डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद

परिपत्रक क्रमांक/एस.यु./विज्ञान/अभ्यासक्रम/७४/२०१४

या परिपत्रकाद्वारे सर्व संबंधीतांना सुचित करण्यात येते की, विज्ञान विद्याशाखेने शिफारस केल्यानुसार बी. एस्सी. / एम. एस्सी. प्रथम व द्वितीय वर्षाच्या सुधारित अभ्यासक्रमास आणि बी. एस्सी. प्रथम वर्षाच्या अभ्यासक्रमात किरकोळ बदल करण्यास विद्यापरिषदेच्या वतीने मा. कुलगुरु यांनी, त्यांना प्राप्त असलेल्या विशेष अधिकार महाराष्ट्र विद्यापीठ अधिनियम-१९९४ कलम १४(७) अन्वये मान्यता दिलेली आहे. त्या अनुषंगाने सुधारीत तयार केलेल्या अभ्यासक्रमाची प्रत या परिपत्रकासोबत आपल्या पुढील कार्यवाहीसाठी पाठविण्यात येत आहे.

[1]	B.Sc. Physics	Semester-III & IV,
[2]	B.Sc. Chemistry	Semester-III & IV,
[3]	B.Sc. Botany	Semester-III & IV,
[4]	B.Sc. Zoology with minor changes	Semester-I & II,
[5]	B.Sc. Zoology	Semester-III & IV,
[6]	B.Sc. Fisheries	Semester-III & IV,
[7]	B.Sc. Electronics (Opt.)	Semester-III & IV,
[8]	B.A./B.Sc. Mathematics	Semester-III & IV,
[9]	B.Sc. Computer Science	Semester-I & II,
[10]	B.Sc. Information Technology	Semester-I & II,
[11]	B.C.A.	Semester-I & II,
[12]	B.Sc. Computer Science(Opt.)	Semester-I & II,
[13]	B.Sc. Information Technology(Opt.)	Semester-I & II,
[14]	B.Sc. Computer Application(Opt.)	Semester-I & II,
[15]	B.Sc. Computer Maintenance(Opt.)	Semester-I & II,
[16]	B.Sc. Biotechnology (Progressively)	Semester-I to VI,
[17]	B.Sc. Biotechnology (Opt.) (Progressively)	Semester-I to IV,
[18]	B.Sc. Sericulture Technology	Semester-I & II,
[19]	B.Sc. Networking Multimedia	Semester-III & IV,
[20]	B.Sc. Bioinformatics	Semester-I & II,
[21]	B.Sc. Hardware & Networking	Semester-I & II,
[22]	B.Sc. Animation	Semester-I & II,
[23]	B.Sc. Dairy Science & Technology	Semester-III & IV,
[24]	B.Sc. Biochemistry	Semester-III & IV,
[25]	B.Sc. Analytical Chemistry	Semester-III & IV,
[26]	B.Sc. Textile & Int. Decoration with minor changes	Semester-I & II,
[27]	B.Sc. Textile & Int. Decoration	Semester-III & IV,
[28]	B.Sc. Home Science with minor changes	Semester-I & II,
[29]	B.Sc. Home Science	Semester-III & IV,
[30]	B.Sc. Agro.Chem. & Fertilizers	Semester-III & IV,

..2..

[31]	**B.Sc. Geology**	**Semester-III & IV,**
[32]	**B.A. Statistics with minor changes**	**Semester-I & II,**
[33]	**B.A. Statistics**	**Semester-III & IV,**
[34]	**B.Sc. Statistics with minor changes**	**Semester-I & II,**
[35]	**B.Sc. Statistics**	**Semester-III & IV,**
[36]	**B.Sc. Industrial Chemistry**	**Semester-III & IV,**
[37]	**B.Sc. Horticultural**	**Semester-I & II,**
[38]	**B.Sc. Dry land Agriculture**	**Semester-I & II,**
[39]	**B.Sc. Microbiology**	**Semester-III & IV,**
[40]	**M.Sc. Computer Science**	**Semester-I to IV,**
[41]	**M.Sc. Information Technology**	**Semester-I to IV.**

हा सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाचा आराखडा शैक्षणिक वर्ष २०१४-१५ करिता मर्यादित असेल व विद्यापरिषदेच्या अंतिम मान्यतेनंतर हे परिपत्रक नियमित ठेवण्याबाबत या कार्यालयाद्वारे नवीन परिपत्रक पारीत करण्यात येईल. तसेच सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाची प्रत विद्यापीठाच्या संकेतस्थळावर उपलब्ध आहे.

करिता, या परिपत्रकाची सर्व संबंधितांनी नोंद घ्यावी.

विद्यापीठ प्रांगण,
औरंगाबाद-४३१ ००४.
संदर्भ क्र.एस.यु./सा.शा./सबवि /२०१३-१४/
६५९९-७०२
दिनांक :- २७-०५-२०१४.

संचालक,
महाविद्यालये व विद्यापीठ
विकास मंडळ.

