<table>
<thead>
<tr>
<th>No</th>
<th>Subject Code</th>
<th>Subject Type</th>
<th>Subject Title</th>
<th>Assignment Marks</th>
<th>Theory Marks</th>
<th>Practica l Marks</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Max</td>
<td>Min</td>
<td>Max</td>
<td>Min</td>
</tr>
<tr>
<td>1</td>
<td>FC-101/1</td>
<td>Core</td>
<td>English Language</td>
<td>10</td>
<td>4</td>
<td>40</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>FC-101/2</td>
<td>Core</td>
<td>Development of Entrepreneurship</td>
<td>10</td>
<td>4</td>
<td>40</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>BSZ 111</td>
<td>Core</td>
<td>Invertebrates &amp; Chordate</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
</tr>
<tr>
<td>4</td>
<td>BSB 111</td>
<td>Core</td>
<td>Diversity of Microbes &amp; Cryptogams</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
</tr>
<tr>
<td>5</td>
<td>BCH 111</td>
<td>Core</td>
<td>Based on Inorganic, Organic And Physical Chemistry</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
</tr>
<tr>
<td>6</td>
<td>BPY 111</td>
<td>Core</td>
<td>MECHANICS</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
</tr>
<tr>
<td>7</td>
<td>BBT 111</td>
<td>Elective</td>
<td>CELL AND MOLECULAR BIOLOGY &amp; MOLECULAR GENETICS</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
</tr>
<tr>
<td>8</td>
<td>BCS-111</td>
<td>Elective</td>
<td>Computer Fundamentals &amp; Application</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
</tr>
<tr>
<td>9</td>
<td>BEC 111</td>
<td>Elective</td>
<td>FUNDAMENTALSOF ELECTRONICS</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
</tr>
<tr>
<td>10</td>
<td>BMM 111</td>
<td>Core</td>
<td>Algebra and Trigonometry</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
</tr>
<tr>
<td>11</td>
<td>BMB 111</td>
<td>Elective</td>
<td>Fundamental of Microbiology</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
</tr>
<tr>
<td>12</td>
<td>BFS 111</td>
<td>Elective</td>
<td>INTRODUCTION TO FOOD TECHNOLOGY</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
</tr>
</tbody>
</table>
Every candidate appearing in B.Sc. Semester 1 examination shall be examined in
(a) Foundation Course F.C (Compulsory) for all students.
(b) Any one of the following combinations:

1. Physics, Maths, Computer Science.
2. Physics, Maths, Electronics.
3. Physics, Chemistry, Maths.
5. Chemistry, Botany or Zoology, Biotechnology.
6. Chemistry, Botany or Zoology, Microbiology.
7. Chemistry, Botany or Zoology, Food Science.

Provided that the courses of studies for Physics offering combinations from (i) to (ii) and for Chemistry offering combinations from (iii) to (vii) shall be those prescribed for biology group.

<table>
<thead>
<tr>
<th>Electives Subjects</th>
<th>Core Subjects</th>
<th>Combinations Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBT 111 Biotechnology</td>
<td>BSZ 111/BSB 111 (Zoology/Botany), BCH 111 Chemistry</td>
<td>BSZ 111/BSB 111, BCH 111, BBT 111.</td>
</tr>
<tr>
<td>BMB 111 Microbiology</td>
<td>BSZ 111/BSB 111 (Zoology/Botany), BCH 111 Chemistry</td>
<td>BSB 111/BSZ 111, BCH 111, BMB 111.</td>
</tr>
<tr>
<td>BEC 111 Electronics</td>
<td>BMM 111 Mathematics, BPY 111 Physics</td>
<td>BMM 111, BPY 111, BEC 111.</td>
</tr>
<tr>
<td>BFS 111 Food Science</td>
<td>BSZ 111/BSB 111 (Zoology/Botany), BCH 111 Chemistry</td>
<td>BSZ 111/BSB 111, BCH 111, BFS 111.</td>
</tr>
<tr>
<td>BCS 111 Computer Science</td>
<td>BMM 111 Mathematics, BPY 111 Physics</td>
<td>BMM 111, BPY 111, BCS 111.</td>
</tr>
<tr>
<td>Core Subjects</td>
<td>Combinations</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>BMM 111 Mathematics</td>
<td>BCH 111 Chemistry/BCS 111 Computer Science/ BEC 111 Electronics, BPY 111 Physics.</td>
<td></td>
</tr>
<tr>
<td>BPY 111 Physics</td>
<td>BCH 111 Chemistry/BCS 111 Computer Science/ BEC 111 Electronics, BMM 111 Mathematics.</td>
<td></td>
</tr>
<tr>
<td>BCH 111 Chemistry</td>
<td>BMM 111 Mathematics, BPY 111 Physics or, BBT 111 Biotechnology, BSZ 111/BSB 111 (Zoology/Botany) or, BMB 111 Microbiology, BSZ 111/BSB 111 (Zoology/Botany) or, BSB 111 Botany, BZB 111 Zoology or, BFS 111 Food Science, BSZ 111/BSB 111 (Zoology/Botany),</td>
<td></td>
</tr>
<tr>
<td>BSZ 111 Zoology</td>
<td>BCH 111 Chemistry, BBT 111 Biotechnology or, BCH 111 Chemistry, BMB 111 Microbiology or, BCH 111 Chemistry, BSB 111 Botany or, BCH 111 Chemistry, BFS 111 Food Science.</td>
<td></td>
</tr>
<tr>
<td>BSB 111 Botany</td>
<td>BCH 111 Chemistry, BBT 111 Biotechnology or, BCH 111 Chemistry, BMB 111 Microbiology or, BCH 111 Chemistry, BSB 111 Zoology or, BCH 111 Chemistry, BFS 111 Food Science.</td>
<td></td>
</tr>
</tbody>
</table>
RKDF UNIVERSITY, BHOPAL
B.Sc. Courses

Semester – I

<table>
<thead>
<tr>
<th>Course</th>
<th>Subject</th>
<th>Subject Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (FOUNDATION COURSE)</td>
<td>English Language</td>
<td>FC-101/1</td>
</tr>
</tbody>
</table>

COURSE OUTCOME

1: In this course students will read and understand about the rich classical texts from Indian literatures written in Hindi as well as Indian literatures written in Urdu, in translated versions

2: Upon the completion of course the students will be able trace the nature of influence that the classical texts have on modern English literatures

3: Know about various innovative ways of using English language in verbal and non-verbal communications.

4: Write clearly, effectively, and creatively, and adjust writing style appropriately to the content, the context, and nature of the subject.

5: Think about the relation between language and literature

COURSE CONTENTS:

Unit-I

1. Amalkanti : NirendranathChakrabarti
2. Sita : ToruDutt
3. Tryst with Destiny : JawaharlalNehru
4. Delhi in 1857 : MirzaGhalib
5. Preface to the Mahabharata : C.Rajagopalachari
6. Where the Mind is Without Fear : RabindranathTagore
7. A Song of Kabir : Translated byTagore
8. Satyagraha : M.K.Gandhi
10. The Portrait of a Lady : KhushwantSingh
11. Discovering Babasaheb : AshokMahadevan
Unit-II

Comprehension

Unit-III

Composition and Paragraph Writing (Based on expansion of an idea).

Unit-IV

Basic Language Skills: Vocabulary – Synonyms, Antonyms, Word Formation, Prefixes and Suffixes, Words likely to be confused and Misused, Words similar in Meaning or Form, Distinction between Similar Expressions, SpeechSkills

Unit-V


Prescribed Books: English Language and Indian Culture, Published by M.P. Hindi Grant Academy.

Note :- Eight questions to be set from unit-1 and four to be attempted.
RKDF UNIVERSITY, BHOPAL
B.Sc. Courses

Semester – I

<table>
<thead>
<tr>
<th>Course</th>
<th>Subject</th>
<th>Subject Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (FOUNDATION COURSE)</td>
<td>Development of Entrepreneurship</td>
<td>FC-101/2</td>
</tr>
</tbody>
</table>

COURSE OUTCOME

1: In this course students will learn and understand the meaning of entrepreneurship, types and functions of an entrepreneur, sequenced planning and guiding capacity explanation.

2: Upon the completion of the course the students will be able to discern distinct entrepreneurial traits

3: They will understand the systematic process to select and screen a business idea

4: Students will be able to design strategies for successful implementation of ideas

5: They will be able to prepare and analyse Project Report and interpret the same.

COURSE CONTENTS:

Unit - I

Entrepreneurship- Definition, Characteristics and importance, Types and functions of an entrepreneur, merits of a good entrepreneur motivational factors of entrepreneurship.

Unit - II

(a) Motivation to achieve targets and establishment of ideas. Setting targets and facing challenges. Resolving problems and creativity. Sequenced planning and guiding capacity, Development of selfconfidence.

(b) Communication skills, Capacity to influence, leadership.

Unit - III

(a) Project Report - Evaluation of selected process. Detailed project report – Preparation of main part of project report pointing out necessary andviability.

(b) Selecting the form of Organization – Meaning and characteristics of sole Proprietorship, Partnership and cooperative committees, elements affecting selection of a form of an organisation.
(c) Economic management – Role of banks and financial institutions banking, financial plans, working capital-evaluation and management, keeping of accounts.

आ. परियोजना प्रतिवेदन
विस्तृत परियोजना प्रतिवेदन– आवश्यकता एवं प्रारंभिकता परियोजना प्रपत्र के प्रमुख भाग परियोजना प्रतिवेदन
लिखित करना।

ि. संगठन के प्रकार का चयन–एकाधी व्यवसाय, साझेदारी एवं सहकारी समिति का अर्थ एवं विशेषताएं संगठन के
प्रयोगकारिता करनेलालचक।

स. अधिक प्राथमिक हस्ताक्षर संस्थान/विद्यालय, महिला संस्थान/कारोबारी, कामने क्रमत राजस्थान, लगत एवं बृहत निष्कर्षकलनकृत्यकार, अधिक
लाभ–जांच करना।

Unit - IV

(a) Production management. Methods of purchase. Management of movable assets/goods. Quality
management. Employee management. Packaging.

(b) Marketing management. Sales and the art of selling. Understanding the market and market policy.
Consumer management. Timemanagement.

आ. उद्योगकारों द्वारा बैंकों/संस्थानों/लाभ समिति / आर्थ क अस्तित्व का प्रकाश, क्षेत्र वित्त परिषद, कब्जी, विकास समिति
ि. विपणन विभाग/विक्रेता, विक्रयविश्वासकृति, प्रारंभिक, विकास समिति, विकास प्रकाश
कौशल प्रशिक्षण, स्वयं प्रकाश

Unit - V

(a) Role of regulatory institutions – district industry centre, pollution control board, food and drug
administration, special study of electricity development and municipalcorporation.

(b) Role of development organizations, khadi & village Commission/ Board, MP Finance
Corporation, scheduled banks, MP Women’s Economics DevelopmentCorporation.

(c) Self-employment-oriented schemes, Prime Minister’s Employment schemes, Golden Jubilee
Urban environment scheme, Rani Durgavati Self-Employment scheme, Pt. Deendayal Self-
employment scheme.

(d) Various grant schemes – Cost-of-Capital grant, interest grant, exemption from entry tax, project
report, reimbursement grant, etc.

(e) Special incentives for women entrepreneurs, prospects & possibilities.

(f) Schemes of M.P. Tribal Finance Development Corporation, schemes of M.P. Antyavasai
Corporation, schemes of M.P. Backward Class and Minorities Finance DevelopmentCorporation.
1. नियामक संस्थाओं की भूमिका-जिला उद्योग केंद्र, प्रदूषण निवारण गंडल, खाद्य एवं औषधि प्रशासन, विद्युत विभाग तथा नगर निगम का विशेष अध्ययन।
2. विकासात्मक संस्थाओं की भूमिका, खाद्य एवं ग्रामीण आयोग/बोर्ड, मध्य प्रदेश वित्त निगम, अनुसूचित बैंक, मध्य प्रदेश का महिला आर्थिक विकास निगम।
3. लगोंगार हसक योजनाएं-फलानीरोजगार, राजनीतिक रोजगार, योजनावांतरिक्ष लगोंगार योजना, विनियमित लगोंगार लगोंगार योजना।
4. विभिन्न अनुदान योजनाएं- लागत पूंजी अनुदान, व्याज अनुदान, प्रवेश कर से छूट, परियोजना प्रतिवेदन, प्रतिपूर्ति अनुवृत्ति।
5. महिला उद्यमियों हेतु विशेष प्रोजेक्टों संभावनाएँ एवं समयान्तर।
6. मध्य प्रदेश आर्थिक सहायता विकास निगम योजनाएं, मध्य प्रदेश विनियमित निगम, मध्य प्रदेश कार्यक्रम एवं उद्यम विकास निगम योजनाएं।
Syllabus
Semester – I

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (Biotechnology)</td>
<td>CELL AND MOLECULAR BIOLOGY &amp; MOLECULAR GENETICS</td>
<td>BBT-111</td>
</tr>
</tbody>
</table>

Course outcome:

1. Exhibit a knowledge base in genetics, cell and molecular biology, and anatomy and physiology
2. An introduction to the physical and chemical organization of living organisms; cell structure, function, and metabolism;
3. Classical and molecular genetics; gene regulation; genetic engineering;
4. Molecular aspects of development; and reproduction.
5. Identify DNA structure and replication, transcription, translation and gene expression.

UNIT-I
Cell as a basic unit - classification of cell types - cell theory - organization of plant and animals cells - comparison of microbial, plant and animal cells.
**Ultra structure of cells** - sub-cellular organization - structure and function of cell membranes, cytosol / Endoplasmic recticulum, nucleus, cytoskeleton, ribosomes, mitochondria and chloroplast, vacuoles, peroxisomes, lysosome, cell wall.

UNIT-II
Cell division (Eukaryotic and Prokaryotic) - mitosis, meiosis and cell cycle.
Cell - Chemical nature and macromolecular protein structure and function; membrane architecture, membrane associated process, ATP synthesis and photosynthesis, Sub-cellular organelles - mitochondria, chloroplast.

UNIT-III

UNIT-IV
Gene as a unit of mutation and recombination - DNA as a genetic material- different types; RNA as a genetic material - different types-genetic code; Mutation - molecular nature - physical and chemical mutagens and its applications. Plant Tissue Culture, Principle of Plant Tissue culture, Applications of Plant Tissue culture, Advantages of Plant Tissue Culture, what makes tissue culture so great.

UNIT-V
Reference

PRACTICLE-I
Cell and Molecular biology & Molecular Genetics

2. Fractionation of cellular components.
4. Mitosis and Meiosis
5. Microscopy and calibrations
6. Single Cell Colony Isolation - Checking for Genetic Markers
7. Induced Mutagenesis (UV and NTG)
8. Isolation of antibiotic resistant and auxotrophic mutants.
9. Cell counting methods:
10. Haemocytometer : WBS, RBC
11. Differential counting using Leishmans
12. Calibration using ocular micrometer
13. Finding out average cells size
14. Isolation of DNA from suitable materials (E.coli. Plant materials)
15. Microscopes and its parts
17. Mitosis in Onion root tips squash
18. Meiosis in grasshopper testis squash
19. Chironomous - Salivary gland Chromosome squash preparation
20. Staining of macro molecules- Carbohydrates and Lipids.
21. Observation of slides (Cardiac muscle, Sperm cell, Muscle cell)
RKDF UNIVERSITY, BHOPAL

B.Sc. Courses

Syllabus
Sem.- I

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (CHEMISTRY)</td>
<td>BASED ON INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY</td>
<td>BCH-111</td>
</tr>
</tbody>
</table>

Course outcome:

1. To learn about the covalent bond and its applications.
2. Learn about the various critical phenomena and its application.
4. To learn about the Concept of isomerism and its brief idea.
5. To study about the Mechanism of Organic Reactions and its details.

Course Contents:

UNIT-I
Covalent Bond
Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions (BeF2, BF3, CH4, PF5, SF6,IF7 SO4, ClO4) Valence shell electron pair repulsion (VSEPR) theory to NH3, H3O+, SF4, CIF3, ICl2- and H2O. MO theory of hetero-nuclear (CO and NO) diatomic molecules, bond strength and bond energy.

UNIT-II
Gaseous States
Maxwell’s distribution of velocities and energies (derivation excluded) Calculation of root mean square velocity, average velocity and most probable velocity. Collision diameter, collision number, collision frequency and mean free path. Deviation of Real gases from ideal behavior. Derivation of Vander Waal’s Equation of State.

UNIT-III
Critical Phenomenon:

UNIT-IV
Stereochemistry of Organic Compounds-I
Concept of isomerism. Types of isomerism. Elements of symmetry, molecular chirality, enantiomers, stereogenic centre, chiral and achiral molecules with two stereogenic centres, diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization.

Stereochemistry of Organic Compounds-II
UNIT- V

Mechanism of Organic Reactions


Books:
2. Applied Mathematics for Physical Chemisty, J.R. Barante, Prenice Hall.
   T. Engel and P. Reid, Physical Chemistry, Benjamin-Cummings.
5. P. S. Kalsi., Organic Reactions and their Mechanisms, New Age International

Paper (Practical’s)

1. **Volumetric Analysis**
   - Redox titrations: Determination of Fe^{2+}, C_{2}O_{4}^{2-} (using KMnO_{4}, K_{2}Cr_{2}O_{7})

2. **Iodometric titrations**: Determination of Cu^{2+} (using standard hyposolution).

3. **Complexometric titrations**: Determination of Mg^{2+}, Zn^{2+} by EDTA.

Section-B (Physical)
1. To determine the specific reaction rate of the hydrolysis of methyl acetate/ethyl acetate catalyzed by hydrogen ions at room temperature.
2. To prepare arsenious sulphide sol and compare the precipitating power of mono-, bi- and trivalent anions.

Section – C (Organic)
1. Preparation and purification through crystallization or distillation and ascertaining their purity through melting point boiling point
2. (i) Iodoform from ethanol (or acetone)
   (ii) m-Dinitrobenzene from nitrobenzene (use 1:2 conc. HNO_{3} - H_{2}SO_{4} mixture if fuming HNO_{3} is not available)
RKDF UNIVERSITY, BHOPAL
B.Sc. Courses

Syllabus
Semester – I

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc (Physics)</td>
<td>MECHANICS</td>
<td>BPY 111</td>
</tr>
</tbody>
</table>

Course outcome:
1. Relative motion. Inertial and non inertial reference frames.
2. Parameters defining the motion of mechanical systems and their degrees of freedom.
3. Study of the interaction of forces between solids in mechanical systems.
4. Centre of mass and inertia tensor of mechanical systems.
5. Application of the vector theorems of mechanics and interpretation of their results.
7. Introduction to analytical mechanics as a systematic tool for problem solving. 8 Use of mechanical simulation software.

UNIT I


UNIT II

SHM: Composition of two SHM’s of same period along a straight line and at the right angles to each other Lissajous figures. Dynamics of Rigid Bodies: Compound pendulum theory condition – for minimum period interchangeability of center of suspension and center of oscillation – g using compound pendulum - Bifilar pendulum – parallel and non – parallel threads.

UNIT III

Center of gravity: Center of gravity of a solid cone, Solid hemisphere, hollow hemisphere and a tetrahedron. Friction: Laws of friction - angle of friction – resultant reaction and cone of fiction – equilibrium of a body on an inclined plane under the action of a force.

UNIT IV

UNIT V


Books for Study:
4. Classical Mechanics by H. Goldstein Addition Wesley Publications
5. Mechanics by D.S. Mathur, S. Chand and Co.,

SEMESTER-I

PRACTICALS

2. Young’s Modulus (q) – Non uniform bending – scale and telescope method. Determination of unknown mass of an object.
4. Surface tension and interfacial surface tension – Drop Weight method.
5. Compound pendulum – Determination of g and k.
8. Spectrometer – (i-d curve).
11. P.O. Box – Temperature coefficient of resistance.
13. Joule’s calorimeter – Specific heat capacity of a liquid – Barton’s correction.

Reference books:
1. Practical Physics – Ouseph, Srinivasan & Vijayendran.
2. Practical Physics – P. R. Sasi Kumar, PHI.
4. Practical Physics – St. Joseph College, Trichy
B.Sc. Courses

Syllabus
Semester – I

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (BOTANY)</td>
<td>Diversity of Microbes &amp; Cryptogams</td>
<td>BSB 111</td>
</tr>
</tbody>
</table>

Course Outcome:
1. Understand the diversity among Bacteria, Viruses and Algae. Know the systematic, morphology and structure, of Bacteria, Viruses and Algae.
2. Understand the life cycle pattern of Bacteria, Viruses and Algae.
3. Understand the useful and harmful activities of Bacteria, Viruses and Algae
4. Understand the morphological diversity of Bryophytes and Pteridophytes.
5. Understand the economic importance of the Bryophytes and Pteridophytes.
6. Know the evolution of Bryophytes and Pteridophytes

Course Contents:

Unit-1

Viruses- Mycoplasma and Bacteria : characteristics of viruses and mycoplasma, general account of TMV and T4 bacteriophage. Bacterial structure, nutrition, reproduction and economic importance; general account of Cynobacteria.

Unit-2

Algae - General characters, classification and economic importance; important features and life history of Chlorophyceae- Volvox, Oedogonium, Charophyceae-Chara Xanthophyceae-Vaucheria, Phaeophyceae- Ectocarpus, Sargassum, Rhodophyceae - Polysiphonia.

Unit-3


Unit-4

Bryophyta - Classification, study of morphology, anatomy, reproduction of Hepaticopsida, Riccia, Marchantia, Anthrocerotopsida Anthoceros, Bryopsida- Polytrichum

Unit-5

Suggested Books :


Practical Work: Semester-I

<table>
<thead>
<tr>
<th>Scheme of practical examination</th>
<th>Marks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algae / Fungi</td>
<td>05</td>
</tr>
<tr>
<td>Brophyta</td>
<td>10</td>
</tr>
<tr>
<td>Pteridophyta</td>
<td>10</td>
</tr>
<tr>
<td>Plant disease</td>
<td>05</td>
</tr>
<tr>
<td>Spoting</td>
<td>10</td>
</tr>
<tr>
<td>Sessional</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
</tr>
</tbody>
</table>
RKDF UNIVERSITY, BHOPAL

B.Sc. Courses

Syllabus
Semester – I

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (Zoology)</td>
<td>INVERTEBRATA &amp; CHORDATA</td>
<td>BSZ 111</td>
</tr>
</tbody>
</table>

Course outcome:
1. To classify Phylum Porifera with taxonomic Keys.
2. To describe the Phylum Coelenterata and its Polymorphism.
3. To explain classification of protozoa and diseases caused by them.
4. To explain general characters of Amphioxus.
5. To identify the characters of Amphibia and its parental care.

