), Antibiotics (Penicillin, Tetracyclin), Organic acids (Citric, Glutamic acid) and Municipal solid waste transformations.

Books Recommended:

1. Davis, B.D., Dulbecco. R., Eisen, H.N. and Ginsberg, H.S. (1990). Microbiology: 4th Edition, Harper & Row, Publishers, Singapore.
2. Tortora, G.J., Funke, B.R. and Case, C.L. (1994). Microbiology: An introduction: 5th Edition, The Benjamin / Cummings Publishing Company, Inc.
3. Stanier, R.Y. (1995). General microbiology, MacMillan Press, London.
4. Pelczar, M.T. (1995). Microbiology, Tata McGraw Hill Publication, New Delhi.
5. Schlegel. H. G., (1995). General Microbiology 7th Edition, Cambridge Univ. Press.
6. Prescott and Dunn (1999). Industrial Microbiology 4th Edition, By S.K. Jain for CBS Publishers & Distributors.
7. Chander, M. And Puri, P. (2008). A Concise Course in Microbiology. Krishna Brothers Publishers, Old Railway Road, Jalandhar.
8. Postgate. J. (2000). Microbes & Man 4th Edition, Cambridge Univ. Press.
9. Tortora. G.J., Funke. B.R., 2001. Microbiology: An Introduction, Benjamin Cummings.

Course Outcome

| Sr. No. | On completing the course, the students will be able to: |
|----------------|---|
| CO-1 | Understand the concepts of industrial, medical, environmental microbiology |
| CO-2 | Be aware of etiology of disease can know live a healthy and disease-free life |
| CO-3 | Learn the higher and complex principles of all fields of microbiology. |
| CO-4 | Gain knowledge on the role of microbes in food industry. |
| CO-5 | Become fully acquainted with the microbes as part of our daily life and know about fruits and fines coming from microbes. |

B.Sc. (BIO-TECHNOLOGY) (SEMESTER-II)

BT-BTP124

General Microbiology-II Lab

Credit Hours : 3

Maximum Marks: 20

Practical: 15

Internal Assessment: 5

Note. The question paper will be set by the examiner based on the syllabus.

Course Objectives

1. To correlate the knowledge of the theoretical fields of Microbiology with practical.
2. To make the pupils aware of the role of Microbiology in daily life.
3. The students made to learn all the general features and identification of various microbes such as fungi, bacteria, virus etc.
4. To teach them microbiology practical applicable in dairy, diagnostics and other industries.
5. The students will be given opportunity to perform each and every experiment, get results and infer upon their findings.

Couse Content:

1. Enumeration of microorganism. Total vs viable counts.
2. Personal hygiene-Microbes from hands, tooth-scum and other body parts.
3. Growth curve of micro-organisms.
4. Identification of fungus by and lactophenol staining.
5. Identification of formation of germ tube by *Candida albicans*.

Books Recommended:

1. Cappuccino, J.G. and Sherman, N. (1999). Microbiology: A Laboratory Manual 4th Ed: Harlow, Addition-Wesley.
2. Sambrook, J., Russel, D.W. (2001). Molecular Cloning.A laboratory manual 3rd Ed., Cold Spring Harbor Laboratory Press, New York.
3. Dubey R.C. and Maheshwari (2012) Practical Microbiology 5th edition: S. Chand and company ltd.New Delhi.

Course Outcome

| Sr. No. | On completing the course, the students will be able to: |
|----------------|--|
| CO-1 | Become aware of procedures to evaluate various types of microbes and quantify them according to various standards. |
| CO-2 | Have first - hand knowledge on quality control testing and analytical micro biology as is applicable to various industries. |
| CO-3 | Have hands-on training on sterilization techniques, media preparation, and isolation of micro-organisms, bacterial/fungus staining and mounting methods. |
| CO-4 | Apply their knowledge to get suitable job after completion of their degree. |

**B.Sc (BIOTECHNOLOGY) SEMESTER-II
BT-BTL-122
Genetics**

**Credit Hours : 3
Maximum Marks: 75
Theory: 56
Internal Assessment: 19**

Note for the paper setters/examiners

The question paper will consist of five sections: A, B, C, D, and E. Section A is compulsory and will consist of 8 short-answer type questions, with each question carrying 2 marks. Candidates are required to attempt six questions from this Section. Sections B, C, D, and E will have two questions from the sections A, B, C and D of the syllabus and carry 11 marks. Candidates are required to attempt one question each from Sections B, C, D, and E of the question paper.

Course Objectives

1. The objective of this course is to introduce the students with the concepts of chromosomal organisation, extra-chromosomal inheritance and chromosomal aberrations.
2. To inculcate the concepts of Mendel's laws of inheritance, crossing over, linkage and how the gene transfer from parents to offspring's.
3. To introduce students with the concept of extra Chromosomal (Cytoplasmic) inheritance like inheritance of mitochondrial DNA, chloroplast DNA, kappa articles in Paramecium, Sigma factor in Drosophila, cytoplasmic male sterility (CMS) in maize & its relevancy.
4. To enhance the hand-on experience in dermatographics, to prepare mitotic slides & the practical learning ability.
5. To introduces the students with concept of Basic Microbial Genetics: Conjugation, transduction & transformation and how the gene flows in a horizontal manner.