****

या परिपत्रकाची एक प्रत :-

१) मा. परिक्षा नियंत्रक, परिक्षा विभाग,
२) मा. प्राचार्य, सर्व संलग्नीत महाविद्यालये,
३) संचालक, युनिक यांना विनंती करण्यात येते की, सदरील अभ्यासक्रम विद्यापीठाच्या संकेतस्थंळावर उपलब्ध करुण देण्यात यावेत.
४) संचालक, ई-सुविधा केंद्र, विद्यापीठ परिसर,
५) जनसंपर्क अधिकारी, मुख्य प्रशासकीय इमारत,
६) कक्ष अधिकारी, पात्रता विभाग, मुख्य प्रशासकीय इमारत,
७) कक्ष अधिकारी, बी.ए. / बी.एस्सी./ बी.सी.एस./एम.एस्सी. विभाग, परीक्षा भवन,
८) अभिलेख विभाग, मुख्य प्रशासकीय इमारती मागे,

डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

Revised Syllabus of

B.Sc. First Year

Bioinformatics

Semester–I & II

Three Years Degree Course

[Effective for 2014-15]

B.Sc. Bioinformatics (3 year 6 Semester) Course Syllabus

Semester-I	**Semester- II**
Paper-I-Basic Biophysics-I	Paper- VII- Basic Biophysics-II
Paper-II- Fundamentals of Biology-I	Paper-VIII- Fundamentals of Biology-II
Paper-III- Basic chemistry-I	Paper-IX-Basic Chemistry-II
Paper-IV- Basic Mathematics & Statistics-I	Paper-X- Basic Math & Statistics-II
Paper-V-Basics of Computers	Paper-XI- Programming in C
Paper-VI- Introduction to Cell Biology	Paper-XII- Introduction to Genetics
LC-I-Basic Biophysics-I and Basic Chemistry-I	LC-IV-Basic Biophysics-II & Basic Mathematics & Statistics-II
LC-II-Basic Mathematics & Statistics-I & Basics of Computers	LC-V-Basic Chemistry-II & Introduction to Genetics
LC-III-Fundamentals of Biology-I & Cell Biology	LC-VI-Programming in C

Semester-III	Semester- IV
Paper-XIII- Biomolecules	Paper-XIX Metabolism
Paper-XIV-Database Management System	Paper-XX Introduction to Data Structure & Algorithm
Paper-XV-Molecular structures & Enzyme Kinetics	Paper-XXI- Central Dogma
Paper-XVI- Basic Techniques in Biology	Paper-XXII- Advanced JAVA
Paper-XVII- OOPs using JAVA	Paper-XXIII- Introduction to chemoinformatics
Paper-XVIII- Introduction to Bioinformatics	Paper-XXIV-Genomics & Proteomics
LC-VII-Biomolecules & Biotechniques	LC-X- OOPs using JAVA
LC-VIII-PL/SQL	LC-XI-Techniques in Bioinformatics
LC-IX- Basic Bioinformatics	LC-XII-Structural Bioinformatics

Semester I

Semester-I				
Paper No	**Subject Name**	**Theory Marks**	**Practical Marks**	**Total**
Paper-I-	Basic Biophysics-I	50	00	50
PaperII-	Fundamentals of Biology-I	50	00	50
Paper-III	- Basic chemistry-I	50	00	50
PaperIV-	Basic Math & Statistics-I	50	00	50
Paper-V	-Basic Computer	50	00	50
PaperVI-	Introduction to Cell Biology	50	00	50
LC-I-	Biophysics and Basic Chemistry	00	50	50
LC-II	-Maths & Computers	00	50	50
LC-III	Fundamentals of biology & Cell Biology	00	50	50
	Total			**450**

Paper I – Basic Biophysics-I Theory Marks 50 Total Hrs-40

UNIT 1: Motion of Objects

Units and Measurements; International Standards of Units; Position, Distance, Displacement;Average Velocity, Average speed; Kinematic Equations; Relative Velocity; Vector representation of Physical quanities; Projectile Motion, Circular Motion

UNIT 2: Laws of Motion

Law of Intertia; Newton's 1^{st} law, 2^{nd} law and 3^{rd} law of motion; conservation of momentum; equilibrium of a particle, common forces in mechanics

UNIT 3: Work, Energy and Power

Notions of work; Force and Work; Kinetic Energy; Potential Energy; Conservation of mechanical energy; Potential energy of a spring; Power ; Collisions

UNIT 4: Rotational Motion and Oscillations

Centroid; Center of mass; Linear Momentum; Angular Velocity Vs Linear velocity, inter-relationshiop; Torque, angular momentum; Rigid bodies; Moment of Intertia; Definition of perpendicular and parallel axes, Kinematics & Dynamics about an axis;

UNIT 5:

Simple Harmonic motion; The force law of SHM; Energy; Angular SHM; Pendulums; Damped Oscillations; Forced Oscillations

Reference Books:

1. Resnik & Haliday Part I
2. Casey E.J. (1967), Biophysics, concepts and mechanisms. Affiliated East west
3. Ackerman E.A. Ellis, L.E.E. & Williams L.E. (1979), Biophysical Science, Prentice-Hall Inc.press
4. Physical Chemistry for Life Sciences by Barrow C, MC-Grow Hill
5. Biophysical Chemistry by Bloomfield V A and Harrington R E, W A Freeman and Co.
6. Biophysical Chemistry by Cantor C R and Schimmel, P R, W A Freeman and Co.
7. Protein, by Hasehemyer R N and Hasehemyer ACBV, John Willy and Sons
8. Aspects of Biophysics, Hughe S W, John Willy and Sons.
9. Introduction of Biophysics by Pranab Kumar Banargy, S Chand and Co.
10. Principles of Nuclic acid structure by Saenge W, Springer-verlag.
11. Principles of Protein Structure by Schule G E and Schirmer R H, Springer-Verlag.
12. Biochemistry by Stryer L, W A Freeman and Co.
13. Essentials of Biophysics by P Narayanan, New Age International Publishers

Paper II – Fundamentals of Biology-I Theory Marks 50

Total Hrs-40

UNIT I – Classification of Organisms

Classification of organisms (Binomial system), Species, Species name, taxonomic hierarchy. Three Domains of life- Archaebacteria, Eubacteria, Eukarya, Five Kingdom classification, Viruses – a special case as exception.