Unit-1

Unit -2

Unit -3

Unit-4
Introduction- Type Study: Amphioxus- external characters, digestive, excretory, respiratory, and circulatory systems.


Unit-5
Class : Amphibia :General characters and classification -Type Study : Frog –External characters, Digestive, Respiratory, Circulatory and Reproductive systems - Structure of Brain.

RKDF UNIVERSITY, BHOPAL
B.Sc. Courses

References

SEMESTER-I
PRACTICLE-I
INVERTEBATA AND
CHORDATA

I. MajorPracticals:
Cockroach-Nervous, digestive, Reproductive system
Prawn-Nervous system

II. MinorPracticals:
Prawn –Appendeges
Mouth parts –Honey Bee, Mosquito, and Cockroach.

III. Spottors:
a) Classify givingreations:
b) Draw LabelledSketch:
T.S. of Taenia ,T.S .of Fasciola , Ephyra larva , Nauplius larva , Zoea larva ,Quill feather , Frog – Pectoral girdle ,Pigeon –Pelvic girdle.
c) Biological Significance:
Sponge –Gemmule, Physalia, Leech, Limulus, Bipinnaria, Ascidian tadpole larva, Ichthiophis, Peripatus.
d) Relate structure andfunction
Taenia –Scolex , Nereis –Parapodium, Peneus –Petasma, Star fish –Tube feet (ventral view), Echenies, Draco, Bat.
e) Comment on Respiratory /skeletal/ dentition of thefollowing
Star fish, Synsacrum, Dentition of Rabbit and Dog.
Course outcome:

1. To study about the basic of computer, about its history and its invention in details.
2. To learn about the hardware and the software system of the computer.
3. To know about the network, its works and internet in details.

UNIT-1

UNIT-2

UNIT-3
Software-Concept, software-Classification, What is Operating system?History of Operating system, Operating System Concepts, Disk Drives and directories.

UNIT-4
General introduction to network, Meaning of network, Definition of network, LAN, WAN, VLAN, SONET, Types of network, Common types of network, Categories of networks, Topology in network:- BUS, STAR, RING, TREE, MESH.

UNIT-5
Accessing the internet, Getting an internet account, Getting connected to internet, World Wide Web, Web page, Net surfing. Beginnings of Email, Email settings, Web browser, web Servers, HTTP,
RKDF UNIVERSITY, BHOPAL

B.Sc. Courses

Semester– I

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECTTITLE</th>
<th>SUBJECTCODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc (Electronics)</td>
<td>FUNDAMENTALSOFELECTRONICS</td>
<td>BEC 111</td>
</tr>
</tbody>
</table>

Course outcome:

1. To give knowledge of some basic electronic components and circuits.
2. To introduce basics of diode and transistor circuits.
3. To understand working of some I C based circuits.
4. To introduce basic aspect of electronic communication systems.
5. To expose the students to working of some power electronic dev ices, transducers and application of transducers.

UNIT-I
Diode circuits and power Supplies: Junction diode characteristics- Half and full wave rectifiers- Expressionforefficiencyandripplefactor-Constructionoflowrangepowerpeakusingdiodes

UNIT-II

UNIT-III
Amplifiers:Generalprinciplesofsmallsignalamplifiers-Classifications-RCCoupledamplifiers- Gain- Frequency response- Input and outputimpedance- Multistage amplifiers-Transformer coupled amplifiers- Equivalent circuits at low, medium and high frequencies -Emitterfollower.ClassAandClassBpoweramplifiers-Singleendedandpush-pulliconfigurations-Power dissipation and output power calculations.

UNIT-IV
Feedback Amplifiers: Basic concept of feedback amplifiers- Transfer gain with feedback-General characteristics of negative feedback amplifier- Effect of negative feedback on gain -Gain stability- Distortion and bandwidth - Input and output resistance in the case of various typesoffeedback -Analysis of voltageand currentin feedback amplifiercircuits.
UNIT-V

TextBooks

14. Practical Physics - M. Arul Thalapathi, Comtek Publishers, Kanchipuram
15. Linear Integrated Circuits - D. Roy Choudhury & Shail Jain, New Age International
RKDF UNIVERSITY, BHOPAL
B.Sc. Courses

Semester – I

<table>
<thead>
<tr>
<th>Branch</th>
<th>Subject title</th>
<th>Subject code</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc (Mathematics)</td>
<td>Algebra and Trigonometry</td>
<td>BMM-111</td>
</tr>
</tbody>
</table>

Course outcome:
1. Understand the concepts of vector spaces, subspaces, bases, dimension and their properties.
2. Use computational techniques and algebraic skills essential for the study of systems of Linear equations, matrix algebra, vector spaces, eigenvalues and eigenvectors, Orthogonality and Diagonalization. (Computational and Algebraic Skills).
3. Discuss the behaviour of the Trigonometrical function.
4. Find Boolean Algebra and graph theory.
5. Expand \( \sin n\theta \), \( \cos n\theta \) and \( \tan n\theta \) by using Demoivre’s theorem.
6. Expand \( \cos \theta \), \( \sin \theta \) and \( \tan \theta \) in terms of \( \theta \).

UNIT-I
Linear Algebra:-Rank of a Matrix, Eigen values, Eigen vectors, Characteristics equation of a matrix, Cayley Hamilton theorem and its use in finding inverse of matrix, Application of matrix to a system of linear( both homogenous and non- homogenious) equations, theorems on consistency and inconsistency of a system of linear equations, Solving the linear equations with three unknowns.

UNIT-II
Theory of Equations .Relation between the roots and coefficients of a general polynomial equation in one variable, Transformation of equations, sum of \( r^{th} \) powers of roots; Reciprocal equations; Descartes rule of Sign.

UNIT-III
Expansion of Trigonometrical function-Expansions of \( \sin x \), \( \cos x \), \( \tan x \) in terms of \( x \); \( \sin nx \), \( \cos nx \), \( \tan nx \), \( \sin^nx \), \( \cos^nx \), \( \tan^nx \), hyperbolic and inverse hyperbolic functions – simple problems.

UNIT-IV
Group Theory and number theory :-Equivalence relations; Groups; subgroups – cyclic groups and properties of cyclic groups – simple problems;

UNIT-V
Boolean Algebra and graph theory:-Algebra of logic, Boolean algebra, Basic theorem, Construction of truth table, Boolean function and Boolean expression, Switching circuit, graph theory and Application of graphs.

Reference Books :-
1. Algebra : T. K. Manickavachagam Pillal and others (S. Viswanathan publications)
2. Trigonometry : P.Duraipandian
Course outcome:

1. Demonstrate theory and practical skills in microscopy and their handling techniques and staining procedures
2. Understand the basic microbial structure and function and study the comparative characteristics of prokaryotes and eukaryotes and also
3. Understand the structural similarities and differences among various physiological groups of bacteria/archaea
4. Know various Culture media and their applications and also understand various physical and chemical means of sterilization
5. Know General bacteriology and microbial techniques for isolation of pure cultures of bacteria, fungi and algae
6. Master aseptic techniques and be able to perform routine culture handling tasks safely and effectively
7. Comprehend the various methods for identification of unknown microorganisms

UNIT I

History, Taxonomy and Classification:
History and Scope of microbiology- Contributions of pioneers, Introduction to major groups of microorganisms and fields of Microbiology, Spontaneous generation versus biogenesis hypothesis, Whittaker’s classification system of prokaryotes. Introduction to Bergey’s manual of determinative and systematic classification, Bacterial nomenclature.

Unit II

Microscopy and Staining Techniques
Bright Field, Dark Field, Phase Contrast, Fluorescence and Scanning and Transmission Electron Microscopy, Stains and staining techniques- Stains and Dyes: classification and types, Types of staining-Simple (Monochrome, Negative), Differential (Gram and Acid fast).

Unit III

Morphology of Bacteria
Size, shape and arrangement of bacterial cells, Structures external to cell wall- Flagella, pili, capsule, sheath and prosthecae, Structures internal to cell wall- Cell membrane, nuclear material, cell wall (Protoplast and Spheroplast), spores, cytoplasmic inclusions, magnetosomes and plasmids.

Unit IV Microbial Taxonomy:
Bacteria with unusual properties- Rickettsia, Chlamydia, Mycoplasma, Archaebacteria, Cyanobacteria, Actinomycetes, Microbes of extreme environments– Adaptations and industrial importance of Thermophiles, Alkalophiles and Halophiles.

Unit V

Introduction to acellular forms of life
Introduction to viruses, viroids and prions, Structure of animal, plant and bacterial viruses, Classification and cultivation of viruses, Multiplication of bacterial viruses (lytic and lysogenic cycles).
RKDF UNIVERSITY, BHOPAL
B.Sc. Courses

Recommended Books (Semester-I)
1. Microbiology, Authors- Pelczar, Chan and Kreig.
2. Microbiology- an Introduction- (8th Edn), Authors- Tortora, G.J., Funke, B.R., Case, C.L.
3. General Microbiology, Authors- Stainer, Ingharam, Wheelis and Painter.
4. General Microbiology, Authors- Stainer RY. Ingharam JL. Wheelis ML. Painter PR
5. Biology of Microorganisms, Authors- Brock and Madigan.
7. Introduction to Microbiology, Authors- Ingraham and Ingraham.
8. Microbial Physiology, Authors- Moat and Foster.

LIST OF EXPERIMENTS
1. Principles and working knowledge of instruments like autoclave, pH meter, incubator, hotair oven, centrifuge, microscope and colonycounter.
2. Preparation of solid and liquid culture media and their sterilization.
3. Growth of bacteria on agar slant, agar stab, Petri plate and inbroth.
4. Staining techniques- Simple staining, Gram staining, Negative staining, Endospore staining, Metachromatic granule staining, Spirochetestaining.
5. Isolation of microorganisms by streak plate method.
6. Isolation of microorganisms by pour plate method.
7. Motility by hanging drop method.
Course outcome:

1. To understand the relationship between food, nutrition and health.
2. To understand the history and the concept of food science.
3. To know the classification of food.
4. To study about the food adulteration and food additive.

Unit I
Introduction to food science
Definition, history Food science concept- Basic SI unit of length, volume and weight, temperature, relative density, pH or potential hydrogen
Physico-chemical properties of food- boiling point, evaporation, melting point, smoke point, surface tension, osmosis, humidity, freezing point and specific gravity.

Unit II
Colloidal systems in foods
Constituents of food, true solution, suspension, stability of colloidal system. Type of colloidal system in food- sol, gel, emulsion, foam

Classification of food
Health food, ethnic food, organic food, functional food, nutraceuticals, fabricated foods, convenience foods, GM foods, space foods

Unit III
Food additive and adulteration
Food additives, antioxidants, sequestrants, preservatives, nutrient supplement, emulsifiers, stabilizers and thickening agents, bleaching and maturing agent, sweeteners, humectants and anti caking agents coloring and flavoring substance
Food adulteration: Types of adulterants- intentional and incidental adulterants, methods of detection

Unit IV
Sampling and sample preparation
Population and sample
Methods of sampling-simple random sampling, systematic sampling, stratified random sampling
Summary Measures – Measures of central Tendency – arithmetic mean, geometric mean, harmonic mean, median, mode

Unit V
Food safety, quality and evaluation
Food safety and quality assurance- definition
Evaluation of food- subjective and objective
Food standards - PFA, BIS, AGMARK, FPO, FAQ, ISI
Reference

- Frederick,J.F. Encyclopedia of Food Science and Technology. Second edition vol 1-4, a widely interscience publication, 2000
- Khader,V. Text book of Food science and Technology. Published by India Council of Agricultural Research, NewDelhi 110012, 2001
# RKDF UNIVERSITY, BHOPAL
## B.Sc. Courses
### SCHEME
#### Semester – II

<table>
<thead>
<tr>
<th>No</th>
<th>Subject Code</th>
<th>Subject Type</th>
<th>Subject Title</th>
<th>Marks Allotted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Assignment Marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Max</td>
</tr>
<tr>
<td>1</td>
<td>FC-201/1</td>
<td>Core</td>
<td>हिंदी गण संख्या</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Foundation course</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>FC-201/2</td>
<td>Core</td>
<td>Environment</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Foundation course</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>BSZ 121</td>
<td>Core</td>
<td>Cell Biology &amp; Genetics</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Zoology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>BSB 121</td>
<td>Core</td>
<td>Cell Biology &amp; Genetics</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Botany</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>BCH 121</td>
<td>Core</td>
<td>Based on Inorganic, Organic And Physical Chemistry</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Chemistry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>BPY 121</td>
<td>Core</td>
<td>PROPERTIES OF MATTER AND SOUND</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Physics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>BBT 121</td>
<td>Elective</td>
<td>BIOMOLECULES&amp;ORGANICMECHANISMSIN BIOLOGY</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Biotechnology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>BCS-121</td>
<td>Elective</td>
<td>Operating System</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Comp. Sci.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>BEC 121</td>
<td>Elective</td>
<td>SEMICONDUCTOR DEVICES AND IC FABRICATION TECHNOLOGY</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Electronics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>BMM 121</td>
<td>Core</td>
<td>Calculus and Numerical Analysis</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Maths</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>BMB 121</td>
<td>Elective</td>
<td>MICROBIAL PHYSIOLOGY &amp; MICROBIAL GENETICS</td>
<td>20</td>
</tr>
<tr>
<td>12</td>
<td>BFS 121</td>
<td>Elective</td>
<td>BASIC NUTRITION</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Food Sci</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Every candidate appearing in B.Sc. Semester 2nd examination shall be examined in

(c) Foundation Course F.C (Compulsory) for all students.

(d) Any one of the following combinations:

1. Physics, Maths, Computer Science.
2. Physics, Maths, Electronics.
3. Physics, Chemistry, Maths.
5. Chemistry, Botany or Zoology, Biotechnology.
6. Chemistry, Botany or Zoology, Microbiology.
7. Chemistry, Botany or Zoology, Food Science.

Provided that the courses of studies for Physics offering combinations from (i) to (iii) and for Chemistry offering combinations from (iii) to (vii) shall be those prescribed for biology group.

<table>
<thead>
<tr>
<th>Electives Subjects</th>
<th>Core Subjects</th>
<th>Combinations Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBT 121 Biotechnology</td>
<td>BSZ 121/BSB 121 (Zoology/Botany), BCH 121 Chemistry</td>
<td>BSZ 121/ BSB 121, BCH 121, BBT 121.</td>
</tr>
<tr>
<td>BMB 121 Microbiology</td>
<td>BSZ 121/BSB 121 (Zoology/Botany), BCH 121 Chemistry</td>
<td>BSZ 121/ BSB 121, BCH 121, BMB 121.</td>
</tr>
<tr>
<td>BEC 121 Electronics</td>
<td>BMM 121 Mathematics, BPY 121 Physics</td>
<td>BMM 121, BPY 121, BEC 121.</td>
</tr>
<tr>
<td>BFS 121 Food Science</td>
<td>BSZ 121/BSB 121 (Zoology/Botany), BCH 121 Chemistry</td>
<td>BSZ 121/ BSB 121, BCH 121, BFS 121.</td>
</tr>
<tr>
<td>BCS 121 Computer Science</td>
<td>BMM 121 Mathematics, BPY 121 Physics</td>
<td>BMM 121, BPY 121, BCS 121.</td>
</tr>
<tr>
<td>Core Subjects</td>
<td>Combinations</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>BMM 121 Mathematics</td>
<td>BCH 121 Chemistry/BCS 121 Computer Science/ BEC 121 Electronics, BPY 121 Physics, BMM 121 Mathematics</td>
<td></td>
</tr>
<tr>
<td>BPY 121 Physics</td>
<td>BCH 121 Chemistry/BCS 121 Computer Science/ BEC 121 Electronics, BMM 121 Mathematics.</td>
<td></td>
</tr>
<tr>
<td>BCH 121 Chemistry</td>
<td>BMM 121 Mathematics, BPY 121 Physics or, BBT 121 Biotechnology, BSZ 121/BSB 121 (Zoology/Botany) or, BMB 121 Microbiology, BSZ 121/BSB 121 (Zoology/Botany) or, BSB 121 Botany, BZB 121 Zoology or, BFS 121 Food Science, BSZ 121/BSB 121 (Zoology/Botany).</td>
<td></td>
</tr>
<tr>
<td>BSZ 121 Zoology</td>
<td>BCH 121 Chemistry, BBT 121 Biotechnology or, BCH 121 Chemistry, BMB 121 Microbiology or, BCH 121 Chemistry, BSB 121 Botany or, BCH 121 Chemistry, BFS 121 Food Science.</td>
<td></td>
</tr>
<tr>
<td>BSB 121 Botany</td>
<td>BCH 121 Chemistry, BBT 121 Biotechnology or, BCH 121 Chemistry, BMB 121 Microbiology or, BCH 121 Chemistry, BSB 121 Zoology or, BCH 121 Chemistry, BFS 121 Food Science.</td>
<td></td>
</tr>
</tbody>
</table>
RKDF UNIVERSITY, BHOPAL
B.Sc. Courses
Semester – II

<table>
<thead>
<tr>
<th>Course</th>
<th>Subject</th>
<th>Subject Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (FOUNDATION COURSE)</td>
<td>हिंदी प्राप्ति सांस्कृतिक कौशल विकास</td>
<td>FC-201/1</td>
</tr>
</tbody>
</table>

COURSE OUTCOME

1: पाठ्यक्रमपूर्वांकनके बाद, एक शिक्षाक्षेत्रीय को हिंदी कायम के बारे में एक उच्चतम समझ होगी।

2: पाठ्यक्रम पूरा करने के बाद, लेख लिखने के साथ-साथ अधिग्रहण करने के लिए एक शिक्षाक्षेत्रीय, वक्तृत्व में और हिंदी कायम में अध्ययन में निपुणता होगी।

3: हिंदीविद्यालयों को बादावर्तनके लिए एक उच्चतम समझ किलेके अनुवाद करने के लिए एक उच्चतम समझ होगी।

4: छात्रोंको हिंदीकायम संसारात्सूत्रिक तथा कौशलों, साहित्यिक तथा वैज्ञानिकविवासतों के लिए अध्ययन करना।
रक्षा शास्त्रिय विद्यालय
कोशिका कर्मचारी पंजीकृत बोर्ड उच्च शिक्षा निदेशक
(संचालन)
शैक्षणिक पंजीयन, कुछ, संस्था
प्रविधिकोष, लक्ष्य, दौरोधय
सं-संस्था-पर्यावरण अभियान और कार्यक्रम
शैक्षिक यथार्थता को उच्च शिक्षा नियुक्ति उप-विभाग
: के प्रवीण संतोष, सम्पूर्ण, संस्था अभियान, अभियान, अभियान, अभियान
RKDF UNIVERSITY, BHOPAL
B.Sc. Courses
Semester – II

<table>
<thead>
<tr>
<th>Course</th>
<th>Subject</th>
<th>Subject Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (FOUNDATION Course)</td>
<td>Environment/पर्यावरण</td>
<td>FC-201/2</td>
</tr>
</tbody>
</table>

**COURSE OUTCOME**

1: The subject facilitate the students’ understanding of complex environmental issues from a problem-oriented, interdisciplinary perspective.

2: Understand environmental problems and ways of addressing them, including interactions across local to global scales.

3: Upon the completion of the course the students will be able to appreciate the ethical, cross-cultural, context of environmental issues and the links between human and natural systems.

4: They will reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

**Unit-I**

*Study of Environmental and ecology:*

(a) Definition and Importance.  
(b) Environmental Pollution and problems.

(c) Public participation and Public awareness.

**Unit-II**

*Environmental Pollution:*

(a) Air, water, noise, heat and nuclear pollution.

(b) Causes, effect and prevention of pollution.

(c) Disaster management – Flood, Earthquake, cyclones and landslides.

**Unit-III**

*Environment and social problems:*

(a) Development – non-sustainable to Sustainable.

(b) Energy problems of cities.

(c) Water preservation – rain-water collection.
**IV**

mankind in conserving natural resources:
(a) Food resources – World food problem
(b) Energy resources – increasing demand for energy.
(c) Land resources – Land as resources.

**Unit-V**

Environment conservation laws:
(a) Conservation laws for air and water pollution.
(b) Wildlife conservation laws.
(c) Role of information technology in protecting environment & health.
Course outcome:
1. To learn about the Rate of reaction, rate equation and its explanations of its reactions.
2. Explanations of metallic bond and semiconductors.
3. To study about the various theory and about alkenes.
4. To learn about the different laws and its applications.

UNIT-I
Hydrogen Bonding – Definition, Types, effects of hydrogen bonding on properties of substances, application Brief discussion of various types of Vander Waals Forces

Metallic Bond and Semiconductors
Metallic Bond- Brief introduction to metallic bond, band theory of metallic bond Semiconductors- Introduction, types and applications.

UNIT-II
Rate of reaction, rate equation, factors influencing the rate of a reaction – concentration, temperature, pressure, solvent, light, catalyst.Order of a reaction, integrated rate expression for zero order, first order, second and third order reaction. Half life period of a reaction. Methods of determination of order of reaction.

Kinetics-II
Effect of temperature on the rate of reaction – Arrheniusequation. Theories of reaction rate – Simple collision theory for unimolecular and bimolecular collision. Transition state theory of Bimolecular reactions.

UNIT-III
Electrolytic conduction, factors affecting electrolytic , Arrhenius theory of ionization, Ostwald’s Dilution Law. Debye-Huckel – Onsager’s equation for strong electrolytes (elementary treatment only) Transport number, definition and determination by Hittorf’s methods, (numerical included).

Electrochemistry-II

UNIT-IV
Nomenclature of alkenes, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides,. The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff’s rule, hydroboration–oxidation, oxymercuration reduction, ozonolysis, hydration, hydroxylation and oxidation with KMnO4.

UNIT-V
IUPAC nomenclature of branched and unbranched alkanes, the alkyl group, classification of carbon atoms in alkanes. Isomerism in alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction Cycloalkanes nomenclature, synthesis of
cycloalkanes and their derivatives – photochemical (2+2) cycloaddition reactions, dehalogenation of β,β-dihalides, pyrolysis of calcium or barium salts of dicarboxylic acids, Baeyer's strain theory and its limitations.

Book suggested:

5. J. P. Lowe and K. Peterson, Quantum Chemistry Academic Press.

Paper (Practical’s)
Section A (Inorganic)
Paper Chromatography
Qualitative Analysis of the any one of the following Inorganic cations and anions by paper chromatography (Pb²⁺ , Cu²⁺ , Ca²⁺ , Ni²⁺ , Cl⁻ , Br⁻ , I⁻ and PO₄³⁻ and NO₃⁻)

Section B (Physical)
1. To determine the surface tension of a given liquid by drop number method.
2. To determine the viscosity of a given liquid.
3. To determine the specific refractivity of a given liquid.