Course content

Section-A

Organization of Chromosomes: The structure of prokaryotic and eukaryotic chromosome (macromolecular organization and ultrastructure), karyotype, idiogram, centromere and telomere structure, significance of telomerase, euchromatin and heterochromatin, Special chromosomes: Polytene chromosomes and Lampbrush chromosomes, satellite DNA, the supercoiling of DNA.

Section-B

Mendel's Laws of Inheritance: Principle of segregation and Independent assortment, Monohybrid, dihybrid and trihybrid crosses, Back cross and test cross. Interaction of Genes: Incomplete inheritance and co-dominance, pleiotropism, modification of F2 ratios: epistasis, complementary genes, supplementary genes, inhibitory genes, duplicate genes, lethality and collaborators genes. Multiple allelism.

Section-C

Linkage: Coupling and repulsion hypothesis, chromosomal theory of linkage, complete and incomplete linkage, linkage groups and significance of linkage. **Crossing Over:** Introduction, mechanism of meiotic crossing over, types of crossing over, factors affecting it and its significance.

Basic Microbial Genetics: Conjugation, transduction, transformation

Section-D

Extra Chromosomal (Cytoplasmic) Inheritance: features; inheritance of mitochondrial DNA, chloroplast DNA, kappa articles in *Paramecium*, Sigma factor in *Drosophila*, cytoplasmic male sterility (CMS) in maize.

Chromosomal aberrations: Structural: deletion, duplication, inversion, translocation; Numerical: polyploidy, aneuploidy; significance of chromosomal aberrations.

Course Outcome

| Sr. No. | On completing the course, the students will be able to: |
|----------------|--|
| CO-1 | Understand the chemical basis of heredity |
| CO-2 | Gain knowledge on genetic methodology and how quantification of heritable traits in families and populations provide insight on the cellular and molecular mechanisms. |
| CO-3 | Gain ability to evaluate conclusions that are based on genetic data. |
| CO-4 | Understand the role of genetic technologies in industries related to biotechnology, pharmaceuticals, energy, and other fields. |
| CO-5 | Learn teamwork and leadership skills including group analysis of data, working together in the research laboratory, joint compositions of written reports, substantive participation in research group meetings etc. |

B.Sc. (BIO-TECHNOLOGY) (SEMESTER-II)

BT-BTP122

Genetics Lab

Credit Hours : 3

Maximum Marks: 20

Practical: 15

Internal Assessment: 5

Note. The question paper will be set by the examiner based on the syllabus.

Course Objectives

1. To make students to solve numerical problem related to mendelism, paternity disputes & multiple allelism.
2. An understanding of the inheritance and expression of human blood groups.
3. An understanding of the clinical relevance of genetic concepts.
4. Ability to the hand-on experience in dermatographics, to prepare mitotic slides & the practical learning ability.
5. Knowledge of Internet genetics resources.
6. An historical perspective of how genetics has evolved

Course content

1. Demonstration of Law of segregation and Independent assortment (use of coloured beads, capsules etc.).
2. Numerical problems on Mendelism and on modified F2 ratios.
3. Numerical problems on Paternity disputes (Blood groups)
4. Segregation demonstration in preserved material
5. Study of polytene chromosomes from permanent slides.
6. Dermatographics : Palm print taking and finger tip patterns.
7. Preparation and study of mitosis slides from onion root tips by squash method.

Course Outcome

| Sr. No. | On completing the course, the students will be able to: |
|----------------|--|
| CO-1 | Study the structural and numerical chromosomal aberrations and their consequences. |
| CO-2 | Solve numerical problem related to mendelism, paternity disputes & multiple allelism. |
| CO-3 | Know about various syndromes in humans. |
| CO-4 | Understand the sex linked inherited characters and diseases. |
| CO-5 | Get in depth knowledge about gene interaction, penetrance and expressivity |
| CO-6 | Demonstrate proficiency in understanding the basic structure of atom and interpret the inheritance of characters by using linkage and crossing over. |

Minor Stream Courses

B.Sc. (BIO-TECHNOLOGY) (SEMESTER-II)

ZO-BTL121

Zoology-I

L T

Credit Hours : 2+1=3

Maximum Marks:75

Theory: 56

Internal Assessment: 19

Note for the paper setters/examiners:

The question paper will consist of five sections: A, B, C, D, and E. Section A is compulsory and will consist of 8 short-answer type questions, with each question carrying 2 marks. Candidates are required to attempt six questions from this Section. Sections B, C, D, and E will have two questions from the sections A, B, C and D of the syllabus and carry 11 marks. Candidates are required to attempt one question each from Sections B, C, D, and E of the question paper.

Course Objectives: The course aims to

1. Understand the metabolic activities in the body of animals.
2. Understand the various bio molecules present in the body.
3. Understand the structure and physiology of endocrine system.
4. Understand the structure and function of blood and heart.
5. Understand the process of digestion and the structure and function of associated glands.
6. Understand the structure and function of brain.
7. Understand the gaseous transport and the structure involved in gaseous transport.