UNIT II – Bacteria

Prevalance of bacteria, bacterial forms, basic structure (surface and interior), Bacterial Diversity, Classification of bacteria, Importance of bacteria

UNIT III – Plants

Plant Kingdom, Histology, Tissue types - Meristematic, permanent, Types of Vascular Bundles, Stelar types and evolution, Plant physiology, Absorption of water and nutrients, translocation of solutes, transpiration, photosynthesis, photorespiration; Plant growth, differentiation, dedifferentiation, redifferentiation, development of plant, plant hormones, photoperiodism, vernalization

UNIT IV – Animals

Animal structure & function, Nutrition and digestion, Gas exchange, Circulation, Immune System, homeostasis, hormones and endocrine systems, reproduction & embryonic development, Nervous system, Motion, Sense organs

UNIT V – Origin and Evolution of life

Origin of life, Evolution of life forms, Evidences of evolution, Mechanism of evolution, Hardy - Weinberg Principle, A brief account of evolution.

Reference Books:

1. Brock Biology of Microorganisms - Madigan et al, 9th ed.
2. Biology by Raven and Johnson
3. Biology by Campbell and Reece
4. Exploring creation with Biology – Wile and Durnell,

5. Biology: Understanding Life by S.Alters & B.Alters, John Wiley & Sons
6. The Living World, 4th Edition by G.B. Johnson, John Wiley & Sons

Paper No-III- Basic Chemistry-I Theory Marks 50 Total Hrs-40

UNIT 1: Introduction

Importance of Chemistry, basic physical quantities and their measurements, SI Units, Dimensional Analysis, matter and its nature, atomic and molecular masses, molar masses, laws of chemical combinations, molecular formula.

UNIT 2: Atomic Structure

Bohr's Atomic models,, Limitations of Bohr's Model, quantum mechanical model of atom, quantum numbers, atomic orbitals, Heisenberg uncertainty principle, Pauli's exclusion principle, Aufbau principle, Hund's rule, Electronic configuration of elements.

UNIT 3: Chemical Bonding & Molecular Structure

Ionic bonds, covalent bonds, polarity of bonds, VSEPR theory, shapes of simple molecules, Valence band theory, hybridization of s, p, d orbitals, shapes of molecules, intermolecular forces, Hydrogen boning, concept of acids and bases: Arrhenius concept, bronsted-lowry theory, Lewis concept.

UNIT 4: Solutions and chemical kinetics

Colligative properties of solutions, common ion effect, hydrolysis of salts, pH, buffer and their applications in chemical analysis.

Rate of chemical Reaction, factors influencing rate of reaction, order of reaction, integrated rate equations of Zero order, first order and second order, Molecularity of reactions, activation energy,Collision theory.

UNIT 5: Periodic Table

Mosley’s Modern periodic law, Periodic trends: Electronegativity, Ionization energy, Atom Size, Electron affinity. General characteristics s-,p-,d- and f-Block Elements.

Biological importance of alkali and alkaline earth metals, Group 14 elements (carbon Family): Introduction, physical properties and chemical reactivity.

Reference Books:

1. N. N. Greenwood, A. Earnshaw: Chemistry of the Elements
2. D. F. Shriver, P. W. Atkins, C.H. Langford: Inorganic Chemistry
3. A. G. Sharpe: Inorganic Chemistry
4. J. March: Advanced Organic Chemistry
5. I. L. Finar: Organic Chemistry (Vol. I)
6. D. A. Mcquarrie and J. D. Simon: Physical Chemistry – A Molecular Approach
7. I. N. Levine: Physical Chemistry
8. G. W. Castellan: Physical Chemistry
9. P. W. Atkins: Physical Chemistry

Paper No-IV-Basic Statistics & Mathematics –I

Theory Marks 50 Total Hrs-40

Unit I: Introduction

Introduction to Biostatistics: Common terms and notations, applications. Sampling: Representative sample, sample size, sampling bias and sampling techniques. Data: collection and presentation: Types of data, methods of collection of primary and secondary data, methods of data presentation, graphical representation by histogram, polygon, ogive curve, pie diagram

Unit II: Central Tendency & Despersion measures

Measures of central tendency: Mean, Median, & Mode, Measures of variability:Standard Deviation, Standard Error, Range, mean deviation, coefficient of variation. Correlation and Regression: Positive and Negative Correlation, Calculation of correlation coefficient, regression, linear regression, and regression equation, ANOVA, one and two way classification.