SECTION – C (Organic)
1. Dibenzalacetone from acetone and benzaldehyde
2. Aspirin from salicylic acid. To study the process of) sublimation of camphor and phthalic acid

Books for practical:

RKDF UNIVERSITY, BHOPAL
B.Sc. Courses

Syllabus
Semester – II

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc (Physics)</td>
<td>PROPERTIES OF MATTER AND SOUND</td>
<td>BPY 121</td>
</tr>
</tbody>
</table>

Course outcome:
1. Study the elastic behavior of materials
2. Analyze the relationship between various types of experiments
3. Perform the procedure as per standard values
4. Understand the applications

UNIT-I
Elasticity: Three types of elastic moduli - Poisson's ratio - Bending of beams - Expression for bending moment - Depression of the loaded end of a Cantilever - uniform - non uniform bending - theory - experiment pin and microscope method - work done in uniform bending – Koenig’s method – non-uniform bending - theory - expression for couple per unit twist - determination of rigidity modulus - Static torsion method with scale and telescope - Rigidity modulus by torsion pendulum with mass.

UNIT-II
Interference and Interferometers : Coherence - temporal coherence and spatial coherence - Air wedge – testing the planeness of a surface - Michelson Interferometer - types of fringes - Difference in wavelength of Sodium D1, D2 lines and thickness of a thin transparent plate. Multiple beam interference - Febry - Perot interferometer - formation of fringes.
Holography : Holography - recording and reconstruction.

UNIT-III
Surface tension and Osmosis : Surface energy - angle of contact and its determination - excess of pressure inside curved surface - formation of drops - Experimental study of variation of Surface tension with temperature - drop weight method of determining surface tension and interfacial surface tension - angle of contact of mercury - Quincke's method - surface tension and vapour pressure osmosis - experimental determination of osmotic pressure - Laws of osmosis pressure - osmotic and vapour pressure of a solution.

UNIT-IV

UNIT-V

BOOKS FOR STUDY:
BOOKS FOR REFERENCE:
3. A Text Book of Sound (2005), R. L. Saighal, S. Chand & Co.,


SEMESTER-II

PRACTICALS PRACTICAL
01. Young's modulus (q) - uniform bending - pin and microscope.
02. Young's modulus (q) - uniform bending - scale and telescope method.
03. Static Torsion – Rigidity modulus.
04. Torsion Pendulum – Moment of Inertia and Rigidity modulus – symmetrical masses.
05. Coefficient of Viscosity of a liquid - graduated burette - radius by mercury pellet method.
06. Melde's apparatus - frequency - transverse and longitudinal modes.
07. Specific heat capacity of a liquid by cooling - verification of Newton's law of cooling.
08. Air Wedge - thickness of a wire and its insulation.
11. Potentiometer - Specific resistance of the given coil and length of second coil without unwinding.
13. Field along the axis of a coil - deflection magnetometer – determination of BH.
14. Carey-Foster's bridge - Specific resistance of a coil.
15. BG - Comparison of Capacities.
16. BG - Comparison of EMF's of two cells.
17. Zener diode – Voltage regulator using four diodes and percentage of regulation.
18. Verification of De Morgan’s theorem.
Course Outcome:
1. Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles
2. Students will understand how these cellular components are used to generate and utilize energy in cells
3. Students will understand the cellular components underlying mitotic cell division.
4. Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function. These can include responses to environmental or physiological changes, or alterations of cell function brought about by mutation.

Unit-1
The cell envelope: plasma membrane, bilayer lipid structure, function of the cell wall. Structure and function of cell organelles: Golgi bodies, ER, Peroxisome, Vacuole, Chloroplast and Mitochondrion.

Unit-2
Ultrastructure and function of nucleus: Nuclear membrane, Nucleolus, Extranuclear genome, Presence and functions of mitochondrial and plastid-DNA, Plasmids. Chromosomal organization; morphology, centromere And telomere, special types of chromosome, Mitosis and Meiosis

Unit-3
Variations in chromosomes structure: Deletions, duplications translocations, inversions; variation in chromosome number, aneuploidy, polyploidy, DNA the genetic material, DNA structure and replication, the nucleosome model, satellite and repetitive DNA.

Unit-4
Structure of gene: genetic code, transfer of genetic information; transcription, translation, protein synthesis, tRNA, and ribosomes. Regulation of gene expression in prokaryotes and eukaryotes.

Unit-5
Genetic inheritance: Mendelism; laws of segregation and independent assortment; linkage analysis; interactions of genes. Genetic variations; mutations, spontaneous and induced; transposable elements; DNA damage and repair.

Suggested Books :

Br. Sc. (Zoology)  

**CELL BIOLOGY & GENETICS**

**BSZ 121**

**Course Outcome:**
1. Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles.
2. Students will understand how these cellular components are used to generate and utilize energy in cells.
3. Students will understand the cellular components underlying mitotic cell division.
4. Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function. These can include responses to environmental or physiological changes, or alterations of cell function brought about by mutation.

**UNIT 1**

**UNIT 2**

**UNIT 3**

**UNIT 4**

**UNIT 5**

**TEXT BOOKS:**
Cell biology. Veer Bala Rastogi, Rastogi Publications.  
Rastogi V.B. A text book of Genetics, K. Ramnath, Meerut.
A. Major Practicals

Use Microscopes, Camera Lucida, Stage and Ocular micrometers.

Total Counting of RBC / WBC Using haemocytometer.

Blood Smear Prepartion, Differential count of WBC.

Mounting Buccal Epithelium and observing living cells using vital staining.Study of mitotic division using onion root tips.

Study of prepared slides of different tissues.Submission of practical record.

B. GENETICSPRACTICALS

Observation of common mutants of drosophila
Preparation of mounting of the salivary gland in chironomous larva
Submission of practical record
Course outcome:
1. Through this course the students are exposed to importance of biological macromolecules.
2. They acquire knowledge in the quantitative and qualitative estimation of biomolecules.
3. They study the influence and role of structure in reactivity of biomolecules.
4. At the end of the course, the students have a thorough understanding on the role of biomolecules and their functions.

Unit -I
Biomolecules: configuration and conformation. Properties of water as biological solvent. Carbohydrates: Chemical structures, nature, properties, Classification and Importance in Biological Systems.

Unit - II
Enzymes: Classification, Characteristics, Factors affecting enzyme activity. Enzyme Kinetics, Km & Vmax, Activation and Inhibition of Enzymes. Non- Protein Enzymes, Application of Enzymes in vitro and in vivo.

Unit - III

Unit-IV
Carbohydrate Metabolism – Aerobic & Anaerobic glycolysis, sequence of reactions in glycolysis, regulation in glycolysis, citric acid cycle, glycogenesis, glycogenolysis (sequence of reactions & regulation), Pentose-phosphate pathway (sequence of reactions & regulation), extraction of energy from food sources.

Unit-V
Amino acid Metabolism – Amino acid breakdown (amino acid deamination, Urea cycle, metabolic breakdown of individual amino acids – glucogenic & ketogenic amino acids), amino acids as biosynthetic precursors (haem biosynthesis & degradation, biosynthesis of epinephrine, dopamine, seretonin, GABA, histamin, glutathione); biosynthesis of essential & non-essential amino acids.
Suggested Readings
1. Principle of Biochemistry : Leinger , A. L.
5. Basic Biological Chemistry : Mahler and Cordes
10. Biochemistry- Prasaranga, Bangalore University
11. Fundamental of Biochemistry – Dr.A.C.Deb

PRACTICLE

1. Determination of pH from unknown biological samples using pH paper and pH meter.
3. Analysis of carbohydrates (sugars, starch), proteins, lipids, and amino acids in biological samples.
4. Assays of amylase, peroxidase, catalase from biological samples using Spectrophotometer.
5. Separation of plant pigments and amino acids by PC and TLC.
6. Demonstration of gel electrophoresis.
7. Fractionation of biological material into its various components by Centrifuge.
8. Qualitative analysis of Carbohydrates, Proteins and Lipids.
12. Analyzing the enzyme activity.
13. Study the effect of pH on enzyme activity.
14. Study the effect of temperature on enzyme activity.
15. Determination of urine urea nitrogen.
16. Isolation of serum albumin by salting out method.
17. Determination of serum albumin by Bromocresol green method.
18. Determination of serum bilirubin.
19. Blood group analysis
20. Determination of haemoglobin content by haemoglobinometer.
<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc (Computer Science)</td>
<td>Operating System</td>
<td>BCS-121</td>
</tr>
</tbody>
</table>

Course outcome:
1. To study about the system programming and its operating system, its history.
2. To learn the files, process and others.
3. Explanation of memory managements in details.

UNIT I
Introduction to System Programs & Operating Systems, Evolution of Operating System (mainframe, desktop, multiprocessor, Distributed, Network Operating System, Clustered & Handheld System), Operating system services, Operating system structure, Operating system design & Implementations. Types of Operating System: Bare machine, Batch Processing, Real Time, Multitasking & Multi programming, time-sharing system.

UNIT II
File: concepts, access methods, free space managements, allocation methods, directory systems, protection, organization, sharing & implementation issues, I/O devices organization, I/O buffering, I/O Hardware.

UNIT III
Process: Concept, Process Control Blocks (PCB), Scheduling criteria Preemptive & non Preemptive process scheduling, Scheduling algorithms, inter process communication. Deadlock: Characterization, Methods for deadlock handling, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

UNIT IV
Memory Hierarchy, Concepts of memory management, MFT & MVT, logical and physical address space, swapping, contiguous and non-contiguous allocation, paging, segmentation, and paging combined with segmentation. Structure & implementation of Page table. Concepts of virtual memory, Cache Memory Organization, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation.

UNIT V
RKDF UNIVERSITY, BHOPAL
B.Sc. (Courses)

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc (Electronics)</td>
<td>SEMICONDUCTOR DEVICES AND IC FABRICATION TECHNOLOGY</td>
<td>BEC 121</td>
</tr>
</tbody>
</table>

Course outcome:
1. Understand the characteristics of IC and Op-Amp and identify the internal structure.
2. Derive and determine various performances based parameters and their significance for Op-Amp.
3. Use the basic logic gates and various reduction techniques of digital logic circuit in detail.
4. Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.
5. Understand and apply the functionalities of PLL to Frequency synthesizer, multiplier, FM, and AM demodulators.
6. Learn to Design & implement a triggering / gate drive circuit for a power device like SCR, MOSFET etc.

UNIT-I

Digital Electronics
Analog and digital signals - Digital circuits - Binary number system - conversion of Binary to decimal - decimal to binary - logic gates - OR gate - AND gate - NOT gate - Combination of Logic gates - NAND and NOR as universal building blocks.

UNIT-II
Number system and codes: Decimal, binary, octal, hex numbers, conversion from one to another - codes, BCD, excess 3, gray codes conversion from one to another - Error correction / detection codes. Boolean algebra and theorems: Basic, Universal logic gates - Boolean Theorems - sum of products, products of sums expression, simplification by Karnaugh Map method, simplification based on basic Boolean theorems - don’t care conditions. Combinational Digital Circuits: Arithmetic building blocks, Basic Adders and Subtractors, BCD adders - Data processing circuits, multiplexers, demultiplexers, encoders, decoders - TTL, CMOS digital logic families.

UNIT-III
Sequential Digital Circuits: Flip - Flops, RS, clocked SR, JK, D, T, master-slave types - shift registers, ring counters-ripple counters - Design of counters - modulus of counters - timer IC 555, applications. DAC and ADC: Parameters, Accuracy, Resolution - DAC, variable resistor network, R-2R ladder network types - ADC, counting, continuous, successive approximation, dual-slope types - comparison of various types of ADC and DAC.

UNIT-IV
Transistors - Working of PNP and NPN transistors - Transistor connections - Relation between β and α - Expression for collector current - Transistor characteristics in CE mode - Transistor as an amplifier and oscillator its performance - Semiconductor devices numbering system - Phototransistor Construction, working characteristics of FET and MOSFET (D and E type) - Parameters of FET - Difference between FET and BJT - Difference between FET and MOSFET - Applications of FET and MOSFET - Advantages of MOSFET.

UNIT-V

Text Books
RKDF UNIVERSITY, BHOPAL
B.Sc. (Courses)

<table>
<thead>
<tr>
<th>Branch</th>
<th>Subject title</th>
<th>Subject code</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc (Mathematics)</td>
<td>Calculus and Numerical Analysis</td>
<td>BMM-121</td>
</tr>
</tbody>
</table>

Course outcome:
1. Assimilate the notions of limit of a sequence and convergence of a series of real numbers.
2. Calculate the limit and examine the continuity of a function at a point.
3. Understand the consequences of various mean value theorems for differentiable functions equations.
4. Sketch curves in Linear Differential equations and equations reducible to the linear form.
5. Apply derivative tests in optimization problems in numerical integration.
6. Student will be to understand differentiation and fundamental theorem in differentiation and various rules.

Unit-1
Successive differentiation, Leibnitz theorem, Maclaurin and Taylor series expansions, Curvature, Tests for concavity and convexity, Points of inflexion, Multiple points, Tracing of curves in Cartesian co-ordinates.

Unit-2
Limit and continuity of functions of two variables, Introduction of Partial differentiation, Euler’s Theorem on homogeneous function, Jacobians, Differentiability of real-valued functions of two variables, Taylor’s theorem for functions of two variables, Double and triple integrals, Dirichlet’s integrals.

Unit-3
Numerical integration: General quadrature formula, Trapezoidal rule, Simpson's one-third rule, Simpson's three-eighth rule, Weddle's rule, Euler-Maclaurin Summation formula, Sterling's formula for n!.

Unit-4
Linear Differential equations and equations reducible to the linear form, Exact differential equation, First order and higher degree equations Solvable for x, y and p, Clairaut’s form and singular solutions, linear differential equations with constant coefficients.

Unit-5
Vector differentiation, Gradient, Divergence and Curl, Vector integration, Theorem of Gauss (without proof) and problems based on it, Theorem of Green (without proof) and problems based on it, Stoke’s theorem (without proof) and problems based on it.

Texts Book
2. Gorakh Prasad – Integral Calculus, Pothishala Pvt. Ltd. Allahabad

Reference Book
Course outcome:

1. Know the terms and terminologies related to molecular biology and microbial growth.
2. Understand the properties, structure and function of genes in living organisms at the molecular level
3. Explain the significance of central dogma of gene action
4. Have a conceptual knowledge about DNA as a genetic material, enzymology, and replication strategies
5. Understand the molecular mechanisms involved in transcription and translation

Unit I

Cultivation and Pure Culture Techniques
Nutrition and nutritional types of bacteria, Bacteriological media (types and uses), cultivation of aerobic and anaerobic microbes, Isolation of microorganisms, pure culture and cultural characteristics.

Unit II

Microbial Growth
Mathematical expression of bacterial growth, generation time and growth rate, Growth curve and phases of growth cycle, Batch, continuous and synchronous cultures; diauxic growth, Factors affecting microbial growth.

Measurement and Preservation Methods
Quantitative measurement of bacterial growth by cell mass, cell number and cell activity, Maintenance and preservation of cultures.

Unit III

Control of Microorganisms- I
Microbial death curve under adverse condition, Concept of sterilization, disinfection, asepsis and sanitation, Physical methods of control- Temperature, radiation, desiccation, osmotic pressure, filtration.

Unit IV

Fundamentals of Genetics
DNA as genetic material, Structure and types of DNA and RNA, Genetic code, Protein synthesis - Transcription and translation.

DNA Replication and Gene Structure
DNA replication, Cis-trans complementation test, Fine structure analysis of r II region of T4 by Benzer.

Unit V

Mutation
Evidence for spontaneous nature of mutation, Molecular basis of mutation- Types of mutation, Types of bacterial mutants and their isolation, Mutagenic agents- Physical and chemical, Mutation rate and Ames test.
Genetic Recombination- I
Gene transfer in bacteria, Transformation- Competence, DNA uptake, artificially induced competence, electroporation, Transposable elements, Plasmid- Structure, properties and types of plasmids.

Reference Books:

1. Genes XI, Author- B. Lewin.
2. Principles of Genetics, Authors- Gardner, Simmons and Snustad.
3. Concepts of Genetics, Authors- Klug and Cummings.
4. Microbial Genetics, Authors- Freifelder.
5. Genetics, Authors- Arora and Sandhu.
6. Text of Microbiology, Authors- Ananthanarayanan and Paniker.
7. Textbook of Microbiology, Authors- Dubey and Maheshwari.
8. Microbiology, A Practical Approach. Authors- Patel and Phanse
9. Experiments in Biotechnology. Authors- Nighojkar and Nighojkar
10. General Microbiology, Authors- Powar and Dainawala.
11. Fundamentals in Microbiology, Authors- Frobisher and Hinsdinn.
12. Immunology, Microbiology and Biotechnology, Author- K.C. Soni.

List of Practicals:

1. Preparation of McFarland scale.
2. Use of counting chamber for bacterial count.
4. Effect of pH on bacterial growth.
5. Effect of osmotic pressure (salt and sugar concentration) on bacterial growth.
6. The oligodynamic action of heavy metals on bacterial growth.
7. One step growth of bacteriophage.
Course outcome:
1. To understand the relationship between food, nutrition and health.
2. To understand digestion, absorption, functions and food sources of various nutrients
3. To appreciate the concept of balanced and healthy diets.
4. To know the different methods of cooking and ways to prevent nutrient losses.
5. To be able to plan and prepare meals and nutritious dishes for various age groups.
6. To be able to assess nutritional status of adults
7. To know the important nutrients of body in details.

Unit I
Introduction to nutrition
Definition, optimum nutrition, nutritional status, good nutritional status, poor nutritional status, malnutrition, under nutrition, signs of good nutritional status, signs of poor nutritional status, definition and functions of nutrients

Unit II
Food and our body
Food and its functions, digestion, absorption and metabolism of food
Buccal digestion, gastric digestion and intestinal digestion, factors that affect digestion, absorption and metabolism
Five food groups.

Unit III
Energy metabolism
Introduction, unit of measurement, energy value of food- calorimetry or bi proximate composition; energy needs of the body- reference man and reference woman; basal metabolic rate, factors affecting the BMR
Carbohydrates
Introduction, classification of carbohydrates, digestion, absorption and metabolism, functions, deficiency, recommended dietary intake and sources.
Role of dietary fibre in prevention and treatment of diseases

Unit IV
Proteins
Function, deficiency, sources and requirements
Fat
Introduction, classification of lipids, saturated and unsaturated fatty acid, functions of fat, digestion, absorption and metabolism of fat, deficiency, food sources and RDA

Unit V

Vitamins
Classification - fat soluble and water soluble vitamins;
Fat soluble vitamins, A, D, E and K - introduction, function, deficiency, sources, RDA Water soluble vitamins - B complex and C-introduction, functions, deficiency, sources, RDA

Minerals
major or macro minerals - General functions of minerals, deficiency, sources and RDA Major minerals - calcium, phosphorus, sodium, potassium, iron
Minor minerals - iron and manganese Trace elements – iodine, fluorine, zinc

Water
Introduction, functions, water, daily intake of water, daily loss of water, body water, water balance, deficiency of water, retention of water, daily requirements, fat.

REFERENCES


• Joshi, S. A Nutrition and dietetics. Third edition, Tata McGraw Hill education pvt ltd, New Delhi, 2010


• Srilakshmi, B, Nutrition Science, New age international (P) Ltd publishers, New Delhi, 2006.


<table>
<thead>
<tr>
<th>No</th>
<th>Subject Code</th>
<th>Subject Type</th>
<th>Subject Title</th>
<th>Marks Allotted</th>
<th>Assignment Marks</th>
<th>Theory Marks</th>
<th>Practica l Marks</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Max</td>
<td>Min</td>
<td>Max</td>
<td>Min</td>
<td>Max</td>
</tr>
</tbody>
</table>
Every candidate appearing in B.Sc. Semester 3rd examination shall be examined in
(e) Foundation Course F.C (Compulsory) for all students.
(f) Any one of the following combinations:
   1   Physics, Chemistry, Maths
   2   Physics or Chemistry, Botany, Zoology
   3   Physics or Chemistry, Botany, Biotechnology
   4   Physics or Chemistry, Botany, Microbiology
   5   Physics, Chemistry or Electronics, Maths
   6   Chemistry, Botany or Zoology, Food Science
   7   Physics, Computer Science, Maths

Provided that the courses of studies for Physics offering combinations from (ii) to (vi) shall be those prescribed for biology group.

<table>
<thead>
<tr>
<th>Electives Subjects</th>
<th>Core Subjects</th>
<th>Combinations Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBT 131 Biotechnology</td>
<td>BSZ 131/BSB 131 (Zoology/Botany), BCH 131 Chemistry</td>
<td>BSZ 131/ BSB 131, BCH 131, BBT 131.</td>
</tr>
<tr>
<td>BMB 131 Microbiology</td>
<td>BSZ 131/BSB 131 (Zoology/Botany), BCH 131 Chemistry</td>
<td>BSB 131/ BSZ 131, BCH 131, BMB 131.</td>
</tr>
<tr>
<td>BEC 131 Electronics</td>
<td>BMM 131 Mathematics, BPY 131 Physics</td>
<td>BMM 131, BPY 131, BEC 131.</td>
</tr>
<tr>
<td>BFS 131 Food Science</td>
<td>BSZ 131/BSB 131 (Zoology/Botany), BCH 131 Chemistry</td>
<td>BSZ 131/ BSB 131, BCH 131, BFS 131.</td>
</tr>
<tr>
<td>BCS 131 Computer Science</td>
<td>BMM 131 Mathematics, BPY 131 Physics</td>
<td>BMM 131, BPY 131, BCS 131.</td>
</tr>
<tr>
<td>Core Subjects</td>
<td>Combinations</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>BMM 131 Mathematics</td>
<td>BCH 131 Chemistry/BCS 131 Computer Science/ BEC 131 Electronics, BPY 131 Physics.</td>
<td></td>
</tr>
<tr>
<td>BPY 131 Physics</td>
<td>BCH 131 Chemistry/BCS 131 Computer Science/ BEC 131 Electronics, BMM 131 Mathematics.</td>
<td></td>
</tr>
<tr>
<td>BCH 131 Chemistry</td>
<td>BMM 131 Mathematics, BPY 131 Physics or, BBT 131 Biotechnology, BSZ 131/BSB 131 (Zoology/Botany) or, BMB 131 Microbiology, BSZ 131/BSB 131 (Zoology/Botany) or, BSB 131 Botany, BZB 131 Zoology or, BFS 131 Food Science, BSZ 131/BSB 131 (Zoology/Botany),</td>
<td></td>
</tr>
<tr>
<td>BSZ 131 Zoology</td>
<td>BCH 131 Chemistry, BBT 131 Biotechnology or, BCH 131 Chemistry, BMB 131 Microbiology or, BCH 131 Chemistry, BSB 131 Botany or, BCH 131 Chemistry, BFS 131 Food Science.</td>
<td></td>
</tr>
<tr>
<td>BSB 131 Botany</td>
<td>BCH 131 Chemistry, BBT 131 Biotechnology or, BCH 131 Chemistry, BMB 131 Microbiology or, BCH 131 Chemistry, BSB 131 Zoology or, BCH 131 Chemistry, BFS 131 Food Science.</td>
<td></td>
</tr>
</tbody>
</table>
RKDF UNIVERSITY, BHOPAL

B.Sc. (Courses)

Semester – III

<table>
<thead>
<tr>
<th>Course</th>
<th>Subject</th>
<th>Subject Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (Foundation Course)</td>
<td>Values &amp; Spirituality</td>
<td>FC-301/1</td>
</tr>
</tbody>
</table>

**COURSE OUTCOME**

**C 01:** The course aims to teach and inculcate the importance of value based living among students and give them a deeper understanding about the purpose of life.