Course content

Section–A

Introduction to Animal Kingdom and its diversification:

Overview and General classification of Kingdom Animalia, General Characteristics of each group upto class level with an example.

Section–B

Digestive System: The alimentary canal and associated glands of Man. Digestion of dietary constituents, regulation of digestive processes and absorption. Extra and intra cellular digestion, enzymatic digestion and symbiotic digestion.

Respiratory System: Respiratory system of man, Transport of O₂ and CO₂, Oxygen dissociation curve of haemoglobin, Bohr effect, chloride shift, Haldane effect and control of breathing.

Section–C

Circulatory System: General plan of circulation in Man, structure of human heart. Origin and regulation of heart beat, Electrocardiogram, Cardiac output and Blood pressure, Composition and functions of blood and lymph, Blood clotting, blood groups including Rh-factor.

Excretory system: Structure of Kidney and nephron. Urine formation and osmoregulation.

Section–D

Skeletal system: Ultrastructure, chemical and physical basis of skeletal muscle contraction.

Neural Integration: Structure and functions of brain, Structure of neuron, resting membrane potential, Origin and propagation of impulse along the axon, synapse and myoneural junction.

Endocrine System: Structure and physiology of thyroid, parathyroid, adrenal, hypothalamus, pituitary, pancreas and gonads of man.

Course Outcomes

| Sr. No. | On completing the course, the students will be able to: |
|----------------|---|
| CO-1 | Develop understanding on various fundamental concepts related to physiology of digestion & absorption |
| CO-2 | Develop understanding on circulatory system and blood components |
| CO-3 | Get familiar with the topics related to nervous and muscular system and their working |
| CO-4 | Learn various aspects of respiratory system and exchange of respiratory gases |
| CO-5 | Develop an understanding of endocrine glands, their functioning and associated disorders |

B.Sc. (BIO-TECHNOLOGY) (SEMESTER-II)
ZO-BTP121
Zoology-I Lab

Credit Hours : 1
Maximum Marks: 25
Practical: 19
Internal Assessment: 6

Note. The question paper will be set by the examiner based on the syllabus.

Course Objectives: The course aims to

1. Study the digestive, circulatory and urinogenital systems of human.
2. Study various macromolecules present in food stuffs.
3. Demonstrate various blood tests in Man.
4. Demonstrate the temporary preparation of blood smear of mammals.

Course content

1. Study the following system of Human with the help of charts / models /videos:
Digestive, Arterial, Venous and Urinogenital systems.
2. Analysis of food stuff for the presence of starch, protein and fats.
3. Determination of blood groups of human blood samples.
4. Recording of blood pressure of man.
5. Estimation of hemoglobin content.
6. Make a temporary preparation of the following:
Blood smear of mammals.
7. Visit to clinical laboratory / hospital for demonstration of ECG, ECHO, X-ray, ultrasound, CT-scan and MRI.

As per UGC guidelines and instructions, the use of live materials is to be avoided and be replaced with models, simulated dissections and slides.

Books Recommended

1. Sobti, R.C. & Nigam, S.K. (2002). Structural & function biology of chordates, Vishal Publishers, Jalandhar.
2. Sobti, R.C. & Sharma, V.L. (2005). Basics of Biotechnology: Introduction of Life Sciences. Vishal Publishers, Jalandhar.
3. Sobti, R.C. (2005). Introduction to Biotechnology, Part-2, Concepts Tools and Application, Vishal Publishers.

Course Outcomes

| Sr. No. | On completing the course, the students will be able to: |
|----------------|---|
| CO-1 | Develop skill for the observation of blood cells. |
| CO-2 | Attain knowledge on qualitative analysis of Macro molecules. |
| CO-3 | Understand the structure and function of various systems of human. |
| CO-4 | Get basic understanding about the experimental methods and designs that can be used for further study and research. |

Note for the paper setters/examiners:

The question paper will consist of five sections: A, B, C, D, and E. Section A is compulsory and will consist of 8 short-answer type questions, with each question carrying 2 marks. Candidates are required to attempt six questions from this Section. Sections B, C, D, and E will have two questions from the sections A, B, C and D of the syllabus and carry 11 marks. Candidates are required to attempt one question each from Sections B, C, D, and E of the question paper.

Course objectives

1. To enable the students to solve Statistical problems using various measure of central tendency.
2. To help the students to collect the data and present it diagrammatically.
3. To establish linear association between two variables by using Correlation.
4. The content of this course is designed to make the students understand various sampling techniques.
5. To enable the students to apply the various techniques of testing of hypothesis.

Course content

Section A

Scientific notation, Significant digits, Rounding off, Scientific notations, Sampling, Problem identification, Concept of population and samples, Random sampling, Data collection, Log, Indices, Design of experiments, differentiation and integration.

Section B

Measurement of central tendency, mean, geometric mean, harmonic mean, Median, Mode, Quartile mean, decile, percentile, Dispersion, Mean deviation, Standard deviation, Geometrical standard deviation, Standard error, Coefficient of variation, Variation, Variance, Coefficient of determinant, moments, skewness and kurtosis.

Section C

Graphical representation of data, scattered diagram, Straight line, Least square test, Correlation coefficient, Regression coefficient, Correction of experimental data and model development.