Unit III: Test of Significance

Parametric and Non-parametric hypothesis testing, Types of Errors, F-test, t-test, Z-test and chi-square test

Unit IV: Matrix algebra

Definition, types of matrices, matrix algebra, addition, subtraction & multiplication. Transpose inverse of matrix.

Unit V: Vector algebra and calculus

Vector Algebra--Addition, subtraction, dot, cross, scalar triple product, divergence, curl of a vector, equation of normal

Reference Books:

1. Introductory Biostatistics: Chap T Le, Wiley interscience publication.
2. Jenny Olive – Maths :- a self study Guide – Cambridge Low prices edition
3. R.G. Bartle and D.R. Sherbert (2nd edition)-1992, JohnWiley, New York
4. E.D. Rainville and P.E. Bedient (1989), Elementary
5. Campbell R.C.–Statistics for Biologist, Cambridge University Press, Cambridge
6. Ward Law A.C. (1985)–Practical Statistics for Experimental Biologists
7. Daily N.T.J.–Statistical Methods in Biology, English University Press
8. P.S.S. Sunderrao & J. Richard–An Introduction to Biostatistics, Prenticd hall Pvt. Ltd. India

Paper No-V-Basics of Computers Theory Marks 50 Total Hrs-40

Unit-I

What is computer, characteristics of computers, applications of computer, computer generation, classification of computers, components of computer system. Input/Output Units: Keyboard, Mouse, Trackball, Joystick, Digitizing tablet, Scanners, Digital Camera, MICR, OCR, OMR, Bar-code Reader, Voice Recognition, Light pen, Touch Screen, CRT, LCD, LED Monitors.

Unit-II

Number systems-Binary, Octal, Decimal, Hexadecimal. Introduction to Operating Systems, Functions and Characteristics of Operating Systems. Concept of multiprogramming, multitasking, timesharing and Batch OS, World of Internet.

Unit-III

Computer Networking, Network Topologies and Protocols, Networking gadgets (Router, Switch, etc), Communication Links (Wire pairs, Coaxial cables, Fiber optics, Microwave, Satellite, etc) .Local Area Network

(LAN), Wide Area Network (WAN), Metropolitan Area Network (MAN) ,OSI Reference Model Network Attacks, Network Security : Firewall, Packet filtering, Honeypots. Data Security : Encryption/Decryption

Unit-IV

Introduction of MS-Office, Different elements of word processing (MS-WORD), Spreadsheets (MS EXCEL), Data storage (MS ACCESS) and PowerPoint presentation (MS POWERPOINT)

Unit-V

Computer Networking, Network Topologies and Protocols, Networking gadgets (Router, Switch, etc), Communication Links (Wire pairs, Coaxial cables, Fiber optics, Microwave, Satellite, etc) .Local Area Network (LAN), Wide Area Network (WAN), Metropolitan Area Network (MAN) ,OSI Reference Model Network Attacks, Network Security : Firewall, Packet filtering, Honeypots. Data Security : Encryption/Decryption

Reference Books:

1.Trainer T., et al, "Computers", McGraw Hill.

2.Norton, Peter, "Introduction to Computers, Mc-Graw-Hill.

3.Microsoft Web Publishing Step by Step, Active Education

4. Information technology concepts by Dr. Madhulika Jain, Shashank & Satish Jain,
[BPB Publication, New Delhi.]

5. Fundamentals of Information Technology By Alexis And Mathews Leon
[Leon Press, Chennai & Vikas Publishing House Pvt Ltd, New Delhi

Paper No-VI-Introduction to Cell Biology Theory Marks 50

Total Hrs-40

Unit I :

Definition of Cell, Cell theory, Diversity of cell size and shape

Overview of cell specialization – Plants – epidermis, vascular tissue and cortex. Special properties pf plant cells- cell wall, vacuoles and chloroplasts

Animals- epithelia, connective tissue, nervous tissue, muscle, blood, germ cells and sensory cells

Unit II

Structure and organization of prokaryotic and eukaryotic cells, differences

Unit-III

Endoplasmic reticulum, lysosomes, Golgi apperatus, mitochondria, cytoskeleton-microtubules, intermediate and actin filaments, cilia and flagella, nucleus, ribosomes

Unit IV

Structure of model membranes- Plasma membranes, Endoplasmic reticulum membrane, nucleus, mitochondrial and chloroplast membranes. Lipid bilayer, membrane proteins and their functions.

Unit V

Transport across membranes, Types of membrane transports- active and passive Transport, Passive transport- Simple and facilitated diffusion, transporters- Uniporters , cotransporters and channel proteins .Active transport- Pumps, Group translocations and electrochemical gradients.

Reference Books:

1. Microbial Physiology – Moat and Foster
2. Molecular Biology of Cell, (2002), 4thEdition; Albert’s et al.
3. Molecular Cell Biology (2004), Lodish et al.

4. Cell and Molecular Biology; Concepts & Experiments (2004).Karp, G.
5. The Cell: A molecular Approach (2004), Cooper, G.M
6. Cell &Molecular biology, de Robertis & df Robertis.
7. Cell proliferation and apoptosis (2003); Hughes & Mehnet.
8. Biochemistry &Molecular Biology of plants (2004); Buchananet al.
9. Lehninger Principles of Biochemistry, (2005) Nelson & Cox

LC-I- Basic Biophysics and Basic Chemistry

Section A- Basic Biophysics-I

Practical course conntent of this subject will be conveyed at the time of starting this course.