**C 02:** Upon the completion of the course the students will understand the importance of value based living.

**C 03:** Students will understand and start applying the essential steps to become good leaders and emerge as responsible citizens with clear conviction to practice values and ethics in life.

**C 04:** Students will become value based professionals and will contribute in building a healthy nation.

**Chapter 1: VALUE EDUCATION**

1.1 Objectives  
1.2 Introduction  
1.3 Concepts of Values  
1.4 Definition and Types of values  
1.5 The need for Education in values  
1.6 Challenges for Value adoption  
1.7 Character development  
1.8 Vision of a better world  
1.9 Summary  
1.10 Glossary  
1.11 Suggested reading

**Chapter 2: INCULCATION OF VALUES**

2.1 Objectives  
2.2 Introduction  
2.3 Classification of values  
2.4 Personal Values  
2.5 Family Values  
2.6 Social Values  
2.7 Spiritual values  
2.8 Benefits of value adoption  
2.9 Summary  
2.10 Glossary  
2.11 Suggested reading

**Chapter 3: MAJOR RELIGIONS OF THE WORLD**

3.1 Objectives  
3.2 Introduction  
3.3 Hinduism  
3.4 Jainism  
3.5 Buddhism  
3.6 Christianity  
3.7 Islam  
3.8 Sikhism  
3.9 Summary  
3.10 Glossary  
3.11 Suggested reading

**Chapter 4: EXPLORING THE SELF**

4.1 Objectives  
4.2 Introduction  
4.3 Anatomy of the self  
4.4 The cyclic processes within the self  
4.5 States of the awareness  
4.6 Innate qualities  
4.7 Acquired qualities  
4.8 Empowering the self  
4.9 Summary  
4.10 Glossary  
4.11 Suggested reading

**Chapter 5: THOUGHT AND THE THINKER**

5.1 Objectives  
5.2 Introduction  
5.3 Know the mind (TEAM)  
5.4 Thought power  
5.5 Types of thoughts  
5.6 Thinking process  
5.7 Positive thinking  
5.8 Power and Acts  
5.9 Summary  
5.10 Glossary  
5.11 Suggested reading
COURSE OUTCOME

C 01: The course aims at providing students with a broad interdisciplinary liberal arts framework for understanding the relationship between humans and their environment;

C 02: Students will contribute to and facilitate interdisciplinary research and problem solving, through independent and collaborative work

C 03: Upon the completion of the course students will be able to demonstrate an integrative approach to environmental issues with a focus on sustainability;

C 04: Communicate complex environmental information to both technical and non-technical audiences;

C 05: Reflect critically on their roles, responsibilities, and identities as citizens, consumers and environmental actors in a complex, interconnected world

Unit - I

Problems of natural resources:
(a) Problems of water resources- Utilization of surface and ground water overutilization, flood, draught, conflict over water, Dams and related problems.
(b) Problems of forest resources -uses and over utilization, deforestation, Dams and its effects on forests and tribes.
(c) Problems of land resources -land as a source, erosion of land, man-induced, land slides and desertification.

Unit - II

Bio-diversity and its protection -
(a) Value of bio-diversity - consumable use: productive use, social, alternative, moral asthetic and values
(b) Bio - diversity and multi - diversity at global and national levels.
(c) Threats to bio - diversity - loss of habitat, poaching of wildlife, man wildlife conflicts.
Unit - III

Human population and environment
(a) Population growth, disparities between countries.
(b) Population explosion, family welfare programme
(c) Environment and human health

Unit - IV

Multidisciplinary nature of environmental studies:
(a) Natural resources
(b) Social problems and the environment
(c) Environmental awareness

Unit - V

Multidisciplinary nature of environmental studies:
(a) Natural resources
(b) Social problems and the environment
(c) Environmental awareness
RKDF UNIVERSITY, BHOPAL
B.Sc. (Courses)

Syllabus
Semester – III

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (Chemistry)</td>
<td>Based on inorganic, and Physical Chemistry</td>
<td>BCH-131</td>
</tr>
</tbody>
</table>

Course outcome:
1. To study about the elements of IIInd and IIIrd transition series and its details.
2. To learn about the thermodynamics and its laws and applications.
3. To know about the carboxylic acid and alcohols and epoxides.

UNIT-I
Definition of transition elements, position in the periodic table, General characteristics & properties of 1st transition elements, Structures & properties of some compounds of transition elements— TiO2, VCl2, FeCl3, CuCl2 and Ni (CO)4. *Chemistry of Elements of IIInd & IIIrd transition series* General characteristics and properties of the IIrd and IIIrd transition elements Comparison of properties of 3d elements with 4d & 5d elements with reference only to ionic radii, oxidation state, magnetic and Spectral properties and stereochemistry.

UNIT-II
Werner’s coordination theory, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes. 
*Non-aqueous Solvents*  Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH3 and liquid SO2.

UNIT-III

UNIT-IV

UNIT-V
**Book suggested:**

**Paper (Practicals)**

**Section – I (Inorganic)**
1. **Gravimetric Analysis**
   Quantitative estimations of, Cu2+ as copper thiocyanate and Ni2+ as Ni – dimethylglyoxime.

**Section-B (Physical)**
1. To determine the CST of phenol – watersystem.
2. To determine the solubility of benzoic acid at various temperatures and to determine the H of the dissolution process.
3. To determine the enthalpy of neutralisation of a weak acid/weak base vs. strongbase/strong acid and determine the enthalpy of ionisation of the weak acid/weakbase.

**Section-C (Organic)**
Systematic identification (detection of extra elements, functional groups, determination of melting point or boiling point and preparation of at least one pure solid derivative) of the following simple mono and bifunctional organic compounds: Naphthalene, anthracene, acenaphthene, benzyl chloride, p-dichlorobenzene, m-dinitrobenzene, p-nitrotoluene, resorcinol, hydroquinone, -naphthol, -naphthol, benzophenone, ethyl methyl ketone, benzaldehyde, vanillin, oxalic acid, succinic acid,
RKDF UNIVERSITY, BHOPAL
B.Sc. (Courses)

Syllabus
Semester –III

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc (Physics)</td>
<td>ELECTRICITY AND MAGNETISM</td>
<td>BPY 131</td>
</tr>
</tbody>
</table>

Course outcome:
1. Study the electric field using Coulombs inverse square law in electrostatics of current
2. Analyse the chemical and heating effect of current
3. Analyse the relations between b, h and m
4. Understand the Faraday's laws of electromagnetic induction by Rayleigh's method
5. Analyse the value of Maxwell equation - boundary conditions

UNIT - I
Principle of a capacitor - energy stored in a capacitor - energy density - change in energy due to dielectric slab - force of attraction between plates of a charged capacitor - capacitance of a spherical and cylindrical capacitors - types of capacitors - electrometers - Kelvin's attracted disc electrometer - quadrant electrometer - measurement of potential, ionization current and dielectric constant (solid).

UNIT - II

UNIT - III

UNIT - IV
Transient current - growth and decay of current in a circuit containing resistance and inductance - growth and decay of charge in a circuit containing resistance and capacitance - measurement of high resistance by leakage - growth and decay of charge in a LCR circuit - condition for the discharge to be oscillatory - frequency of oscillation - Importance in wireless telegraphy.

UNIT - V
Books for Study:


Books for Reference:

RKDF UNIVERSITY, BHOPAL

B.Sc. (Courses)

Semester III

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (Botany)</td>
<td>Diversity &amp; systematics of seed plants</td>
<td>BSB 131</td>
</tr>
</tbody>
</table>

**Course Outcome:**

1. Know the conceptual development of taxonomy & systematics. Understand the general range of variations in the group of angiosperms.
2. Trace the history of development of systems of classification emphasizing angiospermic taxa.
3. Learn about the characters of biologically important families of angiosperms.
4. Know the floral variations in angiospermic families, their phylogeny and evolution. Understand various rules, principles and recommendations of plant nomenclature.
5. Know modern trends in taxonomy.
6. Understand major evolutionary trends in various parts of angiospermic plants.

**UNIT – 1**


**UNIT – 2**

Morphology, Anatomy Reproduction and life cycle of Cycas, Pinus and Ephedra.

**UNIT – 3**

Origin and Evolution of Angiosperms, Fundamental components of α, β, γ taxonomy, Plant Identification, Principles and rules of Botanical Nomenclature, Herbarium and Botanical gardens; Classification of Angiosperms: Bentham and Hooker, and Hutchinson, Modern trends in Taxonomy.

**UNIT – 4**

Diagnostic characteristics and Economic Importance of Families – Ranunculaceae, Brassicaceae, Malvaceae, Rutaceae, Fabaceae, and Apiaceae.

**UNIT – 5**

Diagnostic characteristics & Economic Importance of Families – Asteraceae, Asclepiadaceae, Solanaceae, Lamiaceae, Euphorbiaceae, Liliaceae and Poaceae.

**Practical Exercises + Scheme (Marks- 50)**

Gymnosperms- 10
- Morphological and anatomical study of Cycas, Pinus, and Ephedra (all parts).
- Study of permanent slides of Cycus, Pinus and Ephedra.

Angiosperms- 15
- Study of types of inflorescence and flowers with labelled sketches.
- Technical description of common flowering plants belonging to families mentioned in theory syllabus.

Spotting- 10
Viva-voce- 5
Practical record- 10
SUGGESTED READINGS:--


   (P) Ltd. Kolkata,700009.

   London.


   Ramnagar, New Delhi-110055.


   Ramnagar, New Delhi- 110055.
Course outcome:

1. Identify various stages of embryological development of Amphioxus, frog.
2. To study the difference types of nutrition.
3. To learn about the excretion of organisms.
4. To study about spermatogenesis.

Unit-1

Unit-2

Unit-3

Unit-4

Unit-5

TEXT BOOKS:
Agarwal, V.K. Agarwal, R.A.Srivastava A.K. & Kausha Kumar, Animal physiology & Biochemistry, S. Chand & Co.,
REFERENCES:


YEAR-II SEMESTER-III
PRACTICAL
(ANIMAL PHYSIOLOGY, AND DEVELOPMENTAL BIOLOGY)

I MajorPracticals:

1) Qualitative analysis of digestive enzymes in cockroach.
2) Estimation of the rate of O2 consumption in fish/crab with reference to bodyweight.
3) Detection nitrogenous waste products in fish tank water, bird excreta & mammalian urine.
4) Study of human salivary activity in relation to temperature.
5) Qualitative analysis of carbohydrates, proteins, and aminoacids.

II MinorPracticals:

Kymograph – simple twitch, Trappe, Fatigue, Tetanus, Spigmomanometer, pH meter, Colorimeter, Haemometer, Enzyme action – graphs (temperature, concentration of substrate and enzyme.)
Course outcome:
1. This course enables the students to understand application of biotechnology in Food processing industries.
2. To List out the commercially important enzyme used in food industries.
3. To make the student to understand the causes of food spoilage, control and preventive measures for harmful microorganism.
4. At the end of this course, the student will have an idea of food constituents, importance and their daily dietary allowances; scope and prospects for food industries.

Unit-I
Food as a substrate for microorganisms: pH, moisture content, redox potential, nutrient content and inhibitory substances.
Microorganisms important in food industry: Molds, identification of molds of industrial importance, yeasts & yeasts like fungi, yeasts of industrial importance, bacteria.

Unit-II
General principles underlying spoilage: Causes of spoilage, factors affecting kinds and members of microorganisms in food, factors affecting growth of microorganisms in food. Chemical changes caused by microorganisms.

Unit-III
Foods and enzymes produced by microorganisms – Bread, malted beverages, wines, distilled liquors, vinegar, fermented vegetables, fermented dairy products & oriental fermented goods. Microorganism as food: single cell protein, fats and amino acids from microorganisms. Production of microbial enzymes.

Unit-IV
Introduction to fermentation: rate of microbial growth and death. Fermentation - types, classification, basic requirements, design of a fermentor, factors involved in fermentor design - basic functions - containment body construction - temperature control-stirring and mixing – viscosity

UNIT-V
Isolation and preservation of industrially important micro organisms - strain development mutation and recombination - upstream processing, media for industrial fermentation - characteristics of an ideal production medium - raw material - screening for production media - media formulation - sterilization - (batch and continuous) - addition of antifoaming agents.
References:

2. Pelczar: Microbiology.
3. Prescott: Microbiology.

YEAR-I SEMESTER-III
PRACTICE: FOOD BIOTECHNOLOGY & BIOPROCESS ENGINEERING

1. Quality testing of milk by resazuring test.
2. Determination of phasphatase activity in butter, whey, milk powder.
3. Microbiological analysis of food production.
4. Presumptive test for coliform in butter.
5. Analysis of mycotoxin in fungal contaminated food materials.
6. Introduction of fermenter.
7. Isolation of industrially important microorganisms.
8. Determination of thermal death point (TDP) and thermal death time (TDT) of microorganism for design of a sterilizer.
9. Suggested Readings
11. Plant tissue culture : Gamborg and Phillip.
13. Plants, Genes, and Agriculture : Chrispeels, M. J. and Grierson, D.
14. Genetic Engineering of crop plants : Lycett, G. W. and Grierson, D.
15. Biotechnological innovation in Animal productivity: (Biotol Series)
Course outcome:
1. To study the security trends and cryptography.
2. To know about the Trojans and back doors in details.
3. To study about the different function like hash and all.
4. Knowledge about IP in details.

UNIT I

UNIT II

UNIT III
Hash functions, One way hash functions, SHA (Secure Hash Algorithm), Authentication Requirements, Authentication Functions, Kerberos, Message Authentication Codes, MD5, Message Digest Functions, SSL (Secure Sockets Layer), SSH (Secure Shell).

UNIT IV
Trojans and Backdoors- Overt and Covert Channels, Working, Types (Remote Access Trojans, Data Sending Trojans, Proxy Trojans, FTP Trojans).


UNIT V
IP Security, web Security, firewalls, trusted systems, Computer Forensics, Hacking, classes of hacker (Black Hats, White Hats, Grey Hats, Suicide Hackers), Foot printing, E-mail Spiders.
RKDF UNIVERSITY, BHOPAL
B.Sc.Courses

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc (Electronics)</td>
<td>ELECTRONIC COMMUNICATION SYSTEMS</td>
<td>BEC 131</td>
</tr>
</tbody>
</table>

Course outcome:

1. Explain and apply the concepts telecommunication switching, traffic and networks.
2. Explain and apply concepts of GSM and CDMA system.
3. Carry out Link power budget and Rise Time Budget by proper selection of components and check its viability.
4. Carry out Satellite Link design for Up Link and Down Link.
5. Understand the transmission of voice and data through various networks.

Basic communication systems: UNIT I

Block diagram - information source and input transducer - Transmitter medium - Noise - Receiver - Destination - Necessity for modulation - Types of communication systems. Amplitude Modulation: Definition - AM waveforms - Frequency spectrum and hand width - Modulation index - DSB - SC, SSB, Independent SB, Vestigial SB - Comparison and application of various AM schemes.

UNIT-II


UNIT-III


UNIT-IV

UNIT-V
Television of TV system - Block diagram - Scanning - Synchronisation - VSB transmission and reception Colour signal transmission.

Text Books
Course outcome:
1. Understand the concepts of vector spaces, subspaces, bases, dimension and their properties
2. Relate matrices and linear transformations, compute eigen values and eigen vectors of linear transformations.
4. Realise importance of adjoint of a linear transformation and its canonical form.

UNIT:-I
ALGEBRA : Partial fractions, binomial, exponential and logarithmic series (without proof) summation and approximation-simple problems.

UNIT:-II
THEORY OF EQUATIONS : Polynomial equations with real coefficients, irrational roots, complex roots, symmetric functions of roots, transformation of equation by increasing or decreasing roots by a constant, reciprocal equations. Newton's method to find a root approximately - simple problems.

FINITE DIFFERENCES : Operators E, difference tables, Newton's forward and backward interpolation formulae, Lagrange's interpolation formulae.

UNIT:-III
Laplace transformations: Laplace transformations, Linearity of the Laplace transformation, Existence theorem of Laplace transforms, Laplace transforms of derivatives and integrals, Shifting theorem, Differentiation and integration of transforms, Inverse Laplace transforms, Convolution theorem, Applications of Laplace, transformation in solving linear differential equations with constant coefficients

UNIT:-IV
DIFFERENTIAL CALCULUS: Series Solution of Differential Equations-Power series Method, Bessel’s Equation, Bessel’s function and its properties, recurrence and generating relations, Legendre’s Equation, Legendre’s function and its properties,

UNIT:-V
Groups :- Normal sub group, Quotient groups, homomorphism and isomorphism of groups, Kernel of homomorphism of groups, fundamental theorem of homomorphism of groups, Permutation groups ( even and odd permutations), Alternating groups An, Cayley's theorem.
Reference Books:
6. P.B. Bhattacharya
7. I. S. Luther and I.B. S. Passi, Alegebra Vol- I, II, Narosa Publishing House
Course outcome:

1. Describe the concepts of electrolytes and electrolytic dissociation, pH and its biological significance, buffers, Henderson-Hasselbalch equation, biological buffer systems and their importance.
2. Understanding the laws of thermodynamics, concepts of entropy, enthalpy and free energy changes and their application to biological systems and various biochemical studies and reactions.
3. Conceptual knowledge of air, food, water and soil microbiology.
5. Discuss the biosynthesis and the degradation pathways involved.
6. Specify the biological significance of biomolecules in metabolism.
7. Conceptual knowledge of properties, structure, function of enzymes, enzyme kinetics and their regulation, enzyme engineering, Application of enzymes in large scale industrial processes.

Unit I

Carbohydrates
Chemical structures, nature and properties, Classification and importance in biological cells, Aerobic and anaerobic metabolism. Amino acids—Classification and properties. Structure, Zwitterion nature, Proteins—Classification, Structure and function. Primary, secondary, tertiary and quaternary structure, Proteolysis.

Unit II

Enzymes & Bioenergetics

Unit III

Lipids, vitamins and hormones
Saturated and unsaturated fatty acids, Structure, classification, properties and function of lipids and vitamins, Distribution and functions of lipids in microorganisms, Beta-oxidation of lipids, Hormones: Steroid hormones, Structure and function.

Unit IV

Soil Microbiology, Water Microbiology
Unit V

Food Microbiology & Air Microbiology
Introduction to microbiology of food and milk, Food intoxications, spoilage of food- Fresh food, canned food, vegetables and milk products, Preservation of food and milk, Composition of milk, grading of milk- MBRT., Composition and analysis of air, Aeromicroflora of different habitats, Aeroallergens, Biogeochemical cycles- Role of microbes in Nitrogen and Carbon cycles.

SEMESTER-III

Recommended Books (Semester-III)
1. Principles of Biochemistry, Author- A.L. Lehniger
2. Fundamentals of Biochemistry, Author- J. L. Jain
3. Biochemistry, Author- Voet and Voet.
5. Biochemistry, Author- Stryer.
6. Introduction to protein structure, Authors- Branden and Tooze.
9. Microbial Diversity, Author- D. Colwd.
10. Microbiology A Practical Approach Authors- Patel and Phanse, .
12. Food Microbiology, Authors- Frazier and Westhoff.
13. Food Microbiology, Authors- Adams and Moss
15. Environmental Microbiology, Author- P.D. Sharma.
17. The nature and properties of soil. Authors- Harry buckman and Nyle C. brady.
18. Introduction to soil Microbiology Internationals. Authors- Martin Alexander.

YEAR-I SEMESTER-III
LIST OF EXPERIMENTS

1. Detection of carbohydrates, proteins and lipids.
2. Estimation of activity of enzymes like amylase, protease and lipase.
3. Effect of pH on enzyme activity.
4. Effect of temperature on enzyme activity.
5. Effect of substrate concentration on enzyme activity.
6. Effect of enzyme concentration on enzyme activity.
9. Isolation of organisms from air.
10. Isolation of organisms from water and sewage.
11. Isolation of organisms from food sources.
12. Isolation of Yeast.
13. Isolation of phosphorous solubilizing bacteria/fungus from soil sample.
15. Gradation of milk by Methylene Blue Reduction Test (MBRT).
Course outcome:

1. Understand cold preservation, Freezer types and functioning
2. Understand Dehydration, Dryer types and functioning
3. Understand the engineering units
4. To know the process of heat transfer in food.

Unit I

Engineering units
Dimensions – Primary, secondary
Engineering units- Base units, derived and supplementary units. system – state of system, extensive properties, intensive properties.

Unit II

Heat transfer in food processing
systems for heating and cooling food products, plate heat exchanger, tubular heat exchanger, scraped surface heat exchanger, steam infusion heat exchanger
Thermal properties of foods- specific heat, thermal conductivity.
Modes of heat transfer – conductive heat transfer, convective heat transfer, radiation heat transfer, steady state heat transfer, heat conduction in multilayer system, estimation of convective heat transfer co-efficient, role of insulation in reducing heat loss from process equipment.

Unit III

Mechanical operations
Mixing-different type of mixers used in food in industry, continuously stirred mixing tanks. Filtration- batch filtration, continues filtration, ultra filtration, reverse osmosis
Clarification and concentration process- evaporation, diffusion concentration, single and multiple stage freeze concentration, reverse osmosis.
Dehydration systems - kiln, tunnel, cabinet, drum and spray driers.