Section D

Testing of hypothesis, null and alternate hypothesis, type-I, TYPE II errors, level of significance, Normal distribution, Poisson distribution, Binomial distribution, Student „t“-test, „F“-test, chi-square test, Wilcoxon test, analysis of variance (one way anova)

Books Recommended

1. Kothari, C.R. (2004) Research Methodology Methods and Techniques, New Age International Publications, New Delhi
2. Arora, P.N. & Malhan, P.K. : Biostatistics (Himalaya Publication House)
3. Robert R. Sokal and F. James Rohlf Introduction to Biostatistics

Course Outcomes

| Sr. No. | On completing the course, the students will be able to: |
|----------------|---|
| CO-1 | Learn to solve Statistical problems using various measures of central tendency. |
| CO-2 | Learn how to collect the data and present it diagrammatically. |
| CO-3 | Learn to establish linear association between two variables by using correlation technique. |
| CO-4 | Understand various sampling techniques. |
| CO-5 | Apply various techniques of testing of hypothesis. |

Ability Enhancement Courses

**B.Sc. (BIO-TECHNOLOGY) (SEMESTER-II)
BCSE-1222 COMMUNICATION SKILLS IN ENGLISH**

| L | T | P | Credits |
|---|---|---|---------|
| 3 | 0 | 1 | 4 |

Time: 3 Hours

100

Max. Marks:

Theory: 60

Practical: 15

Internal Assessment: 25

Suggested Pattern of Question Paper:

The question paper will be divided into two sections. Section A will consist of Twelve(12) questions of One(1) mark each. Section B will consist of Six questions of Eight(8) marks each. There will be internal choice wherever possible.

Section A

1. Do as directed
Tenses and Change of voice
(12X1=12Marks)

Section B

- Listening Skills:** Barriers to listening; effective listening skills; feedback skills.
- Speaking and Conversational Skills:** Components of a meaningful and easy conversation; understanding the cue and making appropriate responses; forms of polite speech; asking and providing information on general topics.
- Drafting of a short speech on a given topic.
- Transcoding (given dialogue to prose or given prose to dialogue).
- Taking notes on a speech/lecture/telephonic conversations .
- Translation from Vernacular (Punjabi/ Hindi) to English (Paragraph) (6X8=48 Marks)

Course Objectives:

- To develop competence in oral and visual communication.
- To inculcate innovative and critical thinking among the students.
- To enable them to grasp the application of communication theories.
- To acquire knowledge of the latest technology related to communication skills.
- To provide knowledge of multifarious opportunities in the field of this programme.

Course Contents:

- Listening Skills:** Barriers to listening; effective listening skills; feedback skills, attending telephone calls; note taking.

Activities:

- Listening exercises – Listening to conversation, speech/ lecture and taking notes.
- Speaking and Conversational Skills:** Components of a meaningful and easy conversation; understanding the cue and making appropriate responses; forms of polite speech; asking and providing information on general topics, situation based Conversation in English; essentials of Spoken English

Activities:

- Conversation; dialogue and speech
- Oral description or explanation of a common object, situation or concept.
- Interviews and group discussion

Recommended Books:

1. *Oxford Guide to Effective Writing and Speaking* by John Seely.
2. *The Written Word* by Vandana R Singh, Oxford University Press
3. *Murphy's English Grammar* (by Raymond Murphy) CUP

Course Outcomes:

The completion of this course enables students to:

1. Identify common errors in language and rectify them.
2. Develop and expand Oral skills through controlled and guided activities.
3. Develop coherence, cohesion and competence in oral discourse through intelligible pronunciation.
4. Develop the ability to handle the interview process confidently and learn the subtle nuances of an effective group discourse.
5. Communicate contextually in specific and professional situations with courtesy.

PRACTICAL (Marks: 15)

Course Contents:-

1. Oral Presentation. (5 Marks)
2. Group Discussion. (5 Marks)
3. Mock Interview (5 Marks)

B. Sc. Hons. (Physics, Chemistry, Maths), B. Sc. Bio Tech./ IT/ Fashion Designing/ Food Sc., B. A. JMC, BCA, B.Sc. in Computational Statistics and Data Analytics, B.Sc. Artificial Intelligence and Data Science, Bachelor of Vocational (B.Voc.) (Software Development, Theatre and Stage Craft, Food Processing, Textile Design & Apparel Technology, Renewable Energy Technology)

Semester-II
Compulsory Course
ਲਾਜ਼ਮੀ ਪੰਜਾਬੀ

Credit & Marks Distribution, Eligibility and Pre-Requisites of the Course

| Course title & Code | Total Teaching Hours | Total Credits/ Hours per week | Credit distribution | | | Total Marks 100 | | Time Allowed in Exam |
|--|----------------------|-------------------------------|---------------------|---|---|-----------------|----|----------------------|
| | | | L | T | P | Theory | IA | |
| ਲਾਜ਼ਮੀ ਪੰਜਾਬੀ BHPB-1201 | 60 | 4 | 4 | 0 | 0 | 75 | 25 | 3 Hours |