Section A- Basic Chemistry-I

Practicals:

1. Prepare standard solution oxalic acid ad standardize given NaOH solution.

2. Prepare standard solution oxalic acid ad standardize given KMnO4 solution.

3. Determine the water of crystallization in given salt – $BaCl_2$,.$2H_2O$

4. To determine the specific reaction rate of the hydrolysis of methyl acetate/ ethyl Acetate catalyzed by hydrogen ion at room temperature

5. To study and perform kinetically the reaction rate of decomposition of iodide by H2O2.

6.To determine the percentage composition of a given mixture by viscosity methods

7. To determine the percentage composition of a given binary mixture by surface tension method

LC-II Mathematics & Statistics-I & Basics of Computers

Section A- Mathematics & Statistics

1. Introduction to Biostatistics-

Terminologies used in Biostatistics and their definitions.

2. Data Representation methods-

Types of data, examples on graphical reprentations of data by histogram,bar graph, polygon, ogive curve, pie diagram.

3.Sampling Techniques-

Introduction to sample and population, Sampling methods and examples of sampling methods.

4. Measures of Central Tendency

Problem solution of all measures of central tendancies.

5. Measures of Dispersion

Problem solution of all measures of dispersion.

6. Test of Significance

Problem solution of all types of tests of significance.

7. Matrix Algebra

Problem solution on matrix addition, substraction, multiplication, transpose and inverse.

8. Vector Algebra & calculus

Problem solution on vector addition , substraction, dot, cross, scalar triple product, divergence, curl of a vector, equation of normal

Section B- Basics of Computers

1.Introduction to number system- Problem solving on conversion of number systems.From Decimal to Binary, octal , hexadecimal & vice-versa and all other combinations of conversions.

2.Hands-On experience and regular usage: Tutorials (Typing, Windows OS introduction, Linux OS introduction,Internet etc.), applications.

3. Internet: Introduction to Browsers, utilizing current browsers (Internet Explorere, Mozilla, Chrome etc.) , surfing the Internet, Search Engines,using E-Mail/Web mail.

4. Downloading and installing software/plug-ins on Windows 98/XP, Linux (Acrobat Reader, Post Scripts Viewer, etc.).

5. Word Processing (Microsoft Word): Creating, Saving & Opening a document, Editing, Inserting, Deleting, Formatting, Moving & Copying Text, Find & Replace, Spell Checker & Grammar Checker (Thesaurus), Document Enhancement (Borders, Shading, Header, Footer), Printing document (page layout, Margins), Introduction to the use of Wizards & Templates, Working with Graphics (Word Art).

6. Working with Tables & Charts, Inserting Files (pictures, Databases, Spreadsheets)

7.Microsoft Excel: Worksheet Basics (Entering information in a worksheet, Saving & Opening a worksheet, Editing, Copying & Moving data, Inserting, Deleting & Moving Columns & Rows, Clearing Cells & Formatting cells), Working with workbooks, Working with formulae and functions, Printing worksheets.

8.Introduction to the use of advanced spreadsheet conceptsand applications, Database "Management (Sorting records, Finding records, Adding & Deleting records, Filtering records in a worksheet), Working with Macros, Creating and using multiple worksheets

9. Database Applications (Microsoft Access): Fields, Records, Files, Organization of Files, Access Modes.Database, Relational Database; Primary and Secondary Key, Working with databases & tables, Creating a Database, Appending, Updating Records Querying, Reports, Forms and sub forms, Sorting, Filters.An introduction to use of Macros, Modules, Wizards with database applications

10. Creation of Computer Presentations with graphics (Microsoft Power Point): Creation of slides, Rapid Presentation design using wizards, Inserting graphs & charts Action buttons, Transitions, Build and Animation effects Introduction to Multimedia Tools & Devices Searches on Medline, bibliographic databases, etc.

LC-III Fundamentals of biology & Cell Biology

Section A- Fundamentals of Biology-I

1.Cell organelles study with permanent slides

2. Meiosis

3. Mitosis

4. Study of Osmosis

5. Microtomy

6. TC of stem, pollen grain, stigma, leaves, root7. Xylem, Phloem

7. Detection of normal and abnormal constituents of urine – sugar, albumen bile and blood cells.

8. Demonstration of salivary amylase.

9.Effect of temperature and pH on amylase

Section B- Cell Biology

1.Visualization of Chromosomes in mitotic/ meiotic stages in onion root tips / buds.

2.Isolation and confirmation of mitochondria from plant / animal cells.

3.Lipid solubility of membrane

4.Study of osmosis in blood cells

5.Isolation of Chloroplasts from Spinach leaves

6.Study of hill reaction using isolated chloroplast

7.The effect of detergents on the erythrocyte membrane

8.Effect of lipid composition on membrane permeability.