Unit IV

Mechanical separation- sedimentation, centrifugation, filtration, phase separation, distillation

Thermal processing of packaged foods- retort/ autoclave sterilization, UHT radiation treatment – electron beam X-ray and gamma rays
Unit V

Food Freezing
Introduction
Thermodynamics of food freezing – Freezing temperature depression, Unfrozen water fraction.
Freezing and freeze drying, IQF, plate freezers, air blast freezers, fluidized bed freezer, freeze drier, cryogenic freezing

Reference

<table>
<thead>
<tr>
<th>No</th>
<th>Subject Code</th>
<th>Subject Type</th>
<th>Subject Title</th>
<th>Marks Allotted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Assignment Marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Max</td>
</tr>
<tr>
<td>1</td>
<td>FC-401/1</td>
<td>Core</td>
<td>English Language</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>(Foundation Course)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>FC-401/2</td>
<td>Core</td>
<td>Development of Entrepreneurship</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>(Foundation Course)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>BSZ 141</td>
<td>Core</td>
<td>Ecology &amp; Evolutionary Biology</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>(Zoology)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>BSB 141</td>
<td>Core</td>
<td>Structure, development &amp; reproduction in flowering plants</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>(Botany)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>BCH 141</td>
<td>Core</td>
<td>Based on Inorganic, Organic And Physical Chemistry</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>(Chemistry)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>BPY 141</td>
<td>Core</td>
<td>ELECTRICITY AND MAGNETISM</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Physics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>BBT 141</td>
<td>Elective</td>
<td>Molecular Immunology &amp; Recombinant DNA Technology</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Biotechnolog y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>BCS-141</td>
<td>Elective</td>
<td>Software Designing</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Comp. Sci.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>BEC 141</td>
<td>Elective</td>
<td>MICROPROCESSOR AND ITS APPLICATIONS</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Electronics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>BMM 141</td>
<td>Core</td>
<td>Analysis</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Maths</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>BMB 141</td>
<td>Elective</td>
<td>Immunology &amp; Medical Microbiology</td>
<td>20</td>
</tr>
<tr>
<td>12</td>
<td>BFS 141</td>
<td>Elective</td>
<td>BIOCHEMISTRY</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Food Sci</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Every candidate appearing in B.Sc. Semester 4th examination shall be examined in

(g) Foundation Course F.C (Compulsory) for all students.

(h) Any one of the following combinations:

1. Physics, Maths, Computer Science.
2. Physics, Maths, Electronics.
3. Physics, Chemistry, Maths.
5. Chemistry, Botany or Zoology, Biotechnology.
6. Chemistry, Botany or Zoology, Microbiology.
7. Chemistry, Botany or Zoology, Food Science.

Provided that the courses of studies for Physics offering combinations from (i) to (iii) and for Chemistry offering combinations from (iii) to (vii) shall be those prescribed for biology group.

<table>
<thead>
<tr>
<th>Electives Subjects</th>
<th>Core Subjects</th>
<th>Combinations Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBT 141 Biotechnology</td>
<td>BSZ 141/BSB 141 (Zoology/Botany), BCH 141 Chemistry</td>
<td>BSZ 141/ BSB 141, BCH 141, BBT 141.</td>
</tr>
<tr>
<td>BMB 141 Microbiology</td>
<td>BSZ 141/BSB 141 (Zoology/Botany), BCH 141 Chemistry</td>
<td>BSB 141/ BSZ 141, BCH 141, BMB 141.</td>
</tr>
<tr>
<td>BEC 141 Electronics</td>
<td>BMM 141 Mathematics, BPY 141 Physics</td>
<td>BMM 141, BPY 141, BEC 141.</td>
</tr>
<tr>
<td>BFS 141 Food Science</td>
<td>BSZ 141/BSB 141 (Zoology/Botany), BCH 141 Chemistry</td>
<td>BSZ 141/ BSB 141, BCH 141, BFS 141.</td>
</tr>
<tr>
<td>BCS 141 Computer Science</td>
<td>BMM 141 Mathematics, BPY 141 Physics</td>
<td>BMM 141, BPY 141, BCS 141.</td>
</tr>
<tr>
<td>Core Subjects</td>
<td>Combinations</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>BMM 141 Mathematics</td>
<td>BCH 141 Chemistry/BCS 141 Computer Science/ BEC 141 Electronics, BPY 141 Physics.</td>
<td></td>
</tr>
<tr>
<td>BPY 141 Physics</td>
<td>BCH 141 Chemistry/BCS 141 Computer Science/ BEC 141 Electronics, BMM 141 Mathematics.</td>
<td></td>
</tr>
<tr>
<td>BCH 141 Chemistry</td>
<td>BMM 141 Mathematics, BPY 141 Physics or, BBT 141 Biotechnology, BSZ 141/BSB 111 (Zoology/Botany) or, BMB 141 Microbiology, BSZ 141/BSB 141 (Zoology/Botany) or, BSB 141 Botany, BZB 141 Zoology or, BFS 141 Food Science, BSZ 141/BSB 141 (Zoology/Botany).</td>
<td></td>
</tr>
<tr>
<td>BSZ 141 Zoology</td>
<td>BCH 141 Chemistry, BBT 141 Biotechnology or, BCH 141 Chemistry, BMB 141 Microbiology or, BCH 141 Chemistry, BSB 141 Botany or, BCH 141 Chemistry, BFS 141 Food Science.</td>
<td></td>
</tr>
<tr>
<td>BSB 141 Botany</td>
<td>BCH 141 Chemistry, BBT 141 Biotechnology or, BCH 141 Chemistry, BMB 141 Microbiology or, BCH 141 Chemistry, BSB 141 Zoology or, BCH 141 Chemistry, BFS 141 Food Science.</td>
<td></td>
</tr>
</tbody>
</table>
RKDF UNIVERSITY, BHOPAL
B.Sc. Courses

Semester – IV

<table>
<thead>
<tr>
<th>Course</th>
<th>Subject</th>
<th>Subject Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc.</td>
<td>English Language</td>
<td>FC-401/1</td>
</tr>
<tr>
<td>(Foundation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

COURSE OUTCOME

C 01: The course aims at exposing students to the examples of prose and poetry in English so that they realize the beauty and communicative power of English

C 02: Upon the completion of the course the students will develop the ability to appreciate ideas and think critically

C 03: On successful completion of the Programme, the students will be accurate both in oral and written communication as they will be strong in Writing skills and its usage.

C 04: They can express a thorough command of English and its linguistic Structures.

Unit-I

2. K. Aludiapillai : “Communication Education and Information Technology”
   “Democratic Decentralisation”
3. S.C. Dubey : “Basic Quality of Life”
5. Julian Huxley : “War as a Biological Phenomenon”
7. Ruskin Bond : “The Cherry Tree”

Unit-II

Short Essay of about 250-300 words.

Unit-III

Translation of a short passage from Hindi to English.

Unit-IV

Drafting CV, writing e-mail message for official purpose.

Unit-V

Language Skills, One-word substitution, homonyms, homophones, words that confuse, Punctuation, Idioms
RKDF UNIVERSITY, BHOPAL
B.Sc.Courses
Semester – IV

<table>
<thead>
<tr>
<th>Course</th>
<th>Subject</th>
<th>Subject Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (Foundation Course)</td>
<td>Development of Entrepreneurship</td>
<td>FC-401/2</td>
</tr>
</tbody>
</table>

**COURSE OUTCOME**

**C 01:** The students develop and can systematically apply an entrepreneurial way of thinking that will allow them to identify and create business opportunities that may be commercialized successfully.

**C 02:** After the completion of the course, the students will be able to have the ability to discern distinct entrepreneurial traits

**C 03:** Know the parameters to assess opportunities and constraints for new business ideas

**C 04:** Understand the systematic process to select and screen a business idea and design strategies for successful implementation of ideas

**C 05:** The students will be able to write a business plan

**Unit-I**

**Entrepreneurship** - Meaning, Concept, Characteristics of entrepreneur.

**Unit-II**

Types of entrepreneurship, importance and views of various thinkers (Scholars).
- Formation of goals, How to achieve goals.
- Problems in achieving targets and solutions.
- Self motivation, elements of self motivation and development.
- Views of various scholars, evaluation, solutions. Leadership capacity: Its development and results.

**Unit-III**

Projects and various organisations (Govt., non-Govt.), Govt. Projects, Non-Govt. projects.Contribution of Books, their limitations, scope.

**Unit-IV**

Functions, qualities, management of a good entrepreneur. Qualities of the entrepreneur (Modern and traditional). Management skills of the entrepreneur. Motive factors of the entrepreneur.
Unit-V

Problems and Scope of the Entrepreneur:
- Problem of Capital
- Problem of Power
- Problem of Registration
- Administrative problems
- Problems of Ownership.
Course outcome:
1. To learn about the details of lanthanide compounds and actinides.
2. To describe Electrolytic and Galvanic cells.
3. Students will be able to explain the quantitative relationship between T,V,n & P as described by kinetic molecular theory.
4. To study about the carbonyl group.

UNIT-I
Electronic structure, oxidation states and ionic radii and lanthanide contraction, complex formation, occurrence and isolation, lanthanide compounds. Actinides-General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from U, Comparison of properties of Lanthanides and Actinides and with transition elements.

UNIT-II
Second law of thermodynamics, need for the law, Carnot’s cycles and its efficiency, Carnot’s theorem, Thermodynamics scale of temperature. Concept of entropy - entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, Third law of thermodynamics: Nernst heat theorem, statement of concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions; Gibbs function(G) and Helmholtz function (A) as thermodynamic quantities, A &G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G and A with P, V and T.

UNIT-III

UNIT-IV
Structure and nomenclature of amines, physical properties. Separation of a mixture of primary, secondary and tertiary amines. Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles, reductive amination of aldehydic and ketonic compounds. Gabrielphthalimide reaction, Diazonium Salts Mechanism of diazotisation, structure of benzene diazoniumchloride, Replacement of diazo group by H, OH, F, Cl, Br, I, NO2reaction and its synthetic application. Nitro Compounds Preparation of nitro alkanes and nitro arenes and their chemical reactions.
UNIT-V


Book suggested:

2. T. Engel and P. Reid, Physical Chemistry, Benjamin-Cummings.

(Practicals)

SECTION – I
(Inorganic)

Colorimetry:
1. To verify Beer-Lambert law for KMnO₄/K₂Cr₂O₇ and determine the concentration of the given KMnO₄/K₂Cr₂O₇ solution.
2. Preparations: Preparation of Cuprous chloride, prussian blue from iron fillings, tetraammine cupric sulphate, chrome alum, potassium trioxalatochromate (III).

Section-B (Physical)

3. To determine the enthalpy of solution of solid calcium chloride. To study the distribution of iodine between water and CCl₄.

Section C (Organic)

Systematic identification (detection of extra elements, functional groups, determination of melting point or boiling point and preparation of at least one pure solid derivative) of the following simple mono and bifunctional organic compounds: benzoic acid, salicyclic acid, aspirin, phthalic acid, cinnamic acid, benzoamide, urea, acetanilide, benzanilide, aniline hydrochloride, p-toluidine, phenyl salicylate (salol), glucose, fructose, sucrose, α-, m-, p-nitroanilines, thiourea.

Books for practical:

3. Findley's Practical Physical chemistry, B.P. Levitt, Longman.
Course outcome:

1. Apply knowledge of electricity and magnetism to explain natural physical processes and related technological advances.
2. Use an understanding of calculus along with physical principles to effectively solve problems encountered in everyday life, further study in science.
3. Predict the behavior of any electrical and magnetic circuits.
4. Formulate and solve complex AC, Dc circuits.
5. Identify the type of electrical machine used for that particular application

UNIT I

UNIT II

UNIT III

UNIT IV
Multistage amplifier – definition of gain, frequency response, decibal gain and bandwidth – operation, frequency response, advantage, disadvantage and applications of RC coupled CE transistor amplifier (two stage) and transformer coupled amplifier. Principle of feedback in amplifiers – positive and negative feedback – effect of negative feedback - emitter follower – positive feedback amplifier as an oscillator - Hartley oscillator, Wien-bridge oscillator and Piezo electric crystal oscillator.
UNIT V

Books for Study:

Course Outcome:
1. Study of the families with respect to morphological characters using botanical terms, floral formula, floral diagram and classification giving.
2. Identification of genus and species with the help of flora of the plant materials.
3. Preparation of artificial, bracketed/indented dichotomous keys based on vegetative and reproductive characters.
4. Study of Morphological and biological peculiarities of plants.

UNIT – 1
The Root system: Root apical meristems, Differentiation of primary and secondary tissues and their roles, Anatomy of Monocot and Dicot roots, Morphological modification of root for storage, respiration, reproduction and interaction with microbes.

UNIT – 2

UNIT – 3
The Leaf system: Origin, Development, Diversity in size, shape and arrangement, Internal structure of Dicot and Monocot leaf in relation to photosynthesis and water loss, Adaptations to water stress, senescence and abscission.

UNIT – 4
The Flower system: Concept of flower as a modified shoot, Structure of Anther, Microsporogenesis and Male Gametophyte, Structure of Pistil, Ovules, Megasporogenesis and Development of Female Gametophyte (Embryo Sac) and its types, Pollination – Mechanism and Agencies of Pollination, Pollen Pistil interactions and Selfincompatibility.

UNIT – 5
Double Fertilization, Development and types of Endosperm and its morphological nature, Development of Embryo in Monocots and Dicots, Fruit development and maturation. Seed structure and dispersal, Vegetative Propagation.
Practical Exercises + Scheme

(Marks- 50)

1- Cutting, staining and mounting of cross section of two materials of monocotyledons/dicotyledons root and stem and leaf like Sunflower and Maize or other available material. 15

2- Organisation of shoot Apex and Root Apex. 5

3- Study of Ovules and Anthers and their types 5

- Structure of stigma and style (Hibiscus, Maize, Ocimum, Citrus and Clitoria (Aprajita) or plant studied by you.

4-Spotting- 10

5-Viva- voce- 5

6-Practical Record- 10

SUGGESTED READINGS:-


7• Shrivastava and Das. Modern text book of Botany Vol-III & IV.

RKDF UNIVERSITY, BHOPAL
B.Sc.Courses

Syllabus
Semester – IV

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (Zoology)</td>
<td>ECOLOGY &amp; EVOLUTIONARY BIOLOGY</td>
<td>BSZ 141</td>
</tr>
</tbody>
</table>

**Course outcome:**

1. To Describe Environmental Population and its control measures.
2. To understand methods of wildlife and conservation and endangered species.
3. To describe Innate and Acquired types of behavior.
4. Knowledge regarding principles, applications and management of environmental science.
5. To study of the ecosystem of pond.

**UNIT I**


**UNIT II**


**UNIT III**


**Unit-IV**


**Unit-V**


**TEXT BOOKS**

REFERENCES:

Introduction to evolution-Dodson-Evolution: process and product.

PRACTICAL

Spotters:

Description and uses of autoclave, Hot air oven, Incubator, Water bath, Centrifuge, Refrigerator, pH meter, Colorimeter, Microtome, Rain gauge, Anemometer, Maximum minimum thermometer, Hygrometer, and Barometer.

Computer applications - Hardware of computer, storage device, mouse. Submission of field Report.

Submission of Practical Record.
RKDF UNIVERSITY, BHOPAL
B.Sc.Courses

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (Biotechnology)</td>
<td>MOLECULAR IMMUNOLOGY &amp; RECOMBINANT DNA TECHNOLOGY</td>
<td>BBT-141</td>
</tr>
</tbody>
</table>

**Course outcome:**

1. Understanding the concept of Gene and the gene architecture.
2. Overview of the central dogma of life and various molecular events.
3. Understanding the principles and applications of Polymerase Chain Reaction (PCR).
4. Molecular Events of Transcription and processing of transcripts, RNA editing.
5. Learn on assigning gene function through mutagenesis and genetic engineering.

**UNIT-I**

Historical perspectives - overview of immune system, innate and acquired immunity, immune - systematic structure and organization.
Antigen and antigenicity, Immunoglobulins - structure, complements, antigen - antibody interaction - monoclonal antibodies.

**UNIT-II**

Organisation and expressions of immunoglobulin genes - histocompatibility complex.
Cytokines: Structure and function-cytokine receptors-biological functions of cytokines - cell mediated immunity; reports and T cell activation - Humoral response; B cell activation and proliferation - hypersensitive reactions.

**UNIT-III**

Immune regulation, autoimmunity, vaccines and immune response to infectious diseases - Immunodeficiency diseases (AIDS) - immune suppression & transplantation.

**Unit -IV**


**Unit -V**

Gene transfer methods in animals: Microinjection, Electroporation, Microprojectile bombardment, Shot Gun method, Ultrasonication, Lipofection, Micro laser. Selection and Screening of Recombinants by genetic, immunochecmical and hybridization methods, Southern, Northern and Western blotting.
REFERENCES

4. Immunology - An Introduction, Tizard.
5. Glick, B.R & Pasternak J.J (1994) Molecular Biotechnology, Principles and Applications of Recombinant DNA, American Society for Microbiology, Washington D.C

PRACTICLE- IMMUNOLOGY

1. Blood grouping
2. Blood cell analysis
3. Lymphocyte subset identification and enumeration.
5. Routes of inoculation
6. Preparation of Antigen - Protocol of immunization
7. Methods of bleeding
8. Preparation of serum components
9. Immuno diffusion
11. Immuno electrophoresis
13. Haemoagglutination.
15. Antigen-antibody reaction (precipitation & agglutination reaction tests)
Course details:
1. Learn the phases of software development.
2. Develop process models and process system models.
3. Gather, understand, analyze and specify requirements
4. Develop architectural design, and implement by following coding principles

UNIT I

UNIT II

UNIT III

UNIT IV
Software Analysis and Testing Software Static and Dynamic analysis, Code inspections, Software Testing Fundamentals, Software Test Process, Testing Levels, Black-Box Testing, White-Box Unit Testing and Unit Testing Frameworks,

UNIT V
Software Maintenance & Software Project Measurement
Need and Types of Maintenance, Software Configuration Management (SCM), Software Change Management, Version Control, Change control and Reporting, Program Comprehension Techniques, Re-engineering,
Course outcome:

1. Recall and apply a basic concept of digital fundamentals to Microprocessor based personal computer system.
2. Identify a detailed s/w & h/w structure of the Microprocessor.
3. Illustrate how the different peripherals (8255, 8253 etc.) are interfaced with Microprocessor.
4. Distinguish and analyze the properties of Microprocessors & Microcontrollers.
5. Analyze the data transfer information through serial & parallel ports.

UNIT-I
Architecture of 8085 microprocessor - Registers - Flags - ALU - Address and data buses - Demultiplexing the address / data bus - Control and status signals - Instruction set of 8085 - Addressing modes - Assembly language programming - Programs for addition, subtraction, multiplication and division of binary and BCD numbers (8-bit only)

UNIT-II
Stack and stack related instructions - Subroutines - Advanced programming techniques - Code conversions - Block transfer of data - Sorting of data - Time delays using single register and register pair - Delay calculations.

UNIT-III
Semiconductor memories - Classification - Instruction cycle, Machine cycle and Tstate - Timing diagrams for opcode fetch, memory read, memory write, I/O read and I/O write machine cycles - Interfacing memory chips - Interfacing an input port - Interfacing an output port - I/O mapped I/O and memory mapped I/O techniques.

UNIT-IV
Interrupts - Hardware and software interrupts - Interrupt priorities - SIM and RIM instructions - Polled I/O and interrupt controlled I/O data transfer - Interfacing programmable devices - Programmable Peripheral Interface 8255 - Internal architecture - Control register and control word - Programming 8255 - Interfacing hex-keyboard and seven segment display.

UNIT-V
Interfacing D/A converter and waveform generation - Interfacing A/D converters - Keyboard / Display Controller 8279 - Internal architecture and working - Programmable Interval Timer 8253/54 - Internal architecture and different modes of operation - Stepper motor interface - Temperature controller - Traffic lights controller.
Text Books

1. Microprocessor Architecture, Programming and Applications with the 8085 -Ramesh S. Gaonkar, 5/e, Penram International Publishing (India).
<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc (Mathematics)</td>
<td>Analysis</td>
<td>BMM-141</td>
</tr>
</tbody>
</table>

**Course outcome:**

1. To apply appropriate numerical methods to solve the problem with most accuracy.
2. Using appropriate numerical methods determine approximate solution of ODE and system of linear equation.
3. Compare different methods in numerical analysis w.r.t accuracy and efficiency of solution.
4. Find numerical solutions of system of Cauchy’s theorem and check the accuracy of the solutions.

**Unit-1**

Group automorphisms, inner automorphism, Group of automorphisms, Conjugacy relation and centraliser, Normaliser, Counting principle and the class equation of a finite group, Cauchy’s theorem for finite abelian groups and non-abelian groups.

**Unit-2**

Introduction to rings, subrings, integral domains and fields, simple properties and examples, ring homomorphism, ideals and quotient rings. Divided differences and Newton's divided differences formula for interpolation and Lagrange's formula for interpolation.

**Unit-3**

Laplace Transformation (LT) - definitions, LT of the function t, e^at, cos at, sin at, e^at cos bt, e^at sin bt, Transform f' (t), f'' (t) - inverse LT relating to the above standard functions. Convolution theorem based problem Maxima, Minima and saddle points of functions of two variables, Improper integrals and their convergence, Comparison test, Abel’s and Dirichlet's tests,

**Unit-4**

Partial Differential equations of the first order, Lagrange’s solution, Some special types of equations which can be solved easily by methods other than general methods, Charpit’s general method of solution, Partial differential equations of second and higher orders, Partial differential equations reducible to equations with constant coefficients.

**Unit-5**

Continuity and differentiability of Complex functions, Analytical function, Cauchy Riemann equation, Harmonic function, Mobius transformations, fixed points, cross ratio.

**Text Books:**

1. I.N. Sneddon, Elements of partial Differential equations Mc graw Hill, Co. 1988
4. Numerical Analysis by B.D. Gupta,

**Reference Books:**

Course outcome:

1. Demonstrate an understanding of key concepts in immunology
2. Understand the overall organization of the immune system
3. Conceptualize how the collection of individual clones of lymphocytes (termed the "immune repertoire") arises from rearrangement within two genetic loci: the Ig gene in B cells and the antigen receptor in T cells.
4. Learn how "clonal selection" allows for the expansion of a limited number of antigen-recognizing lymphocytes in response to a specific antigenic stimulus
5. Begin to appreciate the significance of maintaining a state of immune tolerance sufficient to prevent the emergence of autoimmunity
6. To make them understand the salient features of antigen antibody reaction & its uses in diagnostics and various other studies.

Unit I

Infection
Normal flora of the human body, Infection and its types, Mechanism of pathogenesis.

Immune System
Organs of Immune system- Spleen, thymus and lymph nodes, Cells of Immune system- T cells- its types and receptors. B cells and its receptors.

Unit II

Immune Response
Immunity- Innate and acquired, Host defense mechanism- First, second and third line of host defense, Primary and secondary responses.

Antigens and Antibodies
Antigens- Properties and types, Adjuvants, Immunoglobulins- Separation, structure and types, Generation of antibodies, Antibody diversity.

Unit III

Antigen and Antibody Reactions
Agglutination and precipitation reactions, Hemagglutination and PHA, Immunofluorescence, ELISA, RIA, Coombs test (Direct and Indirect), Complement- Components and biological activities.

Unit IV

Epidemiology of Infectious Diseases
Epidemiological study, Transmission of diseases, Types of diseases- Epidemic, pandemic and sporadic, Nosocomial infections.