| | |
|--|--|
| <p>ਕੋਰਸ ਦਾ ਉਦੇਸ਼ Course Objective</p> <ul style="list-style-type: none"> ਵਿਦਿਆਰਥੀਆਂ ਵਿਚ ਸਾਹਿਤਕ ਰੁਚੀਆਂ ਪੈਦਾ ਕਰਨਾ। ਆਲੋਚਨਾਤਮਕ ਰੁਚੀਆਂ ਨੂੰ ਵਿਕਸਤ ਕਰਨਾ। ਵਿਦਿਆਰਥੀ ਨੂੰ ਦਫ਼ਤਰੀ ਅਤੇ ਘਰੇਲੂ ਚਿੱਠੀ ਪੱਤਰ ਤੋਂ ਜਾਣੂ ਕਰਵਾਉਣਾ। ਭਾਸ਼ਾਈ ਗਿਆਨ ਵਿਚ ਵਾਧਾ ਕਰਨਾ। | <p>ਪਾਠ-ਕ੍ਰਮ ਨਤੀਜੇ Course Outcomes (COs)</p> <ul style="list-style-type: none"> ਉਸ ਅੰਦਰ ਸਾਹਿਤਕ ਰੁਚੀਆਂ ਪ੍ਰਫੁੱਲਿਤ ਹੋਣਗੀਆਂ। ਉਸ ਅੰਦਰ ਸਾਹਿਤ ਸਿਰਜਣਾ ਦੀ ਸੰਭਾਵਨਾ ਵਧੇਗੀ। ਵਿਦਿਆਰਥੀ ਚਿੱਠੀ-ਪੱਤਰ ਦੀ ਲਿਖਣ ਸ਼ੈਲੀ ਤੋਂ ਜਾਣੂ ਹੋਵੇਗਾ। ਉਹ ਭਾਸ਼ਾਈ ਬਣਤਰ ਤੋਂ ਜਾਣੂ ਹੋਵੇਗਾ। |
|--|--|

ਅੰਕ-ਵੰਡ ਅਤੇ ਪ੍ਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

ਸਿਲੇਬਸ ਦੇ ਚਾਰ ਭਾਗ ਹਨ ਪਰ ਪ੍ਰਸ਼ਨ-ਪੱਤਰ ਦੇ ਪੰਜ ਭਾਗ ਹੋਣਗੇ। ਪਹਿਲੇ ਭਾਗ ਵਿਚ 1.5-1.5 (ਡੇਢ-ਡੇਢ) ਅੰਕ ਦੇ ਅਤਿ-ਸੰਖੇਪ (Objective Type) 10 ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ ਜੋ ਕਿ ਸਾਰੇ ਸਿਲੇਬਸ ਵਿਚੋਂ ਹੋਣਗੇ ਅਤੇ ਸਾਰੇ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰਨੇ ਲਾਜ਼ਮੀ ਹੋਣਗੇ। ਸਿਲੇਬਸ ਦੇ ਬਾਕੀ ਚਾਰ ਭਾਗਾਂ ਵਿਚ 02-02 ਲੇਖ ਨੁਮਾ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਹਰੇਕ ਭਾਗ ਵਿਚੋਂ 01-01 ਪ੍ਰਸ਼ਨ ਕਰਨਾ ਲਾਜ਼ਮੀ ਹੋਵੇਗਾ। ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ 15 ਅੰਕ ਹੋਣਗੇ। ਪੇਪਰ ਸੈੱਟਰ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਨੋਟ: ਇੰਟਰਨਲ ਅਸੈਸਮੈਂਟ 25 ਅੰਕਾਂ ਦੀ ਹੈ। ਇਸ ਪੇਪਰ ਦੇ ਕੁੱਲ ਅੰਕ 75+25=100 ਹਨ।

ਪਾਠ-ਕ੍ਰਮ

ਭਾਗ-ਪਹਿਲਾ

ਸਾਹਿਤ ਦੇ ਰੰਗ, ਡਾ. ਮਹਿਲ ਸਿੰਘ (ਸੰਪਾ.), ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।

ਭਾਗ ਦੂਜਾ - ਵਾਰਤਕ ਅਤੇ ਰੇਖਾ-ਚਿੱਤਰ, ਡਾ. ਪਰਮਿੰਦਰ ਸਿੰਘ, ਡਾ. ਭੁਪਿੰਦਰ ਸਿੰਘ ਅਤੇ ਡਾ.ਕੁਲਦੀਪ ਸਿੰਘ ਵਿੱਲੋਂ (ਸਹਿ ਸੰਪਾ.)