Semester-II

Semester- II				
Paper No	**Subject Name**	**Theory Marks**	**Practical Marks**	**Total**
Paper- VII	Basic Biophysics-II	50	00	50
PaperVIII-	Fundamentals of Biology-II	50	00	50
Paper-IX-	Basic Chemistry-II	50	00	50
Paper-X-	Basic Mathematics & Statistics-II	50	00	50
Paper-XI-	Programming in C	50	00	50
Paper-XII-	Introduction to Genetics	50	00	50
LC-IV	Fundamentals of Biology-II & Basic Mathematics & statistics-II	00	50	50
LC-V	Basic Chemistry-II & Introduction to Genetics	00	50	50
LC-VI	Programming in C	00	50	50

Paper -VII – Basic Biophysics-II Theory Marks 50 Total Hrs-40

UNIT 1: Waves & Laws of Thermodynamics

Types of waves; Wavelength and frequency; Speed of traveling waves; Energy and power of waves; wave equation; Principle of superposition of waves; Sound waves, speed; Temperature; Definition and applications of Zeroth law, 1st law and 2nd law of thermodynamics; Applications

UNIT 2: Electricity

Electric Charge; Columb's law; Electric field, due to a point charges, due to dipole; due to line of charge; point charge in electric field; Gauss's law;

UNIT 3: Magnetism

Magnetic field, Definition; cyclotrons & synchrotrons; magnetic field in a current carrying wire; Ampere's Law; Solenoids; Energy stored in magnetic fields;

UNIT 4: Electromagnetic waves

Electromagnetic waves; Energy; Polarization; reflection & refraction; total internal reflection;

UNIT 5: Optics & Light

Light as a wave; Diffraction, Young's Interference, double-slit experiment; wave theory of light;

Diffraction grating; X-ray Diffraction

Reference Books:

1. David Friefelder: physical biochestry- w. h. freeman and company
2. Wilson and walker
3. Nath & Upadyay: Biophysical chemistry –himalaya
4. Gudeep and Chatwal :Instrumental methods of chemical -himalaya

Paper -VIII – Fundamentals of Biology-II Theory Marks 50

Total Hrs-40

UNIT 1: Overview

Introduction & History of Microbiology - Biogenesis and abiogenesis Contributions of Redi,Spallanzani, Needham, Pasteur, Tyndal, Joseph Lister, Koch [Germ Theory], Edward Jenner and Flemming [Penicillin], Scope of Microbiology.Classification of Microbes - Systems of classification, Numerical taxonomy, Identifying characters for classification, General properties and principles of classification of microorganisms Systematics of bacteria, Nutritional types [Definition and examples]. Classification on the basis of oxygen requirement.

UNIT 2:Concept of Sterilization

Definition of sterilization, dry and moist heat, pasteurization,tyndalization; radiation, ultrasonication, filtration. Physical and Chemical methods of sterilization;disinfection sanitization, antisepsis sterilants and fumigation. Determination of phenol coefficient of isinfectant.

UNIT 3: Stains and staining techniques

Definition of auxochrome , chromophores, dyes, Classification of stains, Theories of staining, Mechanism of gram staining, acid fast staining, negative staining, capsule staining, flagella staining, endospore staining.

UNIT 4: Microbes in Extreme Environment

Nature, special features of the thermophilic, methanogenic andhalophilic; Archaea; photosynthetic bacteria, Cyanobacteria some Archaea who live in extreme conditions like cold, and space. Pathogenic Microorganisms – List of common bacterial, fungal and viral diseasesof human beings [Name of the disease, causative pathogen, parts affected]

UNIT 5: Basic concepts of Virology

General characteristics of viruses, differences between bacteria and viruses. Classification of viruses Physical and chemical Structures of different Viruses.

Reference Books:

1. Brock Biology of Microorganisms - Madigan et al, 9th ed.
2. Biology by Raven and Johnson
3. Biology by Campbell and Reece
4. Molecular Biology of the Cell – Bruce Alberts
5. Exploring creation with Biology – Wile and Durnell
6. Prescott's Microbiology Joanne Willey , Linda Sherwood , Chris Woolverton
7. Microbiology, Robert bauman

Paper No-IX Basic Chemistry-II Theory Marks 50 Total Hrs-40

UNIT 1: Stereochemistry

Classification of stereoisomers, isomer number, enantiomerism, diastereomerism, chiral center, absolute configuration, R & S, conformations in Cycloalkanes and cyclohexanes, geometrical isomerism: E & Z, resolution, stereoselecting and stereospecific reactions

UNIT 2: Basis of Organic Reactions Mechanism: Elementary treatment of SN1, SN2, E1 and E2 reactions, Hoffmann and Saytzeff rules, Addition reactions, Markonikoff rule and Kharash effect, Diels-Alder reaction, aromatic electrophilic substitution,

UNIT 3: Hydrocarbons

Alkanes, Alkenes, Alkynes: definition, general formula, IUPAC nomenclature, general preparation methods and physical and chemical properties; Cycloalkanes, Aromatic compounds: definitions, general formulae, IUPAC nomenclature, general preparation methods and physical and chemical properties

UNIT 4: Alcohols, Phenols, Aldehydes, Ketones, Carboxylic Acids in Biology

Definition, general formula, IUPAC nomenclature, general preparation methods and bio-physico-chemical properties.