Antimicrobial Agents
Unit V

**Hypersensitivity**

Hypersensitivity- Immediate and delayed type, Autoimmune diseases, Skin tests.

**Microbial Diseases- I**

Gram Positive Cocci- *Staphylococcus aureus* and *Streptococcus pneumonia*, Gram Negative Bacilli- *Salmonella typhi* and *Vibrio cholari*, Acid fast bacteria- *Mycobacterium tuberculosis*. Virus- Hepatitis and HIV.

**Recommended Books (Semester-IV)**

1. Immunology, Author- J. Kuby.
2. Fundamental Immunology, Author– W.E. Paul.
3. Fundamentals of Immunology, Authors– Coleman, Lombard and Sicard.
4. Immunology – Weir and Steward.
5. Immunology, A Textbook, Author- C.V. Rao.
7. Essentials of Immunology, Authors- Roitt, I.M.
8. Immunology-Understanding of Immune System, Author- Klaus D. Elgert (1996)
10. The Experimental Foundations of Modern Immunology. Author- Clark, V.R.,
11. Medical Microbiology, Vol. 1 : Microbial Infection, Vol. 2 : Practical Medical Microbiology,
12. Authors- Mackie and McCartney.
13. Epidemiology and Infections, Author- Smith
14. Lecture Notes in Immunology, Author- I.R. Todd
15. Microbiology in Clinical Practice, Author- D.C. Shanson.
16. Diagnostic Microbiology, Authors- Baron, Peterson and Finegold.

**YEAR-II SEMESTER-IV**

**LIST OF EXPERIMENTS**

1. Estimation of haemoglobin by Sahli’s method.
2. Estimation of haemoglobin by Cynam haemoglobin method.
3. Total count of W.B.C.
4. Total count of R.B.C.
6. Flocculation reaction- VDRL
8. Immuno-diffusion techniques- ODD and RID.
9. UV as a mutagenic agent.
10. Replica plating technique.
11. Estimation of skin microflora.
Course outcome:
1. Understand and describe the general chemical structures of the major components of foods (water, proteins, carbohydrates, and lipids).
2. Give a molecular rationalization for the observed physical properties and reactivity of major food components.
3. Provide a theoretical explanation for observed extent and rates of reactions that are common to foods.
   Predict how processing conditions are likely to change the reactivity of food components.
4. To predict how changes in overall composition are likely to change the reactivity of individual food components.
5. To know the different metabolisms of nutrients.

Unit I
Carbohydrates: classification, monosaccharaides, oligosaccharaides, polysaccharaides, structure and configuration of aldose, ketoses, triose, tetrose, pentose, hexose, starch, inulin, glycogen, cellulose, and biomolecules, prokaryotic and eukaryotic cells, nucleus, mitochondria, endoplasmic reticulum, Golgi apparatus, lysosomes, peroxisomes.

Unit II
Lipids: classification of lipids, fatty acids, essential fatty acids, triglycerols, phospholipids, glycolipids, lipoprotein, sterols, amphipathic lipids, digestion absorption transportation and utilization, functions source and requirement, effect of deficiency.

Unit III
Proteins and amino acid: amino acid, classification, properties, essential amino acid, structure of proteins—primary, secondary, tertiary, quaternary structure of proteins; protein denaturation.

Unit IV
Enzymes: Nomenclature and classification, kinetics of enzymic reactions, types of enzymes, enzyme inhibition, reversible inhibition, irreversible inhibition, conditions affecting enzymatic reactions, co-enzymes.

Vitamins: classification, functions, requirement and deficiency conditions, vitamin A, D, E, K, Ascorbic acid, Thiamine, Riboflavin, Niacin, Pyridoxine, Folic acid, Pantothenic acid.

Unit V
Metabolism of carbohydrates: glycolysis and tricarboxylic acid (TCA) cycle, HMP shunt.

Metabolism of proteins: - Transamination, deamination, decarboxylation, urea cycle.
REFERENCE:

<table>
<thead>
<tr>
<th>No</th>
<th>Subject Code</th>
<th>Subject Type</th>
<th>Subject Title</th>
<th>Marks Allotted</th>
<th>Assignment Marks</th>
<th>Theory Marks</th>
<th>Practica l Marks</th>
<th>Tota l Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Max</td>
<td>Min</td>
<td>Max</td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td>1</td>
<td>FC-501/1</td>
<td>Core</td>
<td>Values &amp; Spirituality</td>
<td>10</td>
<td>4</td>
<td>40</td>
<td>14</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Foundation Course</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>FC-501/2</td>
<td>Core</td>
<td>Basic Computer Information Technology-I</td>
<td>10</td>
<td>4</td>
<td>40</td>
<td>14</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Foundation Course</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>BSZ 151</td>
<td>Core</td>
<td>Microbiology And Biochemistry</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Zoology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>BSB 151</td>
<td>Core</td>
<td>Based On Inorganic, Organic And Physical Chemistry</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Botany</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>BCH 151</td>
<td>Core</td>
<td>Plant Physiology And Biochemistry</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Chemistry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>BPY 151</td>
<td>Core</td>
<td>NUCLEAR PHYSICS</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Physics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>BBT 151</td>
<td>Elective</td>
<td>Instrumentation &amp; Basic Biostatistics</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Biotechnolog y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>BCS-151</td>
<td>Elective</td>
<td>Computer Network</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Comp. Sci.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>BEC 151</td>
<td>Elective</td>
<td>COMMUNICATION</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Electronics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>BMM 151</td>
<td>Core</td>
<td>Real Analysis I</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Maths</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>BMB 151</td>
<td>Elective</td>
<td>Bioinformatics, Biostatistics &amp; Industrial Microbiology</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
<td>50</td>
</tr>
<tr>
<td>12</td>
<td>BFS 151</td>
<td>Elective</td>
<td>FOOD MICROBIOLOGY</td>
<td>20</td>
<td>8</td>
<td>80</td>
<td>27</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Food Sci</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Every candidate appearing in B.Sc. Semester 5th examination shall be examined in
(i) Foundation Course F.C (Compulsory) for all students.
(j) Any one of the following combinations:
   1. Physics, Maths, Computer Science.
   2. Physics, Maths, Electronics.
   3. Physics, Chemistry, Maths.
   5. Chemistry, Botany or Zoology, Biotechnology.
   6. Chemistry, Botany or Zoology, Microbiology.
   7. Chemistry, Botany or Zoology, Food Science.

Provided that the courses of studies for Physics offering combinations from (i) to (iii) and for Chemistry offering combinations from (iii) to (vii) shall be those prescribed for biology group.

<table>
<thead>
<tr>
<th>Electives Subjects</th>
<th>Core Subjects</th>
<th>Combinations Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBT 151 Biotechnology</td>
<td>BSZ 151/BSB 151 (Zoology/Botany), BCH 151 Chemistry</td>
<td>BSZ 151/ BSB 151, BCH 151, BBT 151.</td>
</tr>
<tr>
<td>BMB 151 Microbiology</td>
<td>BSZ 151/BSB 151 (Zoology/Botany), BCH 111 Chemistry</td>
<td>BSB 151/ BSZ 151, BCH 151, BMB 151.</td>
</tr>
<tr>
<td>BEC 151 Electronics</td>
<td>BMM 151 Mathematics, BPY 151 Physics</td>
<td>BMM 151, BPY 151, BEC 151.</td>
</tr>
<tr>
<td>BFS 151 Food Science</td>
<td>BSZ 151/BSB 151 (Zoology/Botany), BCH 151 Chemistry</td>
<td>BSZ 151/ BSB 151, BCH 151, BFS 151.</td>
</tr>
<tr>
<td>BCS 151 Computer Science</td>
<td>BMM 151 Mathematics, BPY 151 Physics</td>
<td>BMM 151, BPY 151, BCS 151.</td>
</tr>
<tr>
<td>Core Subjects</td>
<td>Combinations</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>BMM 151 Mathematics</td>
<td>BCH 151 Chemistry/BCS 151 Computer Science/ BEC 151 Electronics, BPY 151 Physics.</td>
<td></td>
</tr>
<tr>
<td>BPY 151 Physics</td>
<td>BCH 151 Chemistry/BCS 151 Computer Science/ BEC 151 Electronics, BMM 151 Mathematics.</td>
<td></td>
</tr>
<tr>
<td>BCH 151 Chemistry</td>
<td>BMM 151 Mathematics, BPY 151 Physics or, BBT 151 Biotechnology, BSZ 151/BSB 151 (Zoology/Botany) or, BMB 151 Microbiology, BSZ 151/BSB 151 (Zoology/Botany) or, BSB 151 Botany, BZB 151 Zoology or, BFS 151 Food Science, BSZ 151/BSB 151 (Zoology/Botany),</td>
<td></td>
</tr>
<tr>
<td>BSZ 151 Zoology</td>
<td>BCH 151 Chemistry, BBT 151 Biotechnology or, BCH 151 Chemistry, BMB 151 Microbiology or, BCH 151 Chemistry, BSB 151 Botany or, BCH 151 Chemistry, BFS 151 Food Science.</td>
<td></td>
</tr>
<tr>
<td>BSB 151 Botany</td>
<td>BCH 151 Chemistry, BBT 151 Biotechnology or, BCH 151 Chemistry, BMB 151 Microbiology or, BCH 151 Chemistry, BSB 151 Zoology or, BCH 151 Chemistry, BFS 151 Food Science.</td>
<td></td>
</tr>
</tbody>
</table>
COURSE OUTCOME

C 01: The course aims to teach and inculcate the importance of value based living among students and give them a deeper understanding about the purpose of life.

C 02: Upon the completion of the course the students will understand the importance of value based living.

C 03: Students will understand and start applying the essential steps to become good leaders and emerge as responsible citizens with clear conviction to practice values and ethics in life.

C 04: Students will become value based professionals and will contribute in building a healthy nation.

Chapter 1: THE SUPREME- SOURCE OF VALUES

6.1 Objectives 6.2 Introduction 6.3 All about the Supreme
6.4 Name & Form of the Supreme 6.5 Abode of the Supreme
6.6 Attributes of the Supreme 6.7 Action of benediction
6.8 Auspicious confluence (Now or never) 6.9 Summary
6.10 Glossary 6.11 Suggested reading

Chapter 2: HEALING RELATIONSHIPS WITH THE SUPREME

7.1 Objectives 7.2 Introduction 7.3 Significance of the relationships
7.4 All relations with ONE major relations 7.6 True and eternal relations
7.7 Benefits of various relationships 7.8 The timeless dimensions 7.9 Summary
7.10 Glossary 7.11 Suggested reading

Chapter 3: RAJYOGA MEDITATION

8.1 Objectives 8.2 Introduction 8.3 Methods of Meditation
8.4 Rajyoga meditation with a difference 8.5 Five fold impact of Rajyoga meditation
8.6 Stages of Rajyogameditation 8.7 Attainments of Meditation
8.8 Research studies on meditation 8.9 Summary
8.10 Glossary 8.11 Suggested reading

Chapter 5: SPIRITUAL LIFE STYLE

9.1 Objectives 9.2 Introduction 9.3 Early morning meditation
9.4 Regular spiritual study 9.5 Authentic life style 9.6 SatwicDiet
9.7 Selfless service 9.8 Review of Personal Progress
9.9 Summary 9.10 Glossary 9.11 Suggested reading

Chapter 5: EXERCISES FOR PRACTICE

Quiet reflection- Practice introversion-Being an observer-Stand back and observe -Self awareness (Soul consciousness)-Experiencing Body free stage-Reflect on original qualities-Visualize the Divine-Think attributes of the Supreme-Developing a living relationship-Surrender to God-Create Good wishes for all-Visualization in Meditation: Orbs of Light- The forest-The Balloon
COURSE OUTCOME

C 01: After studying this course the students will understand the fundamental hardware components that make up a computer’s hardware and the role of each of these components.

C 02: Have an understanding about an operating system and an application program, and what each is used for in a computer

C 03: Demonstrate a basic understanding of computer hardware and software.

C 04: Students will apply the computer concepts and skills learned to solve business problems

C 05: Students will understand the basic concepts and terminology related to computer technology

Unit – I


Unit – II

INTRODUCTION TO COMPUTER ORGANIZATION –II : -Basic components of a computer system Control Unit, ALU. Input/ Output function and Characteristics, memory RAM, ROM, EPROM, PROM.

Unit – III

Unit – IV


INTRODUCTION TO OPERATING SYSTEM :- Introduction to operating systems, its functioning and types. basic commands of dos & Windows operating System.

Disk Operating System (DOS)

- Introduction, History and Versions of DOS.
- DOS Basics
  - Physical Structure of disk, Drive name, FAT, file & directory structure and naming rules, booting process, DOS system files.
- DOS Commands
  - Internal DIR, MD, CD, RD, Copy, DEL, REN, VOL, DATE, TIME, CLS, PATH, TYPE etc.
  - External CHKDSK, SCOPE, PRINT DISKCOPY, DOSKEY, TREE, MOVE, LABEL, APPEND, FORMAT, SORT, FDISK, BACKUP, MODE, ATTRIB HELP, SYS etc.

Books Recommended

1. 
2. 

University BHOPAL
B.Sc. Courses
PRACTICALS

DOS:
• DOS commands: Internal & External Commands.
• Special batch file: Autoexec, Bar Hard disk setup.

Windows 98:
• Desktop setting: New folder, rename bin operation, briefcase, function. Control panel utility.
• Display properties: Screen saver, background settings.

Ms-Word:
• Creating file: save, save as HTML, Save as Text, template, RTF Format.
• Page setup utility: Margin settings, paper size setting, paper source, layout.
• Editing: Cut, paste special, undo, redo, find, replace, goto etc.
• View file: page layout, Normal Outline, master document, ruler header, footer, footnote, full screen.
• Insert: break, page number, symbol, date & time, auto text, caption file, object, hyperlink, picture etc.
• Format: font, paragraph, bullets & numbering, border & shading, change case, columns.
• Table: Draw label, insert table, cell handling, table auto format, sort formula.
Course outcome:

1. To study about the monosaccharide and its details.
2. To desrcibed about the transition metal complex of the various properties.
3. Various spectroscopy methods and spectrums.
4. To learn about organo compounds.

UNIT-I
Limitations of valence bond theory, an elementary idea of crystal-field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, Magnetic Properties of Transition Metal Complex Types of magnetic behavior, methods of determining magnetic susceptibility, spin-only formula. L-S coupling, Electron Spectra of Transition Metal Complexes Types of electronic transitions, selection rules for d-d transitions ,spectroscopic ground states, spectro chemical series. Orgel-energy level diagram for d1 and d9 states, discussion of the electronic spectrum of [Ti(H2O)6]3+ complex ion.

UNIT-II
Black-body radiation, Plank’s radiation law, photoelectric effect, heat capacity of solids, Compton effect, wave function and its significance of Postulates of quantum mechanics , quantum mechanical operator, commutation relations, Hamiltonian operator, Hermitian operator, average value of square of Hermitian as appositive quantity, Role of operators in quantum mechanics, To show quantum mechanically that position and momentum cannot be predicated simultaneously, Determination of wave function & energy of a particle in one dimensional box, Pictorial representation and its significance.

UNIT-III

UNIT-IV
Organomagnesium compounds: the Grignard reagents—formation, structure and chemical reactions. Organozinc compounds: formation and chemical reactions. Organolithium compounds: formation and chemical reactions.

Books:
4. P.W. Atkins, Physical Chemistry, ELBS.

(Practical)

SECTION – I
(Inorganic)

Semimicro qualitative analysis of mixture containing not more than four radicals (including interfering, Combinations and excluding insolubles):
Pb²⁺, Hg²⁺, Hg²²⁺, Ag⁺, Bi³⁺, Cu²⁺, Cd²⁺, As³⁺, Sb³⁺, Sn²⁺, Fe³⁺, Cr³⁺, Al³⁺, Co²⁺, Ni²⁺, Mn²⁺, Zn²⁺, Ba²⁺, Sr²⁺, Ca²⁺, Mg²⁺, NH₄⁺, CO₃²⁻, S₂⁻, SO₃²⁻, S₂O₃²⁻, NO₂⁻, CH₃COO⁻, Cl⁻, Br⁻, I⁻, NO₃⁻, SO₄²⁻, C₂O₄²⁻, PO₄³⁻, BO₃⁻

Section-B (Physical)

1. To determine the strength of the given acid solution (mono and dibasic acid) conductometrically.
2. To determine the solubility and solubility product of a sparingly soluble electrolyte conductometrically
3. To determine the strength of given acid solution (mono and dibasic acid)/KMnO₄ – Mohr salt potentiometrically.

Section-C (Organic)

1. Laboratory Techniques
   (a) Steam distillation (non evaluative) Naphthalene from its suspension in water Separation of o-and p-nitrophenols
   (b) Column chromatography (non evaluative) Separation of fluorescein and methylene blue Separation of leaf pigments from spinach leaves

2. Chromatography Method
   Determination of Rf values and identification of organic compounds
   (a) Separation of green leaf pigments (spinach leaves may be used) by paper chromatographic method
   (b) Separation of a mixture of coloured organic compounds using common organic solvents by TLC.

3. Synthesis of the following organic compounds:
   1. To prepare p-bromoaniline from p-bromoacetanilide.
   2. To prepare m-nitroaniline from m-dinitrobenzene.
Course outcome:
1. Understand the properties of positive rays, experimental proof by frank and hertz method
2. Analyse the relationship between various types of couplings
3. Understand the properties of x-ray's verification
4. Analyse the ideas of basics of nucleus and their energy
5. Perform the procedures for nuclear fission and fusion

UNIT-I

RADIOACTIVITY:

UNIT II

NUCLEAR DETECTORS:

UNIT III

ARTIFICIAL TRANS MUTATION:
UNIT IV

UNIT V
NUCLEAR FISSION, FUSION AND ELEMENTARY PARTICLES

Books for Study:

Books for Reference:
3. Atomic and Nuclear Physics by Little field and Thorley, ELBS (2002)
Basic Nuclear Physics and Cosmic rays, B.N. Srivatsava, Pragti Prakasham
**Course Outcome:**

1. Know importance and scope of plant physiology.
2. To understand the plants and plant cells in relation to water.
3. Understand the process of photosynthesis in higher plants with particular emphasis on light and dark reactions, C3 and C4 pathways.
4. Understand the respiration in higher plants with particular emphasis on aerobic and anaerobic respiration.
5. Understand the biochemical nature of nucleic acids, their role in living systems, experimental evidences to prove DNA as a genetic material.
6. Understand the process of synthesis of proteins and role of genetic code in polypeptide formation.

**UNIT – 1**


**UNIT – 2**

**Photosynthesis:** Chloroplast, Photosynthetic pigments, Red drop, Emerson's effect, Concept of two Photosystems, Light reaction, Dark reaction - Calvin cycle, Hatch-Slack cycle, CAM cycle, Factors affecting rate of photosynthesis & photorespiration.

**UNIT – 3**

**Respiration:** Mitochondria, aerobic and anaerobic respiration, Respiratory coefficient, mechanism of respiration - Glycolysis, Kreb’s cycle, Pentose phosphate pathway, Electron transport system, Factors affecting rate of respiration, Redox potential and theories of ATP synthesis.

**UNIT – 4**

**Definition, classification and chemical structure:** Monosaccharide, disaccharide, oligosaccharide and polysaccharides; Amino acids, essential and non essential amino acids; Lipids, saturated and non saturated fatty acids.

Classification, nomenclature and characteristics of Enzymes, Concept of holoenzyme, apoenzyme, co-enzyme and co-factors, mode & mechanism of enzyme action, Factors affecting enzyme activity. Plant Hormones, mode of action of Auxins, Gibberellins, Cytokinin and Abscissic acid.

**UNIT – 5**

**Genetic Engineering:** Tools and techniques of recombinant DNA technology; cloning vectors; genomic and cDNA library; transposable elements; gene mapping and chromosome walking. Biotechnology: Functional definition; basic aspects of plant tissue culture; cellular totipotency, differentiation and morphogenesis biology of Agrobacterium; vectors for gene delivery and marker genes; salient achievements in crop biotechnology.
Practical Exercises+Scheme (Marks-50)

Question 1 -
1- Preparation of solution of specific Normality, Molal and Molar solutions.
2- Exercises related to osmosis and osmotic relation.
3- Exercises related to Transpiration.
4- To separate Plastidial pigments by Paper Chromatography.
5- To perform the exercise of Photosynthesis & Respiration.
6- To perform biochemical test for Carbohydrate, Lipid and Protein.
7- To extract Enzyme for any plant part and demonstrate its activity. (Any two experiments from above mentioned list)

Question 2: Comment on any technique related to Biotechnology- 05
Spotting- 10
Viva-voce- 5
Practical Record- 10

SUGGESTED READINGS:-

Syllabus
Semester – V

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (Zoology)</td>
<td>MICROBIOLOGY AND BIOCHEMISTRY</td>
<td>BSZ 151</td>
</tr>
</tbody>
</table>

Course outcome:
1. To study the classification of different microorganisms.
2. To learn about the different morphology of water, soil, food microbiology and its effects.
3. Learn the structure and functions of bio-molecules and their role in metabolism.

Unit-1

Unit-2

Unit-3

Unit-4
Biochemistry- Definition and its importance, Physio- chemical forces acting on the living body – a) Definition of pH and its determination, Maintenance of pH of blood. 
b) Definition of osmosis, abnormality in edema and dehydration. 
Nucleic acids, structure and classification.

Unit-5

REFERENCES:
Microbiology- Pelzer. 
Biology of Microorganism- Madigan-Brock 
Microbiology Lab manual – Capachim. 
Microbiology fundamentals and application- Atlas.R.M. 
MAJOR PRACTICALS:

1. Estimation of dissolved oxygen content in the given water sample (Winklers method).

2. Estimation of salinity and pH in given watersample.


MINOR PRACTICALS:

4. Examination of yeast, mould, protozoa and pathogenic bacteria.

5. Estimation of urinesugar.


7. Problems on calculation of Mean, median, mode.

Spotters

Developmental Biology-Slides

Slides of mammalian sperm and Ovum

Slides of different developmental stages of chick embryos (24, 48, 72, 96 hrs)

Slides of blastula and gastrula of frog (morula, early gastrula, yolk plug stage, late gastrula)

Placenta of Sheep / Pig/ Rat.
Course outcome:
1. Understanding the principles and operation of ELISA readers; Spectrophotometers; Freeze driers/lyophilizes.
2. Learning principle and operations of Thermal cyclers; Real-time PCR; DNA synthesizer; DNA sequencer; Microscopes: Light, stereo, phase contrast and inverted.
3. Learning various analytical techniques and principles for separation of Biopharmaceuticals including Ion exchange chromatography, Affinity chromatography, Gel filtration chromatography, HPLC method for purification of proteins.
4. To learn the Methodologies of Biostatistics and its application in selection of the Biological samples.
5. To understand Biostatistical Analysis of the Biological Experiments.