(ਵਾਰਤਕ ਭਾਗ ਵਿਚੋਂ ਸਾਰ/ਵਿਸ਼ਾ-ਵਸਤੂ। ਰੇਖਾ-ਚਿੱਤਰ ਭਾਗ ਵਿਚੋਂ ਸਾਰ/ਨਾਇਕ ਬਿੰਬ)

ਭਾਗ-ਦੂਜਾ

ਪੰਜਾਬ ਦੇ ਮਹਾਨ ਕਲਾਕਾਰ (ਸੰਪਾ. ਬਲਵੰਤ ਗਾਰਗੀ)

ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।

(ਸਤੀਸ਼ ਗੁਜਰਾਲ ਤੋਂ ਸੁਰਿੰਦਰ ਕੌਰ ਤਕ)

(ਵਿਸ਼ਾ-ਵਸਤੂ/ਸਾਰ/ਨਾਇਕ ਬਿੰਬ)

ਭਾਗ-ਤੀਜਾ

(ੳ) ਦਫ਼ਤਰੀ ਚਿੱਠੀ ਪੱਤਰ

(ਅ) ਮੁਹਾਵਰੇ ਅਤੇ ਅਖਾਣ

ਭਾਗ-ਚੌਥਾ

- (ੳ) ਸ਼ਬਦ-ਬਣਤਰ ਅਤੇ ਸ਼ਬਦ-ਰਚਨਾ - ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਮੁਢਲੇ ਸੰਕਲਪ
(ਅ) ਸ਼ਬਦ-ਸ਼੍ਰੇਣੀਆਂ

B. Sc. Hons. (Physics, Chemistry, Maths), B. Sc. Bio Tech./ IT/ Fashion Designing/ Food Sc., B. A. JMC, BCA, B.Sc. in Computational Statistics and Data Analytics, B.Sc. Artificial Intelligence and Data Science, Bachelor of Vocational (B.Voc.) (Software Development, Theatre and Stage Craft, Food Processing, Textile Design & Apparel Technology, Renewable Energy Technology)

Semester-II
Compulsory Course
ਮੁਢਲੀ ਪੰਜਾਬੀ

(In Lieu of Compulsory Punjabi)

Credit & Marks Distribution, Eligibility and Pre-Requisites of the Course

| Course title & Code | Total Teaching Hours | Total Credits/ Hours per week | Credit distribution | | | Total Marks 100 | | Time Allowed in Exam |
|---|----------------------|-------------------------------|---------------------|---|---|-----------------|----|----------------------|
| | | | L | T | P | Theory | IA | |
| ਮੁਢਲੀ ਪੰਜਾਬੀ BPBI-1202 | 60 | 4 | 4 | 0 | 0 | 75 | 25 | 3 Hours |

ਕੋਰਸ ਦਾ ਉਦੇਸ਼ Course Objective

- ਵਿਦਿਆਰਥੀ ਅੰਦਰ ਸ਼ਬਦ ਬਣਤਰ ਦੀ ਸਮਝ ਵਿਕਸਤ ਕਰਨਾ।
- ਵਿਦਿਆਰਥੀ ਨੂੰ ਸ਼ਬਦ ਪ੍ਰਕਾਰ ਬਾਰੇ ਜਾਣਕਾਰੀ ਪ੍ਰਦਾਨ ਕਰਨਾ।
- ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੇ ਵਿਆਕਰਨਕ ਪ੍ਰਬੰਧ ਸੰਬੰਧੀ ਗਿਆਨ ਕਰਾਉਣਾ।
- ਸਿਖਲਾਈ ਤੇ ਅਭਿਆਸ ਦੁਆਰਾ ਪੰਜਾਬੀ ਸ਼ਬਦ ਭੰਡਾਰ ਵਧਾਉਣਾ।

ਪਾਠ-ਕ੍ਰਮ ਨਤੀਜੇ Course Outcomes (COs)

- ਉਹ ਪੰਜਾਬੀ ਸ਼ਬਦ-ਬਣਤਰ ਦੀ ਜਾਣਕਾਰੀ ਹਾਸਲ ਕਰਕੇ ਭਾਸ਼ਾਈ ਗਿਆਨ ਨੂੰ ਵਿਕਸਿਤ ਕਰਨਗੇ।
- ਪੰਜਾਬੀ ਸ਼ਬਦ-ਰਚਨਾ ਸੰਬੰਧੀ ਮੁਹਾਰਤ ਹਾਸਲ ਕਰਨਗੇ।
- ਵਿਦਿਆਰਥੀ ਸ਼ਬਦਾਂ ਦੀਆਂ ਭਿੰਨ-ਭਿੰਨ ਕਿਸਮਾਂ ਤੋਂ ਜਾਣੂ ਹੋਵੇਗਾ।
- ਵਿਦਿਆਰਥੀਆਂ 'ਚ ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ ਭੰਡਾਰ 'ਚ ਵਾਧਾ ਹੋਵੇਗਾ।