UNIT 5: Heterocyclic & Polymer Chemistry

Hetero-cyclic systems, 5-membered rings: structures of pyrols, furenes and thiophenes, electrophilic substitions;

6-membered rings: structures of pyridines; sources, reactions of pyridines, basicity of pyridines.
Introduction, preparation and physical and chemical properties of poly-ethylene, PVC, Nylon-6, Nylon-6-6, Polyester, Styrene, Natural rubber,

Reference:

1. N. N. Greenwood, A. Earnshaw: Chemistry of the Elements
2. D. F. Shriver, P. W. Atkins, C.H. Langford: Inorganic Chemistry
3. A. G. Sharpe: Inorganic Chemistry
4. J. March: Advanced Organic Chemistry
5. I. L. Finar: Organic Chemistry (Vol. I)
6. D. A. Mcquarrie and J. D. Simon: Physical Chemistry – A Molecular Approach
7. I. N. Levine: Physical Chemistry
8. G. W. Castellan: Physical Chemistry
9. P. W. Atkins: Physical Chemistry
10. Organic Chemistry, R. T. Morrison & R. N. Boyd, 6th Edition, Publishers: Pearson Education.
11. Organic Chemistry, Arun Bahl & B. S. Bahl, Publishers: S. Chand

Paper No-X-Basic Statistics & Mathematics- II Theory Marks 50

Total Hrs-40

Unit I: Introduction to Probability

Introduction to probability- definition& types of probability. Probability distribution – binomial, Poisson , normal,Baye's theorem, cocept of Random variable,types of Random variable

Unit II: ANOVA & MANOVA

ANOVA, one-way and two-way ANOVA, applications of ANOVA in biological problems, Multivariate ANOVA

Unit III: Limit & Continuity

Functions, types of functions ,Limits, standard formulae, limits of logarithmic, exponential, trignometric ,implicit and explicit functions.

Continuity, definition, continuity of functions.

Unit IV: Derivatives

Derivatives:laws of derivatives of functions, differentials of all types of functions functions- logarithmic, exponential, trignometric ,implicit and explicit functions.

Unit V: Integration

Concept of Integration, applications, types: Definite and Indefinite(Nondefinite), basic rules and properties of Integration.

Definite Integrals, definite integrals of functions- logarithmic, exponential, trignometric ,implicit and explicit functions.

Non-definite Integrals, definite integrals of functions- logarithmic, exponential, trignometric ,implicit and explicit functions

References:

1. Introductory Biostatistics: Chap T Le, Wiley interscience publication
2. Jenny Olive – Maths :- a self study Guide – Cambridge Low prices edition
3. R.G. Bartle and D.R. Sherbert (2nd edition)-1992, JohnWiley, New York
4. E.D. Rainville and P.E. Bedient (1989), Elementary
5. Campbell R.C.–Statistics for Biologist, Cambridge University Press, Cambridge
6. Ward Law A.C. (1985)–Practical Statistics for Experimental Biologists
7. Daily N.T.J.–Statistical Methods in Biology, English University Press
8. P.S.S. Sunderrao & J. Richard–An Introduction to Biostatistics, Prenticd hall Pvt. Ltd. India

Paper No-XI-Programming in C/C++ Theory Marks 50

Total Hrs-40

UNIT 1: Introduction to C/C++(CPP):

Importance of C/CPP, Basic structure of C/CPP program, creating a simple CPP program, executing a CPP program, header files, Data types, Operators and Expressions: Character set, keywords and identifiers, constants and variables, data types, declaration of variables, defining symbolic constants. Operators: relational operators, logical operators, assignment operators, increment and decrement operators, conditional operator, library functions, arithmetic expressions evolution of expression, precedence of arithmetic operators, operator precedence and associatively.

UNIT 2: Loops & Control Statements

Data Input Output, Branching and Loops:Reading a character, writing a character, formatted input and formatted output. Decision making and if... else statement, nesting of if... else statement, the switch statement, the? : operator, the goto statement, The while statement, the do statement, the for statement.

UNIT 3: Arrays

Arrays and Functions: One dimensional arrays, two dimensional arrays, sorting algorithm bubble sort and insertion sort.

UNIT 4: Functions

Defining a function, function prototype, return type, passing arguments, call by value, call by reference, recursive function, passing array to function, scope rule. String manipulation functions.

UNIT 5: Introduction to OOPs & Standard Template Library (STL)

Introduction to concept of Object Oriented Programming, characteristics of OOP's (Encapsulation, Abstraction, Inheritance,Polymorphism), classes and objects , Bytecode ,Using STL's (Streams, fstreams, numeric, vectors).

References

1. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, ISBN:9788120305960, PHI Learning
2. How to Solve it by Computer, R.G. Dromey, ISBN:9788131705629, Pearson Education
3. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg ISBN:9788131500941, Cengage Learning India
4. Using The GNU Compiler Collection, Richard M. Stallman; The GCC Developer Community Pothi.com

5. Mastering C by Venugopal, Prasad – TMH
6. Complete reference with C Tata McGraw Hill
7. C – programming E.Balagurusamy Tata McGray Hill
8. Schaums outline of Theory and Problems of programming with C : Gottfried
9. The C programming language : Kerninghan and Ritchie
10. An introduction to data structures with applications, Jean-Paul Trembly and Paul Sorenson, (2nd edition), 1884.

Paper No-XII-Introduction to Genetics Theory Marks 50
Total Hrs-40

UNIT 1: Mendel's Principles of Heredity

The Basic Principles of Inheritance, Mendel's experiments, Monohybrid Crosses: The Principles of Dominance and Segregation, Dihybrid Crosses: The Principle of Independent Assortment, Applications of Mendel's Principles, Mendalian inheritance in Humans, Mendelian Principles in Human Genetics, Pedigrees, Mendelian Segregation in Human Families

UNIT 2: Extensions to Mendel's laws

Extensions of Mendelism, Allelic Variation and Gene Function, Incomplete Dominance and Codominance, Multiple Alleles, Allelic Series,

UNIT 3: Chromosome Theory of Inheritance

Inborn Errors of Metabolism, Pleiotropy, The Chromosomal Basis of Mendelism, Sex, Chromosomes, Genes, Sex Chromosomes, The Chromosome Theory of Heredity, Experimental Evidence Linking the Inheritance of Genes to Chromosomes

UNIT 4: Linkage, Recombination and the mapping of Genes on Chromosomes

Linkage, Recombination, and Crossing Over, Exceptions to the Mendelian Principle of Independent Assortment, Frequency of Recombination as a Measure of Linkage Intensity, Crossing Over as the Physical Basis of Recombination, Evidence that Crossing Over Causes Recombination, Chiasmata and the Time of Crossing Over, Chromosome Mapping, Crossing Over as a Measure of Genetic Distance, Recombination Mapping with a Two-Point Testcross, Recombination Mapping with a Three-Point Testcross, Recombination Frequency and Genetic Map Distance, Chiasma Frequency and Genetic Map Distance, Cytogenetic Mapping, Localizing Genes Using Deletions and Duplications, Genetic Distance and Physical Distance, Linkage Analysis in Humans, Detecting Linked Loci by Pedigree Analysis, Somatic-Cell Techniques for Assigning Genes to Chromosomes, Recombination and Evolution, Evolutionary Significance of Recombination, Suppression of

Recombination by Inversions, Genetic Control of Recombination, Focus on Evolutionary Divergence of the Human X and Y Chromosomes

UNIT 5: Quantitative Genetics and Alterations of Chromosomes

Polygenic inheritance, heritability and its measurements, QTL Mapping. Deletion, duplication, inversion, translocation, ploidy and their genetic implications.

Reference Books:

1. Genetics a conceptual approach – Benjamin Pierce
2. Principles of Genetics – Tamarin
3. Genetics: Strickberger, M. W. (Macmillan)
4. Principle of Genetics (2001) 8thEd. -Gardener et al.
5. Concept of Genetics 7thEd. (2003) -Klug& Cummings.

LC-IV -Basic Biophysics-II & Basic Mathematics & statistics-II

Section A- Fundamentals of Biology-II

1.Simple staining/Monochrome staining

2. Negative staining

3. Differential staining –Grams staining and Acid Fast staining

4. Cell wall staining

5. Capsule staining

6. Flagella staining

7. Spore staining

8. Nucleic acid staining

9. Media construction, minimal and complex medium

10. Selective medium for Salmonella

11.. Growth curve for E. coli strain and LB medium

12.Testing efficiency of sterilization

Section B- Basic Mathematics & statistics-II

1.Introduction to Probability: Introduction to probability,definition & problem solving on types of probability, Probability distribution – binomial, Poisson , normal,Baye's theorem in with statistical and biological problems.

2.ANOVA & MANOVA: Biological problem solving on ANOVA, one-way and two-way ANOVA, Multivariate ANOVA

3.Limit & Continuity: Problem solving on Functions, types of functions ,Limits, standard formulae, limits of logarithmic, exponential, trignometric ,implicit and explicit functions.

Continuity, definition, continuity of functions.

4.Derivatives :Problems solving on Derivatives:laws of derivatives of functions, differentials of all types of functions functions- logarithmic, exponential, trignometric ,implicit and explicit functions.

5. Integration: Problem solving on Definite and Indefinite (Nondefinite) Integrals, Definite Integrals, definite integrals of functions- logarithmic, exponential, trignometric ,implicit and explicit functions.Non-definite Integrals, definite integrals of functions- logarithmic, exponential, trignometric ,implicit and explicit functions

LC-V-Basic Chemistry-II & Introduction to Genetics

Section A- Basic Chemistry-II

1. Systematic qualitative analysis of organic compounds (Single compound:

   i. Benzoic Acid ii. Pthalic acid iii. Cinnamic acid iv. 2 -naphthol

   vi. *p*-nitroaniline vii. Acetanilide viii. Naphthalene) for

   nature, functional group, elements, derivatives and physical constant.

2. Purification of organic compound by crystallization-Benzoic acid
3. Purification of organic compound by sublimation- Naphthalene.
4. Purification of organic compound by distillation.

Section B- Introduction to Genetics

1. Determination of mutation rate
2. Fluctuation analysis
3. Spontaneous mutation –drug resistance phenotype
4. Mutations by UV rays
5. Mutations by chemical agents such as; base analogue, intercalating agents or Alkylating agents.
6. Bacterial transformation
7. Bacterial conjugation
8. Bacterial transduction
9. UV survival curve and Photo and/or Dark repair.

LC-VI-Programming in C

1. Introduction to C and C++

2.Working with Operators in C and C++

3. Working with loop and control statements C and C++

4. Using Functions Binding data and functions C and C++

5.Pointers and Arrays C and C++

6. Function and Operator Overloading in C++

7. Reusing classes in C++

8. Object-oriented programming
in C++

9.Standard Template Library (STL) & its uses in C++

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