Unit - I

Unit - II

Unit - III

Unit - IV
Introduction and Definition of Biostatistics, Tabulation and classification of data, Frequency distribution and Graphical distribution of data, Measures of central tendencies Mean, Median, Mode and their properties. Computation of mean, variance and standard deviation, t-test, correlation coefficient.

Unit - V
Measures of dispersion: range, Mean deviation, Standard deviation and coefficient of Variation. Student T and Chi-square test, Concepts and problems on probability, Normal Distribution and their applications. Types of errors (Type I, II).
Suggested Readings

2. Analytical Chemistry: Christion G. D.
4. An Introduction to Practical Biochemistry: Plummer D. T.
9. Molecular databases for protein and sequence and structure studies: Sillince A. and Sillince M.
10. Sequence Analysis primers : Gribskov, M. and Devereux, J.
11. Bioinformatics: Sequence and Genome Analysis By David W.
12. Mount, University of Arizona, Tucson
13. Discovering Genomics, Proteomics, & Bioinformatics, Second EditionBy A. Malcolm Campbell, Davidson College; Laurie J.
14. Heyer, Davidson College; With a Foreword by Francis S. Collins

PRACTICLE- INSTRUMENTATION

1. Determination of bacterial growth curve
2. Immobilization of enzymes using sodium alginate
3. Immobilization of yeast cells using sodium alginate
4. Ethanol production using immobilized yeast cells
5. Estimation of ethanol
6. Compound separation using column chromatography and thin layer chromatography
7. Fermentors

Introduction and working to all Instruments.
<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc.(Computer Science)</td>
<td>COMPUTER NETWORK</td>
<td>BCS-151</td>
</tr>
</tbody>
</table>

Course outcome:

1. Create a new protocol and test its efficiency.
2. Design a new network architecture using protocols and interfaces.
3. Create a hybrid topologies using the existing topologies, and check in efficiency.
4. Apply different encoding and decoding mechanisms involved in different types of transmission media and to measure the transmission impairments.
5. Design a model internet with various categories of networks and test the transmission rate.

UNIT I


UNIT II


UNIT III

MAC Sub layer: Static & Dynamic channel allocation, Media access control for LAN & WAN. Classification of MAC Sub layer protocol, Study of various collisions, Wireless LANs, Broadband Wireless, Bluetooth: Architecture, Application & Layering.

UNIT IV

Network Layer: Need, Services Provided, Design issues, Routing algorithms: Least Cost Routing algorithm, IP protocol, IP Addresses, Comparative study of IPv4 & IPv6, Mobile IP.

UNIT V

RKDF UNIVERSITY, BHOPAL
B.Sc.(Courses)

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc (Electronics)</td>
<td>COMMUNICATION</td>
<td>BEC 151</td>
</tr>
</tbody>
</table>

Course outcome:

1. To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver, Picture Tubes and Television Camera Tubes.
2. To study audio recording systems such CD/DVD recording, Audio Standards, and Acoustics principles.
3. To study the various Colour Television systems with a greater emphasis on television standards.
4. Able to know standing wave ratio for open, short and matched terminations on trainer kit.
5. Explain and apply the concepts telecommunication switching, traffic and networks.
6. Carry out Link power budget and Rise Time Budget by proper selection of components and check its viability.

UNIT-I

UNIT-II

UNIT-III

UNIT-IV
Colour Television receivers - PAL D Colour receiver, AGC, Sync - Separators and deflection circuits, Luminance channel, Colour signal processing, separation of U and V modulation products - Subcarrier generation and control. Special Topics in Television - Digital tuning techniques - Remote control - Cable Television - Satellite TV - video tape recorders - Video disc systems - Digital TV - Fundamentals of Digital TV.
UNIT-V

Text Books

4) 2. An Introduction to Thyistors and Their Applications - M. Ramamoorthy, 2/e, East West press.

Television and Video Engineering - A. M. Dhake, 2/e, Tata McGraw Hill
### Course Outcome:

1. Find numerical solutions of system of linear equations and check the accuracy of the solutions.
2. Solve initial and boundary value problems in differential equations using numerical methods.
3. Apply various numerical methods in real life problems.
4. Describe fundamental properties of the real numbers that lead to the formal development of real analysis.
5. Demonstrate an understanding of limits and how they are used in sequences, series, Construct rigorous mathematical proofs of basic results in real analysis.

### UNIT:-I

**Sets and functions** :-Sets and elements; operations on sets; functions; real valued functions; equivalence; countability; real numbers; least upper bounds.

**Sequences of Real Numbers** :-Definition of a sequence and subsequence; limit of a sequence; convergent sequences; divergent sequences; bounded sequences; monotone sequences; operations on convergent sequences; operations on divergent sequences; limit superior and limit inferior; Cauchy sequences.

### UNIT:-II

**Series of Real Numbers** :-Convergence and divergence; series with non-negative numbers; alternating series; conditional convergence and absolute convergence; tests for absolute convergence; series whose terms form a non-increasing sequence; the class 1².

**Limits and metric spaces** :-Limit of a function on a real line; metric spaces; limits in metric spaces.

### UNIT:-III

UNIT:-IV


UNIT:-V


Reference Book :-

1. Treatment as in "Methods of Real Analysis" : Richard. R. Goldberg (Oxford and IBH Publishing Co.)
2. C E Frooerg. Introduction to Numerical Analysis, (Second Edition L Addison-Wesley - 1979,
Course outcome:
1. To study the bioinformatics and its application on biology.
2. To know the statistical application in biology.
3. To understand the industrial microbiology and its process.
4. To study the scale up process.

Unit I
Introduction to Bioinformatics
Bioinformatics- Definition and relation to molecular biology, Potential of bioinformatics, Application of bioinformatics.
Databases
Nucleic acid and Protein databases, Structure databases, Enzyme databases, Specialized (organism and species) databases.

Unit II
Biostatistics
Measure of central tendency- Mean, mode and median, Measure of dispersion- Standard deviation and Standard error, Diagrammatic and graphic representation of frequency distribution.

Biostatistics II
Basic idea of probability- Addition and Multiplication laws, Test of significance- Chi square test, Normal distribution and departures from normality.

Unit III
Fundamentals of Industrial Microbiology
General concepts of industrial microbiology, Primary and secondary screening, Strain development strategies, Sterilization of fermentor, media and air.

Fermentor Design
Types of fermentations processes, Design of typical batch fermentor, Factors affecting fermentor design, Control of agitation, aeration, pH, temperature and dissolved oxygen, Types of fermentors.

Unit IV
Scale up and DSP
Inoculum development, Scale up of fermentation process, Raw material for media preparation, Harvesting and product recovery.

Unit V
Industrial production – I
Production of antibiotics- Penicillin and semi-synthetic penicillins, Production of enzymes-Amylase, Immobilization of enzymes and applications of immobilized enzymes.

Industrial production – II
Production of solvent- Ethanol, Production of Vitamins- Cyanocobalamin, Production of Organic Acids- Acetic Acid, Production of Amino Acids- Glutamic Acid,
Recommended Books (Semester-V)
1. Bioinformatics, Author- Baxevanis.
2. Bioinformatics, Author- Higgins and Taylor.
3. The Internet and the New Biology: Tools for Genomic and Molecular Research, Author- Peruski and Peruski.
5. Principles of Biostatistics, Authors- Pagano et al.
6. Introduction to Biostatistics, Authors- Forthoter and Lec.
7. Text of Microbiology, Author- Ananthanarayanan and Panikar.
9. Epidemiology and Infections, Author- Smith
10. Lecture Notes in Immunology, Author- I.R. Todd
11. Microbiology in Clinical Practice, Author- D.C. Shanson.
12. Diagnostic Microbiology, Authors- Baron, Peterson and Finegold.

YEAR-III SEMESTER-V
LIST OF EXPERIMENTS

1. Examination of urine – Physical, chemical, microscopic and bacteriological.
2. Isolation and identification of Gram positive bacteria
   (a) Staphylococcus sp.
   (b) Streptococcus sp.
3. Isolation and identification of Gram positive bacteria
   a. E. coli
   b. Proteus sp.
   c. Salmonella sp.
4. Antibiotic sensitivity test by disc diffusion technique.
5. Isolation of antibiotic resistant mutants by gradient plate technique.
6. Measure of central tendencies- Mean, Mode and Median.
7. Explore NCBI.
8. To read GenBank entries.
9. To read SWISSPROT entries.
10. To perform sequence similarity search using BLAST.
11. To perform multiple sequence alignment using Clustal W.
12. To visualize PDBIB 1AJE with the help of RASMOL.
Course outcome:
1. Understand the important genera of microorganisms associated with food and their characteristics, their growth pattern and parameters.
2. Comprehend the role of the microorganisms in spoilage of foods and methods of their control.
3. Knowledge about the beneficial role of microorganisms and different types of fermented foods.
4. Identify the role of microorganisms in food borne diseases and control measures.
5. Understand the laboratory techniques to detect, quantify, and identify microorganisms in foods.

Unit I
Introduction to microbiology:
Microbiology in daily life, Characteristics and morphology of bacteria, fungi, virus, protozoa & algae.

Unit II
Cultures & Media:
Different type of media- Selective media and differential media; Preparation of media- PDA media, Nutrient agar, Mac Conkey agar; Culturing techniques- Spread plate and streak plate, pour plate.
Indicator microorganisms: Sources, methods of detection, growth & survival; significance of coliforms, faecal streptococci, enterobacteriaceae.

Unit III
Contamination and spoilage of different foods:
Cereals, sugar and their products, Milk & milk products, Fruits and vegetables, canned foods, Meat, fish, egg and poultry

Unit IV
Food borne illness:
Food intoxication- Staphylococcal intoxication, botulism
Food infection- Salmonellosis, Clostridium perfringens, Bacillus cereus gastroenteritis, E.coli infection and others.
Unit V

Beneficial microorganisms:
SCP- Microorganisms used, raw materials used as substrate, condition for growth and production, nutritive value and use of SCP;
Fat from microorganisms- Microorganisms used, raw materials, production of fat; Production of amino acids; Production or other substances added to foods.
Production of enzymes- amylases, invertase, pectolytic enzymes, proteolytic enzymes, other enzymes

Fermentation- tempeh kedele, soya sauce production, vinegar, lactic acid bacteria fermented food, Dairy based fermented foods- Kefir, yoghurt, cheese and butter; Yeast based fermented foods- bread, wine and beer

REFERENCES
• Khetarpaul, N. Food microbiology, Daya publishing house, New Delhi, 2009
• Narayanan, L.M. and Mani,L. Microbiology.Saras Publications, Nagercoil.
<table>
<thead>
<tr>
<th>No</th>
<th>Subject Code</th>
<th>Subject Type</th>
<th>Subject Title</th>
<th>Marks Allotted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Assignment Marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Max</td>
</tr>
<tr>
<td>1</td>
<td>FC-601/1</td>
<td>Core</td>
<td>Values &amp; Spirituality</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Foundation Course</td>
<td></td>
<td>Basic Computer Information Technology-I</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>BSZ 161</td>
<td>Core</td>
<td>Biostatistics And Computer Applications &amp; Basic Animal Biotechnology</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>BSB 161</td>
<td>Core</td>
<td>Based On Inorganic, Organic And Physical Chemistry</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>BCH 161</td>
<td>Core</td>
<td>Plant Ecology, Biodiversity And Phytogeography</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>BPY 161</td>
<td>Core</td>
<td>ELECTRONIC COMMUNICATION</td>
<td>20</td>
</tr>
<tr>
<td>7</td>
<td>BBT 161</td>
<td>Elective</td>
<td>Bioinformatics &amp; Tissue Culture Technology</td>
<td>20</td>
</tr>
<tr>
<td>8</td>
<td>BCS-161</td>
<td>Elective</td>
<td>Information Storage &amp; Management</td>
<td>20</td>
</tr>
<tr>
<td>9</td>
<td>BEC 161</td>
<td>Elective</td>
<td>ELECTRONIC INSTRUMENTATION, DIGITAL SYSTEM DESIGN &amp;MICROCONTROLLER</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>BMM 161</td>
<td>Core</td>
<td>Programming Language with 'C' Theory</td>
<td>20</td>
</tr>
<tr>
<td>11</td>
<td>BMB 161</td>
<td>Elective</td>
<td>Analytical Microbiology &amp; Applied Microbiology</td>
<td>20</td>
</tr>
<tr>
<td>12</td>
<td>BFS 161</td>
<td>Elective</td>
<td>BIOPROCESS ENGINEERING AND TECHNOLOGY</td>
<td>20</td>
</tr>
</tbody>
</table>
Every candidate appearing in B.Sc. Semester 6th examination shall be examined in
(a) Foundation Course F.C (Compulsory) for all students.
(b) Any one of the following combinations:
   1. Physics, Maths, Computer Science.
   2. Physics, Maths, Electronics.
   3. Physics, Chemistry, Maths.
   5. Chemistry, Botany or Zoology, Biotechnology.
   6. Chemistry, Botany or Zoology, Microbiology.
   7. Chemistry, Botany or Zoology, Food Science.

Provided that the courses of studies for Physics offering combinations from (i) to (iii) and for Chemistry offering combinations from (iii) to (vii) shall be those prescribed for biology group.

<table>
<thead>
<tr>
<th>Electives Subjects</th>
<th>Core Subjects</th>
<th>Combinations Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMB 161 Microbiology</td>
<td>BSZ 161/BSB 161 (Zoology/Botany), BCH 161 Chemistry</td>
<td>BSB 161/ BSZ 161, BCH 161, BMB 161.</td>
</tr>
<tr>
<td>BFS 161 Food Science</td>
<td>BSZ 161/BSB 161 (Zoology/Botany), BCH 161 Chemistry</td>
<td>BSZ 161/ BSB 161, BCH 161, BFS 161.</td>
</tr>
<tr>
<td>Core Subjects</td>
<td>Combinations</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>BMM 161 Mathematics</td>
<td>BCH 161 Chemistry/BCS 161 Computer Science/ BEC 161 Electronics, BPY 161 Physics.</td>
<td></td>
</tr>
<tr>
<td>BPY 161 Physics</td>
<td>BCH 161 Chemistry/BCS 161 Computer Science/ BEC 161 Electronics, BMM 161 Mathematics.</td>
<td></td>
</tr>
<tr>
<td>BCH 161 Chemistry</td>
<td>BMM 161 Mathematics, BPY 161 Physics or,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BBT 161 Biotechnology, BSZ 161/BSB 161 (Zoology/Botany) or,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BMB 161 Microbiology, BSZ 161/BSB 161 (Zoology/Botany) or,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BSB 161 Botany, BZB 161 Zoology or,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BFS 161 Food Science, BSZ 161/BSB 161 (Zoology/Botany),</td>
<td></td>
</tr>
<tr>
<td>BSZ 161 Zoology</td>
<td>BCH 161 Chemistry, BBT 161 Biotechnology or,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BCH 161 Chemistry, BMB 161 Microbiology or,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BCH 161 Chemistry, BSB 161 Botany or,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BCH 161 Chemistry, BFS 161 Food Science.</td>
<td></td>
</tr>
<tr>
<td>BSB 161 Botany</td>
<td>BCH 161 Chemistry, BBT 161 Biotechnology or,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BCH 161 Chemistry, BMB 161 Microbiology or,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BCH 161 Chemistry, BSB 161 Zoology or,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BCH 161 Chemistry, BFS 161 Food Science.</td>
<td></td>
</tr>
<tr>
<td>Course</td>
<td>Subject</td>
<td>Subject Code</td>
</tr>
<tr>
<td>-------------------------</td>
<td>--------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>B.Sc. (Foundation Course)</td>
<td>तकनित एवं अधिनियमकाल</td>
<td>FC-601/1</td>
</tr>
</tbody>
</table>

### उकाई-1

1. नर्तकीसंस्कृति
2. साहित्यसमाजशास्त्र
3. समस्तताहा वर्णकारी
4. शिल्पकला
5. साहित्य-प्रमाणितकालीनम

### उकाई-2

1. धम
2. तर्कावली
3. दर्शन
4. नीति
5. साहित्य

### उकाई-3

1. संगीतशास्त्र-साहित्यसम्प्रदाय-संस्कृति
2. साहित्य-संसार
3. संगीतवांतरिक्ष
4. शिल्पकला
5. एकांत

### उकाई-4

1. सिद्धांत
2. रंगमंच
3. संगीत
4. चित्र-मूलबांधकाल
5. शिल्पकला

### उकाई-5

1. कम्युनिटी
2. रचनाविदारणसंगीत
3. श्रृंखलावांतरिक्ष
4. साहित्य-शास्त्रकारकशास्त्रकालिन
5. साहित्य-प्रकाशिकताविद्यापीठ

संक्षेपमंत्र - साहित्यशास्त्रकारकशास्त्रकालिन द्वारा प्रकाशित पृष्ठ
RKDF UNIVERSITY, BHOPAL
B.Sc.(Courses)

Semester – VI

<table>
<thead>
<tr>
<th>Course</th>
<th>Subject</th>
<th>Subject Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (Foundation Course)</td>
<td>Basic Computer Information Technology-II</td>
<td>FC-601/2</td>
</tr>
</tbody>
</table>

Unit-I

Word Processing: Word
- Introduction to wordProcessing.
- MS Word: features, Creating, Saving and Operating Multi document windows, Editing Text selecting, Inserting, deleting movingtext.
- Previewing documents, Printing document to file page. Reduce the number of pages by one.
- Formatting Documents: paragraph formats, aligning Text and Paragraph, Borders and shading, Headers and Footers, MultipleColumns.

Unit-II

Introduction to Excel Excel & Worksheet:
- Worksheetbasic.
- Creating worksheet, entering data into worksheet, heading information, data text, dates, alphanumeric, values, saving & quittingworksheet.
- Opening and moving around in an existingworksheet.
- Toolbars and Menus, keyboardshortcuts.
- Working with single and multiple workbook coping, renaming, moving, adding and deleting. coping entries and moving betweenworkbooks.
- Working with formulas & cellreferencing.
- Autosum.
- Copingformulas
- Absolute & Relativeaddressing.

Unit-III

Introduction to Power Point
- Features and variousversions.
- Creating presentation using Slide master and template in various colourscheme.
- Working with slides make new slide move, copy, delete, duplicate, lay outing of slide, zoom in or out of aslide.
- Editing and formatting text: Alignment, editing, inserting, deleting, selecting, formatting of text, find and replacetext.

Unit-IV
Power Point – II

- Bullets, footer, paragraph formatting, spellchecking.
- Printing presentation Print slides, notes, handouts and outlines.
- Inserting objects Drawing and inserting objects using Clip Arts pictures and charts.
- Slide sorter, slide transition effect and animation effects. Presenting the show making stand alone presentation, Pack and Gowizards.

Unit – V

Evolution, Protocol, concept, Internet, Dial-up connectivity, leased line, VSAT, Broad band, URLs, Domain names, Portals, E-mail, Pop & web based Email. Basic of sending and receiving Emails, Email & Internet Ethics, Computer virus, Antivirus software wage, Web Browsers.

Books Recommended:

1. ए पकजसिकटप्याक विज्ञान
2. ए पकजसिकटप्याक विज्ञान
RKDF UNIVERSITY, BHOPAL
B.Sc.(Courses)

<table>
<thead>
<tr>
<th>Course</th>
<th>Subject</th>
<th>Subject Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (Foundation Course)</td>
<td>Basic Computer Information Technology-I</td>
<td>FC 601/2</td>
</tr>
</tbody>
</table>

**Practical**

**Ms-Power Point:**
Creating new slide, formatting slide layout, slide show & sorter, Inserting new slide, slide no., date, time, chart, formatting slide, tool operation.

**List of suggested practical work:**
- Under standing of a dial up connection through modem.
- Configuring a computer for an e-mail and using outlook Express or Netscape Messenger.
- Registration an e-mail address.
- Understanding of e-mail drafting.
- Understanding of address book maintenance fore-mail.
- Understanding of different mail program tools.
- Send and receive functions of e-mail.
RKDF UNIVERSITY, BHOPAL
B.Sc.(Courses)

Syllabus
Semester VI

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (Chemistry)</td>
<td>Based on inorganic, Organic &amp; Physical Chemistry</td>
<td>BCH-161</td>
</tr>
</tbody>
</table>

Course outcome:
1. To learn about the bioinorganic chemistry and its details.
2. To different laws and equations of radiation.
3. To study about the heterocyclic compounds.
4. To learn about the various biomolecules, classification and in details.

UNIT-I
Arrhenius, Bronsted – Lowry, the Lux – Flood, Solvent system and Lewis concepts of acids & bases, relative strength of acids & bases, Concept of Hard and Soft Acids & Bases. Symbiosis, electronegativity and hardness and softness.

Bioinorganic Chemistry

UNIT-II
Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grotthus-Drapper law, Stark-Einstein law (law of photochemical equivalence) Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes (simple examples).

UNIT-III
Statement and meaning of the terms – phase component and degree of freedom, thermodynamic derivation of Gibbs phase rule, phase equilibrium of one component system – example – water and Sulpher systems. Phase equilibrium of two component systems solid-liquid equilibrium, simple eutectic Example Pb-Ag system, desilication of lead.

UNIT-IV
UNIT-V
Nomenclature, structural features, Methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulphonamides and sulphaguanidine. Synthetic detergents alkyland aryl sulphonates. **Amino Acids, Peptides & Proteins**


**Books:**
1. Ira N. Levine, Quantum Chemistry, Prentice Hall.
5. Valence, C. A. Coulson, Oxford University Press.

**(Practical)**

**Section-B (Physical)**
1. To determine the molecular weight of a non-volatile solute by Rast method.
2. To standardize the given acid solution (mono and dibasic acid) pH metrically.

**Section-C (Organic)**
2. **Chromatography Method**
   Determination of Rf values and identification of organic compounds
   (a) Separation of green leaf pigments (spinach leaves may be used) by paper chromatographic method
   (b) Separation of a mixture of coloured organic compounds using common organic solvents by TLC.

3. **Synthesis of the following organic compounds:**
   1. To prepare o-chlorobenzoic acid from anthranilic acid.
   2. To prepare S-Benzyl-iso-thiouronium chloride from thiourea.

**Book for practical:**
Course outcome:

1. Able to design and implement various digital modulation and demodulation techniques.
2. Able to identify and describe different techniques in modern digital communications, in particular in source coding using MATLAB or similar tools.
3. Able to understand and verify sampling theorem for practical applications.
4. Able to implement and verify DFT property using MATLAB.
5. Able to comment on Stability and Causality of Discrete time system using Z-transform on MATLAB tool.
6. Able to design and implement digital filter and use of various windows.