ਅੰਕ-ਵੰਡ ਅਤੇ ਪ੍ਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

ਸਿਲੇਬਸ ਦੇ ਚਾਰ ਭਾਗ ਹਨ ਪਰ ਪ੍ਰਸ਼ਨ-ਪੱਤਰ ਦੇ ਪੰਜ ਭਾਗ ਹੋਣਗੇ। ਪਹਿਲੇ ਭਾਗ ਵਿਚ 01-01 ਅੰਕ ਦੇ ਅਤਿ-ਸੰਖੇਪ ਉੱਤਰ ਵਾਲੇ (Objective Type) 11 ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ ਜੋ ਕਿ ਸਾਰੇ ਸਿਲੇਬਸ ਵਿਚੋਂ ਹੋਣਗੇ ਅਤੇ ਸਾਰੇ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰਨੇ ਲਾਜ਼ਮੀ ਹੋਣਗੇ। ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਦੂਸਰੇ ਭਾਗ ਵਿਚ, ਸਿਲੇਬਸ ਦੇ ਪਹਿਲੇ ਭਾਗ ਵਿਚੋਂ ਤਿੰਨ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਜਿੰਨ੍ਹਾਂ ਵਿਚੋਂ ਕੋਈ ਦੋ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰਨੇ ਹੋਣਗੇ। ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ 8-8 ਅੰਕ ਹੋਣਗੇ। ਇਸੇ ਤਰ੍ਹਾਂ ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਤੀਸਰੇ ਭਾਗ ਵਿਚ ਤਿੰਨ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ ਜਿੰਨ੍ਹਾਂ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰਨੇ ਹੋਣਗੇ। ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ 8-8 ਅੰਕ ਹੋਣਗੇ। ਭਾਗ ਚੌਥੇ ਵਿਚ ਪੰਜ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਜਿੰਨ੍ਹਾਂ ਵਿਚੋਂ ਚਾਰ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰਨੇ ਹੋਣਗੇ। ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ 4-4 ਅੰਕ ਹੋਣਗੇ। ਭਾਗ ਪੰਜਵੇਂ ਵਿਚ ਤਿੰਨ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਜਿੰਨ੍ਹਾਂ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਲਾਜ਼ਮੀ ਹੋਣਗੇ। ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ 8-8 ਅੰਕ ਹੋਣਗੇ।

ਨੋਟ: ਇੰਟਰਨਲ ਅਸੈਸਮੈਂਟ 25 ਅੰਕਾਂ ਦੀ ਹੈ। ਇਸ ਪੇਪਰ ਦੇ ਕੁੱਲ ਅੰਕ 75+25=100 ਹਨ।

ਪਾਠ-ਕ੍ਰਮ
ਭਾਗ-ਪਹਿਲਾ

ਪੰਜਾਬੀ ਸ਼ਬਦ-ਬਣਤਰ:

ਪਾਤੂ, ਵਧੇਤਰ (ਅਗੇਤਰ, ਮਧੇਤਰ, ਪਿਛੇਤਰ), ਪੰਜਾਬੀ ਕੋਸ਼ਗਤ ਸ਼ਬਦ ਅਤੇ ਵਿਆਕਰਨਕ ਸ਼ਬਦ
ਭਾਗ-ਦੂਜਾ

ਪੰਜਾਬੀ ਸ਼ਬਦ-ਪ੍ਰਕਾਰ:

(ੳ) ਸੰਯੁਕਤ ਸ਼ਬਦ, ਸਮਾਸੀ ਸ਼ਬਦ, ਦੋਜਾਤੀ ਸ਼ਬਦ, ਦੋਹਰੇ/ਦੁਹਰਕਤੀ ਸ਼ਬਦ ਅਤੇ ਮਿਸ਼ਰਤ ਸ਼ਬਦ
(ਅ) ਸਿਖਲਾਈ ਤੇ ਅਭਿਆਸ

ਭਾਗ-ਤੀਜਾ

ਪੰਜਾਬੀ ਸ਼ਬਦ-ਰਚਨਾ:

ਇਕ-ਵਚਨ/ਬਹੁ-ਵਚਨ, ਲਿੰਗ-ਪੁਲਿੰਗ, ਬਹੁਅਰਥਕ ਸ਼ਬਦ, ਸਮਾਨਅਰਥਕ ਸ਼ਬਦ, ਬਹੁਤੇ ਸ਼ਬਦਾਂ ਲਈ ਇਕ ਸ਼ਬਦ, ਸ਼ਬਦ ਜੁੱਟ, ਵਿਰੋਧਅਰਥਕ ਸ਼ਬਦ, ਸਮਨਾਮੀ ਸ਼ਬਦ

ਭਾਗ-ਚੌਥਾ

ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ

ਖਾਣ-ਪੀਣ, ਸਾਕਾਦਾਰੀ, ਰੁੱਤਾਂ, ਮਹੀਨਿਆਂ, ਗਿਣਤੀ, ਮੌਸਮ, ਬਜ਼ਾਰ, ਵਪਾਰ, ਧੰਦਿਆਂ ਨਾਲ ਸੰਬੰਧਿਤ

SEMESTER-II
PUNJAB HISTORY & CULTURE (C 321 BC TO 1000 A.D.)
(Special Paper in lieu of Punjabi compulsory)
(For those students who are not domicile of Punjab)
Course Code: BPHC-1204

Credit: 04
L- T- P
04-0-0

Time: 3 Hours

Total Marks: 100
Theory: 75
Internal Assessment: 25

Instructions for the Paper Setters:

Question paper should consist of two sections—Section A and Section B. The paper setter must ensure that questions in Section–A do not cover more than one point, and questions in Section–B should cover at least 50 per cent of the theme.

Section–A: The examiner will set 15 objective type questions out of which the candidate shall attempt any 10 questions, each carrying 1½ marks. The total weightage of this section will be 15 marks. Answer to each question should be in approximately one to two sentences.

Section–B: The examiner will set 8 questions, two from each Unit. The candidate will attempt 4 questions selecting one from each Unit in about 1000 words. Each question will carry 15 marks. The total weightage of this section will be 60 marks.

Note: The examiner is to set the question paper in two languages: English & Hindi.

Course Objectives: The main objective of this course is to educate the students who are not domicile of the Punjab about the history and culture of the Ancient Punjab. It is to provide them knowledge about the social, economic, religious, cultural and political life of the people of the Punjab during the rule of various dynasties such as The Mauryans, The Khushans, The Guptas, The Vardhanas and other ancient ruling dynasties of the period under study.

Unit-I

1. The Punjab under Chandragupta Maurya and Ashoka.
2. The Kushans and their Contribution to the Punjab.

Unit-II

3. The Punjab under the Gupta Emperors.
4. The Punjab under the Vardhana Emperors

Unit-III

5. Political Developments 7th Century to 1000 A.D.
6. Socio-cultural History of Punjab from 7th Century to 1000 A.D.

Unit-IV

7. Development of languages and Literature.
8. Development of art & Architecture.

Suggested Readings:-

- L. Joshi (ed.), *History and Culture of the Punjab*, Part-I, Patiala, 1989 (3rd edition).
- L.M. Joshi and Fauja Singh (ed), *History of Punjab*, Vol.I, Patiala 1977.
- Budha Parkash, *Glimpses of Ancient Punjab*, Patiala, 1983.
- B.N. Sharma, *Life in Northern India*, Delhi. 1966.

Course Outcomes:

On completing the course, the students will be able to:

- CO-1** Understand the history and culture of the Punjab in Ancient Period.
- CO-2** Analyse social, economic, religious, cultural and political life of Ancient Indian dynasties.
- CO-3** Study about the political developments from 7th century to 1000 AD.
- CO-4** Understand socio-cultural history of the Punjab from 7th century to 1000 AD.
- CO-5** Analyse language, literature, art and architecture of Ancient Punjab.

Value Added Courses

B.Sc. (BIO-TECHNOLOGY) SEMESTER-II

Course Code: ZDA121

**Course Title-DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION
DRUG ABUSE: MANAGEMENT AND PREVENTION**

Instructions for the Paper Setters:

- 1) There will be a total of 9 questions of which 5 are to be attempted.
- 2) Question 1 is compulsory and having 10 short answer type questions (1 mark each).
- 3) The remaining 8 questions (10 marks each) shall include 2 questions from each unit. Candidates shall be required to attempt 4 questions, one from each unit. Preferably, the question should not be split into more than two sub-parts.

Course Objectives:

The course aim is to

| | |
|-------|---|
| CO-1. | Describe the role of family in the prevention of drug abuse. |
| CO-2. | Describe the role of school and teachers in the prevention of drug abuse. |
| CO-3. | Emphasize the role of media and educational and awareness program. |
| CO-4. | Provide knowhow about various legislation and Acts against drug abuse. |

UNIT-I

• **Prevention of Drug abuse**

Role of family: Parent child relationship, Family support, Supervision, Shaping values, Active Scrutiny.

UNIT-II

- School: Counseling, Teacher as role-model.
- Parent-teacher-Health Professional Coordination, Random testing on students.

UNIT-III

• **Controlling Drug Abuse**

Media: Restraint on advertisements of drugs, advertisements on bad effects of drugs, Publicity and media, Campaigns against drug abuse, Educational and awareness program

UNIT-IV

- Legislation: NDPS act, Statutory warnings, Policing of Borders, Checking Supply/Smuggling of Drugs, Strict enforcement of laws, Time bound trials.

References:

1. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
2. Gandotra, R. and Randhawa, J.K. 2018. voZrI d[otos'A (BPky'oh) gqzXB ns o'eEkw. Kasturi Lal & Sons, Educational Publishers, Amritsar- Jalandhar.
3. Inciardi, J.A. 1981. The Drug Crime Connection. Beverly Hills: Sage Publications.
4. Modi, Ishwar and Modi, Shalini (1997) Drugs: Addiction and Prevention, Jaipur: Rawat Publication.
5. Randhawa, J.K. and Randhawa, Samreet 2018. Drug Abuse-Management and Prevention.

Kasturi Lal & Sons, Educational Publishers, Amritsar- Jalandhar.

6. Sain, Bhim 1991, Drug Addiction Alcoholism, Smoking obscenity New Delhi: Mittal Publications.
7. Sandhu, Ranvinder Singh, 2009, Drug Addiction in Punjab: A Sociological Study. Amritsar: Guru Nanak Dev University.
8. Singh, C. P. 2000. Alcohol and Dependence among Industrial Workers: Delhi: Shipra.
9. World Drug Report 2011, United Nations office of Drug and Crime.
10. World Drug Report 2010, United Nations office of Drug and Crime

Course Outcomes:

The students will be able to:

| | |
|-------|---|
| CO-1. | Understand the importance of family and its role in drug abuse prevention. |
| CO-2. | Understand the role of support system especially in schools and inter-relationships between students, parents and teachers. |
| CO-3. | Understand impact of media on substance abuse prevention. |
| CO-4. | Understand the role of awareness drives, campaigns etc. in drug abuse management. |
| CO-5 | Learn about the Legislations and Acts governing drug trafficking and Abuse in India. |