UNIT I
Modulation - definition - types of modulation AM, FM, PM – expression for amplitude modulated voltage - wave form of amplitude modulated wave - collector modulation circuit - single side band generation - balanced modulator - AM transmitter - block diagram and explanation - frequency modulation - expression for frequency modulated voltage - side bands in FM, AM production by transistor modulator - comparison of AM, FM, PM.

UNIT II
Demodulation - definition - diode detection of AM signals - FM detection - Foster Seely discriminator - radio receivers - straight receivers - TRF receivers - super heterodyne receivers - block diagram - explanation of each stage - FM receivers – block diagram.

UNIT III

UNIT IV

UNIT V
Digital communications - digital technology - fundamentals of data communication systems - characteristics of data transmission circuits – digital codes - error detection and correction - data sets and inter connection - requirements - modern classification - modern interfacing.
Books for Study:

2. Electronics Communication Systems - Kennedy and Davis, TMH.
4. Electronics Communications - Frenzel, TMH.
RKDF UNIVERSITY, BHOPAL
B.Sc.(Courses)

Semester VI

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc. (Botany)</td>
<td>Plant ecology, biodiversity and phytogeography</td>
<td>BSB 161</td>
</tr>
</tbody>
</table>

Course Outcome:
1. Understand the “Science of Heredity”. Realize the role of genes in evolution of species.
2. To understand linkage, segregation and mutation of genes during evolution.
3. Understand the science of plant breeding.
4. To introduce the student with branch of plant breeding for the survival of human being from starvation. To study the techniques of production of new superior crop verities.
5. To study the evolution in living organisms.

UNIT – 1
Ecosystems: Structure and types, Biotic and Abiotic components, Trophic levels, Food chains, Food webs, Ecological pyramids, Energy flow; Biogeochemical cycles: Concept, Gaseous and Sedimentary cycles, Carbon, Nitrogen, Phosphorus and Sulphur cycle.

UNIT – 2
Ecological adaptations: Morphological, Anatomical and Physiological responses, Water adaptation (Hydrophytes, Xerophytes and Mesophytes), Temperature adaptation (Thermoperiodism and Vernalization), Light adaptation (Heliophytes and Scrophylous plants), Plant Succession: Causes, trends and processes, types of succession - Lithosere, Hydrosere and Xerosere.

UNIT – 3

Biodiversity: Basic concept, definition, Importance, Biodiversity of India, Hotspots, In situ and ex situ conservation, Endangered and threatened species, Red databook.

UNIT – 4
Soil: Physico-chemical properties, Soil formation, Development of Soil Profile, Soil classification, Soil composition, Soil factors; Pollution: Definition, Types & Causes; Global warming, Climate change and Ozone holes.

UNIT – 5
Phytogeography: Phytogeographical regions of India, Vegetation - types of Madhya Pradesh, Biosphere reserves, Sanctuaries and National parks of Madhya Pradesh, Natural resources – definition and classification of natural resources, Conservation and management of natural resources, Land resources management, Water resources management, Wet land resource management.
Practical Exercises + Scheme
(Marks- 50)
1- To determine the minimum size of Quadrat by species areacurvemethod. 05
2- To conduct exercise on Frequency, Density and Abundance.
3- Study of soil with reference to soil texture, water holding capacity, pH and test for Carbonate and Nitrate. 05
4- Preparation of slides of Xerophytic, Hydrophytic and Mesophytic plants. 10
5- To comment upon Phytogeographic region (model/ charts) and National Parks (Photographs). 05
6- Spotting- 10
7- Viva voce- 5
8- Practical Record- 10

SUGGESTED READINGS:--
Course outcome:
1. To study the data types and its tabular and graphical representation.
2. To learn about the central tendency and its different methods and equations.
3. To learn about the computer and its application to biology.
4. To learn the Cryopreservation of cell cultures and animal cell culture.

Unit-1
Introduction-definition, date types – primary and secondary – Classification of data, Collection of data – tabular and graphical representation – Bar diagram, Pi diagram, Column graph, Histogram, Ogive curves.

Unit-2
Measures of central tendency – Mean, Mode and Median, Variance, Standard deviation, Standard error and Coefficient or variance. Simple Correlation, Simple Regression, Chi square test, student’s – t- test.

Unit-3
Fundamentals of Computer: Classification, Computer organization, Input devices, processing unit, output devices, external storage devices, software, WWW, CONCEPT OF E-Mail. Computer and its application to biology-Definition and scope of Bioinformatics - application and introduction to Biological data.

Unit-4
History of animal cell culture, Laboratory requirements for animal cell culture, Sterilization techniques. Media used for animal cell culture, Types of cell culture (Primary and Secondary), Introduction to established cell lines, Stem cells.

Unit-5

REFERENCES:
Introduction to Biostatistics by Pranab kumar, S.Chand company Ltd. New Delhi.
Course outcome:
1. To have knowledge on Biomolecules, their importance and Classification I Bioinformatic.
2. To explain the properties of Biomolecules.
3. To understand principles of animal culture, media preparation.
4. To explain Invitro fertilization and embryo transfer technology.
5. To describe meristem culture and clonal propagation of plants on a commercial scale.

UNIT-I
Bioinformatics-definition, history; computer - system, topology and peripherals for communication; Internet - basics, connection, web browsing and URL. 
Data bases - Nucleic acid sequence data bases (NCBI, EMBL, DDJB), Protein sequence data base-SWISS-PORT, data base searching - BLAST.

UNIT-II
Introduction to Techniques - Introductory history, Laboratory organization, Maintaining Aseptic environment, Basic concepts in cell culture - cell culture, Cellular Totipotency, Somatic Embryogenesis. In vitro culture : approaches & methodologies - preparation steps for tissue culture, surface sterilization of plant tissue material, basic procedure for aseptic tissue transfer, incubation of culture.

UNIT-III
Tissue nutrition : Growth Hormones - Plant cells (Composition of culture media, Growth hormones, Vitamins, Unidentified supplements, selection of media); Animal cells (substrate on which cells grow, Feeder layer on substrate, gas phase for tissue culture, media and supplements).

UNIT-IV
Tissue culture methodologies - Plant cells (Callus Culture, Cell Suspension Culture, Organ culture); Animal cells (Source of tissue, primary culture, differentiation of cells, growth kinetics, animal cell lines and their origin and chracterization).

UNIT-V
Cloning & Selection of specific cell types – cloning, somatic cell fusion and HAT election, Medium suspension fusion, selection of Hybrid clone, production of monoclonal antibodies, Organ Culture - Culture of embryonic organs, whole embryo culture, culture of adult organs.

Reference
5. Plant tissue culture : Bajaj, Y.P.S. Series.
6. Plant tissue culture : Gamborg and Phillip.
8. Plants, Genes, and Agriculture : Chrispeels, M. J. and Grierson, D.
9. Genetic Engineering of crop plants : Lycett, G. W. and Grierson, D.
10. Biotechnological innovation in Animal productivity: (Biotol Series)
PRACTICLE:
1. Primary cell culture
2. Continuous cell culture
3. Drug/Toxicity testing
4. Assessment of genetic variation related to plant taxa using allozyme method
5. Tissue culture methods-media preparation, sterilization, inoculation of explants, callus culture, suspension cultures, anther and ovule cultures.
6. Isolation of protoplasts, viability test for protoplasts, protoplast culture.
7. Working gel documentation system and analysis of electrophoretic gels.
8. Quantification of DNA and RNA in plant tissues by spectrophotometer method.
9. Quadratic equations
10. Mean, standard deviation
11. Factorial (using subroutine)
12. NCR using subroutine
13. Prime numbers
14. Largest and smallest numbers.
Course outcome:

1. To learn about the storage technology and networked storages.
2. To know about the storage systems and architecture.
3. To learn about the hybrid storage solutions.

UNIT 1
Introduction to Storage Technology: Data proliferation, evolution of various storage technologies, Overview of storage infrastructure components, Information Lifecycle Management, Data categorization.

UNIT-II
Storage Systems Architecture: Intelligent disk subsystems overview, Contrast of integrated vs. modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, RAID levels & parity algorithms, hot sparing,

UNIT-III
Introduction to Networked Storage: JBOD, DAS, NAS, SAN & CAS evolution and comparision. Applications, Elements, connectivity, standards, management, security and limitations of DAS, NAS, CAS & SAN.

UNIT -IV
Hybrid Storage solutions; Virtualization: Memory, network, server, storage & appliances. Data center concepts & requirements, Backup & Disaster Recovery.

UNIT -V
Information storage on cloud :Concept of Cloud, Cloud Computing, storage on Cloud, Cloud Vocabulary, Architectural Framework, Cloud benefits, Cloud computing Evolution, Applications & services on cloud, Cloud service providers and Models, Essential characteristics of cloud computing, Cloud Security and integration.
## Course outcome:
1. Learn importance of microcontroller in designing embedded application.
2. Learn use of hardware and software tools.
3. Develop interfacing to real world devices.
4. Able to design and implement various digital modulation and demodulation techniques.
5. Design and implementation of Basic Microcontroller Based system using 8051 and PIC Microcontroller.

### UNIT-I


### UNIT-II

**Intrumentation Amplifiers and Signal Analysers:** Instrumentation amplifier - Electronic Voltmeter and Multimeter - Digital Voltmeter - Function Generator - Wave Analyser - Fundamentals of Spectrum Analyser. **Transducer and Display Devices:** Strain Gauge - Unbounded Strain Gauge - LVDT - Resistance Thermometer - Photoelectric Transducer - Pen Recorder - Audio Tape Recorder - Seven Segment Display LCD.

### UNIT-III

**Boolean Algebra and Logic Gates:** Review of binary number systems - Binary arithmetic - Binary codes - Boolean Algebra and theorems - Boolean functions - Simplifications of Boolean functions using Karnaugh map and tabulation methods - Logic gates. **Combinational Logic:** Combinational circuits - Analysis and design procedures - Circuits for arithmetic operations - Code conversions - Introduction to Hardware Description Language (HDL). **Design with MSI Devices:** Decoders and Encoders - Multiplexers and Demultiplexers - Memory and programming logic - HDL for combinational circuits. **Synchronous Sequential Logic:** Sequential circuits - Flip-flops - Analysis and design procedures - State reduction and state assignments - Shift registers - Counters - HDL for sequential logic circuits, shift registers and counters. **Asynchronous Sequential Logic:** Analysis and design of asynchronous sequential circuits - Reduction of state and flow tables - Race free state assignment - Hazards.

### UNIT-IV

**Microprocessor and Micro-controller:** 8051 Micro-controller hardware: 8051 oscillator and clock - Program counter and data pointer - A and B CPU register - Flags and PSW - Internal memory - Internal RAM - Stack and stack pointer - Special function registers - Internal ROM. **Input / output pin, ports and circuits:** External memory. **Counter and Timer:** Counter / Timer interrupts - Timing - Timer modes of operation - Counting. **Serial data input / Output:** Serial data interrupt - Data transmission - Data reception - serial data transmission modes. **Interrupts:** Timer flag interrupt - Serial port interrupt - External interrupt - reset - Interrupt control - Interrupt priority - Interrupt destination - Software generated interrupts.
UNIT-V


- Display interface - 7 segment and LCD display - D/A conversion - A/D conversion - Stepper motor Interface.

Text Books

3) Digital Fundamentals - T.L. Floyd, 8/e, Pearson Education.
8) Electronic Instrumentation and Measurement - Kalasi.
14) Fundamentals of Microprocessor 8085 - V. Vijayendran, S. Visvanathan

PRACTICAL - I year

1) adder, subtractor circuits and counters using logic gates.
2) application of microprocessor in basic mathematical function, code conversion and DAC.
3) Amplitude modulation and detection.
4) 2. Frequency modulation and detection.
5) 3. Pulse Amplitude modulation and detection.
6) Pulse Width modulation and detection.
7) Pulse Position modulation and detection.
8) Half, Full and BCD adders using simple logic gates.
9) Half, Full and BCD adders using NAND gates.
10) Half and Full subtractors using simple logic gates.
11) Half and Full subtractors using NAND gates.
12) Study of 7490 BCD counter, divided by (1 to 10) as scalar.
13) BCD to seven segment decoder using 7447/7448.
14) Microprocessor Practical Experiments
15) Addition, Subtraction, Multiplication and Division - 8 bit.
16) Picking up the largest/smallest in an array.
17) Ascending/Descending order.
18) Code conversions:
   a. Binary to BCD
   b. BCD to Binary
   c. Binary to ASCII
   d. ASCII to Binary
   e. BCD to ASCII
   f. ASCII to BCD

**Practicals II year**

1) Construction of dual power supply using Zener diodes.
2) Construction of dual power supply using IC.
3) Op-amp - Inverting and Non-inverting modes, unity follower.
4) Op-amp - Summing amplifier - Inverting and Non-inverting modes.
5) Op-amp - Integrator and Differentiator.
6) Op-amp - Square wave generator.
7) Op-amp - Sine wave generator.
8) Instrumentation Amplifier.
9) Universality of NAND gate.
10) Universality of NOR gate.
11) Verification of basic Boolean identities using NAND gates.
12) Verification of basic Boolean identities using NOR gates.
13) Sum of Products and Product of Sums - NAND gates.
14) Sum of Products and Product of Sums - NOR gates.
15) Astable, Monostable multivibrators and Schmitt trigger using NAND gates.
16) Monostable multivibrators and Schmitt trigger using 555 timer.
17) Astable multivibrator using 555 timer.
18) Study of RS, D and JK flip flops.
19) AM, FM and PM modulation and detection techniques.
20) Characteristics of Zener diode.
21) Transistor characteristics in CE mode.
22) Regulated power supply using Zener diode.
23) Uses of CRO - Measurement of voltage, current, frequency and phase - Displaying waveforms and Lissajou’s figures - Study Experiment.
24) Transistor single stage amplifier - Frequency response.
25) Construction of low range power supply using rectifying diodes (6 V to 9 V).
26) Basic logic gates (AND, OR) using diodes.
28) Basic logic gates (AND, OR, NOT) using transistor.
29) characteristics of semiconductor devices such as UJT, JFET and SCR.
30) power control by SCR, audio wave generation and pulse shaping using Schmitt triggers.
31) Characteristics of UJT.
32) Characteristics of SCR.
33) SCR power control.
34) Characteristics of TRIAC.
35) Characteristics of JFET.
36) FET as an amplifier.
37) JFET multivibrator.
38) Emitter follower.
39) Darlington pair amplifier.
40) Transistor Hartley oscillator.
41) Transistor Colpitts oscillator.
42) Transistor phase shift oscillator.
43) Transistor Wien bridge audio oscillator.
44) Transistor monostable multivibrator.
RKDF UNIVERSITY, BHOPAL
B.Sc.(Courses)

<table>
<thead>
<tr>
<th>Branch</th>
<th>Subject title</th>
<th>Subject code</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc (Mathematics)</td>
<td>Programming Language with “C” Theory</td>
<td>BMM-161</td>
</tr>
</tbody>
</table>

Course outcome:
1. Understand and apply the programming concepts of C++ which is important for mathematical investigation and problem solving.
2. Use mathematical libraries for computational objectives.
3. Represent the outputs of programs visually in terms of well formatted text and plots.

UNIT:-I
C constants, Variables, Data-types, Declaration of variables, Assigning values to variables.


Decision making with looping: While, Do, For Statement, Jumps in loops Arrays: 1-dimensional, 2-dimensional array, Initiatising 2-D arrays, Multi-Dimensional arrays

UNIT:-II
User-Defined Function: Need for user-defined function, Multi-Function Progarm, The form of C-Function return value and their types, Calling a function, Category of functions, No arguments and no return values, arguments but no return values, arguments with return values. Handling of non-integer functions, Nesting of functions, Recursion, Function with Arrays, Scope and lifetime of variables in functions Structure and Unions: Structure definition, Giving values to numbers, Structure initialisation, Comparison of structure variables, Arrays of structure, Arrays within Structures, Structure within Structures, Structures and functions.

UNIT:-III
Pointers: Understanding pointers, accessing the address of a variable, Declaring and initialising of pointers, accessing a variablethrough its pointer, Pointer expression, Pointer increments and scale factor, Pointers and arrays, Pointers and functions, Pointers and structures Files: Defining and opening a file, closing a file.

UNIT:-IV

UNIT:-V
Graphs, Multigraphs, Weighted Graphs, Paths and Circuits, Shortest Paths: Dijkstra’s Algorithm, Matrix Representation of Graph: Incidence and Adjacency Matrix, Trees and its simple properties.
PRACTICAL LIST OF PROGRAMME:-
1. The Factorial of an Integer
2. Binomial coefficient nCr, where n and r are Positive Integers
3. Matrix addition and subtraction.
4. Matrix multiplication.
5. Transpose of a Matrix.
6. Insertion sort
7. Bisection method
8. Solve a System of Linear Simultaneous equations by Gauss-Elimination method
9. To evaluate a definite integral using Simpson's one-third rule.
10. To solve an Ordinary Differential equation of first order by Runge-Kutta method of fourth order

Text Books:

Reference Books:
Course outcome:

1. To understand the bioassay and quality control.
2. To study the classification of different microorganisms.
3. To learn about the different morphology of agriculture microbiology and its effects.
4. To know the different types of colorimetry, spectrophotometry and separation techniques.

Unit I

**Bioassays**

**Quality Control**
Quality control tests - Sterility testing, Microbial Limit Test (MLT), Pyrogen testing (LAL test), Minimum Inhibitory Concentration (MIC), FDA and Good Manufacturing Practices, Quantitative and qualitative analysis of food, milk, water and sewage.

Unit II

**Colorimetry and Spectrophotometry**
Lambert – Beer’s Law, Ultraviolet, Visible, Infra red and Fluorescence spectroscopy, Atomic absorption, Raman spectrum, X-ray Crystallography and NMR.

**Separation Techniques - I**
Chromatography - Principle, Types of chromatography - Paper, Thin layer, Column, Ion exchange and Gas chromatography.

Unit III

**Separation Techniques - II**
Electrophoresis - Principle and working, Agarose gel, native PAGE and SDS-PAGE, Principle, working and applications of centrifuge.

Unit IV

**Microorganisms in Agriculture**
Bacteria and fungi as biopesticides, Genetically modified crops containing insecticidal genes, Biofertilizers - Nitrogen fixers, PSB and Mycorrhiza, Fuel from microorganisms - Biogas technology, Microbial hydrogen production, Concept of gasohol.

Unit V

**Pharmaceutical Biotechnology**
Genetically engineered microorganisms, Production of heterologous proteins - Insulin, Growth hormones, Interleukins and t plasminogen activator, Recombinant vaccines.
Food from Microbes
Dairy products- Cheese, Butter, Yogurt, Microorganisms as food- SCP, Spirullina and Mushroom, Indian and Oriental fermented foods.

Recommended Books (Semester-VI)
2. Industrial Microbiology, Author- L. E. Cassida
3. Industrial Microbiology, Author- G. Reed.
4. Industrial Microbiology, Author- Agarwal And Parihar.
6. Principles of Fermentation Technology, Authors- Standbary, Whitaker and Hall.
7. Principles of Physical Biochemistry, Authors- Van Holde et.al.
8. Biochemistry of Nucleic Acids, Authors- Adams et. al.

YEAR-III SEMESTER-VI
LIST OF EXPERIMENTS
1. Isolation of antibiotic producer from soil sample.
2. Isolation of amylase producer from soil sample.
3. Estimation of soil microflora.
4. Qualitative and quantitative examination of Food.
5. Qualitative and quantitative examination of Milk.
6. Qualitative and quantitative examination of Water.
7. Qualitative and quantitative examination of Sewage.
10. Sugar estimation by Cole’s Method.
11. Estimation of MIC.
12. Sterility testing of pharmaceutical products- injectibles, eye and ear drops.
15. Separation of amino acids by TLC.
**Course outcome:**

1. To know about the industrial microorganism.
2. To understand the types of fermentation processes.
3. To get a brief knowledge about food technology.

**UNIT-I**
Isolation, preservation and maintenance of industrial microorganisms, kinetics of microbial growth and death, media formulation for industrial fermentation, Air and media sterilization. Designing of a fermenter/Bioreactor.

**UNIT-II**
Types of fermentation processes, analysis of batch fed batch and continuous bioreactions, biotransformation, stability of microbial reactors, analysis of mixed microbial populations, specialized bioreactors (pulsed, fluidized, photo bioreactors etc.)

**UNIT-III**
Downstream processing: introduction, removal of microbial cells and solid matters, foam separation, precipitation, filtration, centrifugation, cell disruption, liquid-liquid extraction, chromatography, drying and crystallization,

**UNIT-IV**
Industrial production of chemicals: alcohols, acids (citric, acetic and gluconic), solvents (glycerols, acetone, butanol), antibiotics (penicillin, streptomycine, tetracycline) amino acids (lysine, glutamic acid), single cell proteins.

**UNIT-V**
Food Biotechnology: Food spoilage and preservation process, dairy products, wine, beer and other alcoholic Beverages and formulated plant products, petro crops, food from water, fungal protein food from yeast, hybrid seeds, conventional breeding of plant for food production. Transformation of steroids and non steroid compounds. Mushroom-types, isolation and culture.

**BOOKS:**

<table>
<thead>
<tr>
<th>BRANCH</th>
<th>SUBJECT TITLE</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc (Food Science &amp; Tech.)</td>
<td>BIOPROCESS ENGINEERING AND TECHNOLOGY</td>
<td>BFS 161</td>
</tr>
</tbody>
</table>
BFS (P) - FOOD MICROBIOLOGY PRACTICALS

1. Microbiology laboratory basic rules and requirements:
   a. Laboratory rules - basic rules of a microbiology lab
   b. Basic requirements of a microbiological lab - common glass ware; test tube, culture tube and screw capped tubes, Petri dish, pipette, Pasteur pipette, glass spreader, inoculation needle, busen burner, water bath, autoclave, laminar air flow, incubator, hot air oven, quebec colony counter, centrifuge, microscope.
   c. Disposal of laboratory waste and culture.

2. Staining of microorganisms
   a. Methods for detection of specific bacteria:
      - wet mount preparation for motile bacteria,
      - hanging drop mount method,
      - Petri dish culture method for detection bacteria.
   b. Methods for staining of micro organism:
      - Simple staining (Monochrome staining)
      - Gram staining for differentiation of bacteria
      - Negative staining of bacteria
      - Endospore staining

Composition, preparation and sterilization of media:

PDA media
Nutrient agar media
Mc-Conkey agar media

Demonstration of techniques for pure culture of microorganisms:

Streak plate method
Pour plate method
Serial dilution agar plate method
Microbiology of:

a. Milk:
   • standard plate count method,
   • enzymatic test of milk by methylene blue reductase test,
   • quality testing of milk by resazurin test,
   • determination of phosphates activity of milk,
   • detection of mastitis through milk test

b. Meat, Fish, Egg

c. Water: (MPN test)
   • Presumptive test
   • Confirmed test
   • Completed test

REFERENCE: