।। सा विद्या या विमुक्तये ।।

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

"ज्ञानतीर्थ" परिसर, विष्णुपूरी, नांदेड - ४३१६०६ (महाराष्ट्र)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

"Dnyanteerth", Vishnupuri, Nanded - 431606 Maharashtra State (INDIA)

Established on 17th September 1994 – Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade

25 1994 - 2019 SILVER JUBILEE YEAR

ACADEMIC (1-BOARD OF STUDIES) SECTION

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संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील प्रथम वर्षाचे CBCS Pattern नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०१९–२० पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, **दिनांक ०८ जून २०१९ रोजी संपन्न झालेल्या ४४व्या मा. विद्या परिषद बैठकीतील ऐनवेळचा विषय क्र.११/४४–२०१९** च्या ठरावानुसार प्रस्तुत विद्यापीठाच्या **संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील प्रथम वर्षाचे** खालील विषयांचे **C.B.C.S. (Choice Based Credit System) Pattern** नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०१९–२० पासून लागू करण्यात येत आहेत.

1. Agricultural Microbiology
2. Agrochemicals & Fertilizers
3. Analytical Chemistry
4. B.C.A.
5. B.Voc. (Food Processing, Preservation and Storage)
6. B.Voc. (Web Printing Technology)
7. Biochemistry
8. Bioinformatics
9. Biophysics
10. Biotechnology (Vocational)
11. Biotechonology
12. Botany
13. Chemistry
14. Computer Application (Optional)
15. Computer Science (Optional)
16. Computer Science
17. Dairy Science
18. Dyes and Drugs
19. Electronics
20. Environmental Science
21. Fishery Science
22. Food Science
23. Geology
24. Horticulture
25. Industrial Chemistry
26. Information Technology (Optional)
27. Mathematics
28. Microbiology
29. Network Technology
30. Physics
31. Software Engineering
32. Statistics
33. Zoology

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.: शैक्षणिक–०१/परिपत्रक/पदवी–सीबीसीएस अभ्यासक्रम/२०१९–२०/**२९२**

दिनांक : ०३.०७.२०१९.

स्वाक्षरित/–
उपकुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत माहिती व पुढील कार्यवाहीस्तव :

१) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

SYLLABUS B.Sc. BIOTECHNOLOGY

CHOICE BASED CREDIT SYSTEM (June 2019)

Semester	Code	Title of the Course	Hr/Week	Type of Course	Credit	Marks		Total
						ESA	CIA	
I	AECBT-IA	Functional English	4	AEC	4	75	25	100
	CCBT- 1A	Introduction to Biotechnology	4	CC	4	75	25	100
	CCBT-2A	Basic Bioscience	4	CC	4	75	25	100
	CCBT-3A	Microbiology-I	4	CC	4	75	25	100
	Lab course I	Practicals based on AECBT 1A and CCBT1A	03+03	PR	4	100		100
	Lab course II	Practicals based on CCBT 2A and 3A	03+03	PR	4	100		100
					24	500	100	600

Semester	Code	Title of the Course	Hr/Week	Type of Course	Credit	Marks		Total
						ESA	CIA	
II	AECBT - 2A	Business Communication	4	AEC	4	75	25	100
	CCBT - 1B	Principles of Genetics	4	CC	4	75	25	100
	CCBT - 2B	Biomolecules	4	CC	4	75	25	100
	CCBT - 3B	Microbiology-II	4	CC	4	75	25	100
	Lab Course III	Practicals based onAECBT2A and CCBT 1B	03 + 03	PR	4	100		100
	Lab course IV	Practicals based on CCBT 2B+ 3B	03 + 03	PR	4	100		100
					24	500	100	600

SY - III

Semester	Code	Title of the Course	Hr/Week	Type of Course	Credit	Marks		Total
						ESA	CIA	
III	CCBT-1C	Metabolism	4	CC	4	75	25	100
	CCBT-2C	Basic Enzymology	4	CC	4	75	25	100
	CCBT-3C	Molecular Biology	4	CC	4	75	25	100
	DSEBT-4C	Bioinstrumentation Techniques Plant Physiology	4	DSE	4	75	25	100
	SEC-I	IA) Algal Culture Technology IB) Culturing and Maintenance of Microorganisms.	2	SEC	2	25	25	50
	Lab CourseV	Practicals based on CCBT 1C+2C	4	PR	4	100		100
	Lab Course VI	Practicals based on CCBT 3C+4C	4	PR	4	100		100
					26	550	100	650

Semester	Code	Title of the Course	Hr/Week	Type of Course	Credit	Marks		Total
						ESA	CIA	
IV								
	CCBT-1D	R- DNA Technology	4	CC	4	75	25	100
	CCBT-2D	Applied & Medical Microbilogy	4	CC	4	75	25	100
	CCBT-3D	Immunology and Virology	4	CC	4	75	25	100
	DSEBT-4D	Basics of Computer Plant Tissue Culture	4	DSE	4	75	25	100
	Sec-II	IIA) Diagnostic Biology IIB) Enzyme Technology	3	SEC	2	25	25	50
	Lab Course VII	Practicals based on CCBT 1D+ 2D	3+3	PR	4	100		100
	Lab Course VIII	Practicals based onCCBT 3D+ 4D	3+3	PR	4	100		100
					26			650

TY - V

Semester	Code	Title of the Course	Hr/Week	Type of Course	Credit	Marks		Total
						ESA	CIA	
V		Envronmental Studies	4					
	CCBT-1E	R-DNA Technology	4	CC	4	75	25	100
	CCBT-2E	Developmental Biology	4	CC	4	75	25	100
	CCBT-3E	Bioprocess Technology	4	CC	4	75	25	100
	DSEBT-4E	I) Advanced Bioinformatics II) Medical Biotechnology	4	DSE	4	75	25	100
	Lab Course IX	Practicals based on CCBT 1E+ 2E	4	PR	4	100		100
	Lab Course X	Practicals based on CCBT 3E+ DSEBT4E	4	PR	4	100		100
					24			600

Semester	Code	Title of the Course	Hr/Week	Type of Course	Credit	Marks		Total
						ESA	CIA	
VI	CCBT-1F	Pharmaceutical Biotechnology	4	CC	3	75	25	100
	CCBT-2F	Industrial Biotechnology	4	CC	3	75	25	100
	CCBT-3F	Environmental Biotechnology	4	CC	3	75	25	100
	DSEBT-4F	I) Agriculture Biotechnology II) Animal Biotechnology	4	DSE	3	75	25	100
	Lab Course XI	Practicals based on CCBT 1F+2F	3+3	PR	4	100		100
	Lab Course IX	Practicals based on CCBT 3F+4F	3+3	PR	4	100		100
	Lab Course X	Dissertation Project Work	3	PR	2	50		50
					24	550	100	650

CC- Core Course, DSE- Discipline Specific Elective, AEC- Ability Enhancement Course,ESA- End Semester Assesment, MSA- Mid Semester Assesment, PR- Practical, SEC-Skill Enhancement Course

Total credits = 150

Functional English-AECBT-IA

Maximum Marks: 75 **Hours: 50** **Credits: 3**

Learning Objective:

1. To enable students to utilize their knowledge of grammar effectively for communicative purposes.
2. To develop communicative skills of the learners in listening, speaking, writing and reading.
3. To focus on how English is used in real-life situations
4. To develop fluency in conversation and efficiency in interactional skills
5. To learn to use grammar communicatively so that they become effective and efficient communicators in English.

Learning outcome:

By the end of this course students should be able to:

1. Understand and demonstrate Basic English usages for their different purposes.
2. Clear entrance examination and aptitude tests.
3. Write various letters, reports required for professional life.

Unit I:

Morphology **10 Lectures**

1.1 Morphology: Free & Bound Morphemes
1.2 Word Formation Processes
1.3 Morphological Analysis of words

Unit II:

A. Grammar in day-to-day use: **15Lectures**

2.1 Word Classes: Open and Closed Word Classes
2.2 Phrase: Types and functions of the phrases

B. Speaking Situations:

2.3 Role Playing
2.4 Group Discussion
2.5 Seminars

Unit III:

A. Error Detection **15Lectures**

3.1 Determiners: Article, Quantifiers and Demonstratives
3.2 Subject – Verb Agreement

B. Transformation of Sentences: -

3.4Voice: Active & Passive
3.5Speech: Direct & Indirect

Unit IV:

Business Correspondence **10 Lectures**

4.1 Letters (Formal & Informal),
4.2 Report Writing (Scientific and Formal)
4.3 Essay Writing
4.4 Resume

Reference Books:

1) Developing of Communication Skills -Krishna Mohan & Meera Banerji
2) A Practical English Grammar A.J. Thomson -Oxford
3) Mastering English Grammar – S. H. Burton
4) Technical Communication- Raman Sharma- Oxford
5) Written Communication in English – Sarah Freeman Orient Longman Pvt. Ltd.
6) A Course in Phonetics & Spoken English -J. Sethi & P. V. Dhamija.

List of Practical:

1) Group Discussion
2) Seminars on the general topics
3) Debate Competitions
4) Public Speaking
5) Role Playing
6) Telling Stories and Jokes in English
7) Hosting the programmes as an Anchor
8) Translations: Mother tongue to English

Introduction to Biotechnology- CCBT-1A

Maximum Marks: 75 **Hours: 45** **Credits: 3**

Objective:

To have overview and understanding of world of Biotechnology with applications.

Outcome:

Students become able to understand the applications of Biotechnology in different fields.

Unit-I: Introduction:

Definition, Historical overview of Biotechnology, Recent discoveries from Cell biology to Biotechnology.

Application of Biotechnology in Agriculture:

Plant tissue culture, Seed Technology, Transgenic plants, Bio-fertilizers, Bio-pesticide with examples. etc.

Unit II: Biotechnology in Health & Biopharmaceuticals:

Diagnostics- Ag-Ab Interactions and other types of diagnosis. Concept of Stem Cells, Hybridoma Technology, Genetic Counseling. Transgenic Animals and their applications.

Unit-II: Biotechnology in Industry:

Beverage-Winery, Distillery, Dairy, Food
Processing and packaging, Enzymes, Paper & Pulp etc

Unit-IV: Application of Biotechnology in Environment & Biodiversity:

Waste Water Treatment, Biodegradation, Bioremediation, composting, Solid waste Management. Biofuel- Biodiesel, Biogas, Ethanol. Biodiversity: *in situ*, *ex situ* conservation of endangered species.
Ethical, Legal (IPR, Patent) and Social impact of Biotechnology.

Reference Books & Text:

1. Introduction to Biotechnology- Brown, C Publications ampbell, Priest-Panima Publications
2. Biotechnology-U Satyanarayana- New Age Publications
3. Biotechnology - B.D. Singh, Kalyani Publications
4. Biotechnology: Expanding Horizon- B.D. Singh- Kalyani Publications
5. Elements of Biotechnology - P.K. Gupta, Rastogi Publications
6. A Text book of Biotechnology - R.C. Dubey- S. Chand
7. Advances in Biotechnology- S.N. Jogdand- Himalaya Publication
8. Concepts in Biotechnology-Balasubranian- University Press
9. Biotechnology - Purohit- Agrobios Publication
10. Modern concepts of Biotechnology, H.D. Kumar, Vikas Publications

Practical:

1. Students are expected to go on field study to reveal the applied areas of biotechnology, Biotech Companies, Products and their impact on society.
2. Survey and report on commercial dairy products and packaged food products available in market.

3. Survey and report on bio pesticides, and bio control agents available in market
4. Survey and report on genetically modified/hybrid crops seeds and vegetables
5. Survey and report on vaccination programme in India and vaccines in market
6. Survey and report diagnostic kits, antibiotics, anti-sera available in market
7. Survey and report on use of Biofuel (Biodiesel, biogas, ethanol, biomass, coal etc)
8. Visit and report on local drinking and waste water treatment, bio composting, biogas unit
9. Report on government agencies- DBT, CSIR, ICMR, ICAR, TIFR, ISSER, IIT, DRDO
10. Report on Top 10 Biotech companies in India and World
11. Visit and report on Biotech Research Institute, Forensic Laboratory and Biotech Industry

Basic Bioscience- CCBT-2A

Maximum Marks: 75 **Hours: 45** **Credits: 3**

Objective:

To understand the basic concept of Life forms, Evolution and Biodiversity
Learning Outcomes: Students will understand biodiversity of living organism and plant body organization

Unit-I: Evolution in life

Prebiological chemical evolution, Diversity of living world, Whittaker's Five Kingdom System, Classification up to genus & species level, Brief account of Prokaryotic & eukaryotic cell.

Unit-II: Plant body organization

Structural Morphology of vegetative and reproductive organs of monocot & dicot plants, **Functional - Flower-** Parts and their functions. **Inflorescence-** Types, special types of inflorescence, **Physiology of flowering** –Photoperiodism, Vernalization and Dormancy **Fruit-** Types of fruit, Parthenocarpy. **Seed** – Development, structure, germination, control of seed germination,

Unit-III : Brief Introduction to types of Animals

Placentation in mammals, Gametogenesis, Reproductive cycles, Fertilization, Gestation, Partuition & Lactation and Introduction to Nuclear & Embryo transplantation. A Brief Introduction to Poultry farming, Apiculture, Sericulture, Aquaculture & Vermiculture.

Unit-IV: Fungi

General characters of Fungi, Classification of fungi Ultra structure of typical fungal cell, cell wall composition, Nutrition, Reproduction, Types of spores, Effect of environment on growth, prevention of fungal growth.

Reference Books:

1. Botany by –A.C. Dutta- Oxford
2. Botany for Degree Students- Vasitha- S. Chand Publication
3. College Botany- B.P. Pandey- S.Chand
4. An Introduction to Mycology- K.R.Aneja- New Age
5. Plant Physiology-SundaraRanjan- Anmol Publication
6. Fundamentals of Plant Physiology- V.K. Jain- S. Chand
7. Fungi for Degree Students- Vashist- S.Chand
8. Zoology –Jordan &Verma-S. Chand
9. Chordate Embryology- Verma, Agarwal- S.Chand
10. Plant physiology, Biochemistry & Biotechnology- Verma&Verma- S Chand

Practicals:

1. Study of T S of Monocot & Dicot stem and root
2. Study of Flower, Inflorescence, fruits, Seeds
3. Study of TS of anther and ovule
4. Preparation of Potato dextrose agar and growth of any fungus
5. Study of embryo development (Chicken /Frog)

6. Study of extra embryonic membranes in chicks
7. Visit to a protected area of the state to understand and appreciate biodiversity
8. Observation of permanent slides of anther, ovule, embryo sac, embryo and endosperm etc
9. Study of eukaryotic and prokaryotic cell structures

Microbiology I-CCBT-3A

Maximum Marks: 75 **Hours**: 45 **Credits**:3

Objective:

To understand basic concepts in Microbiology. To understand the morphology and fine Structure of Bacteria

Learning Outcomes: Students will understand the history of microbiology. They will learn the fine structure of bacteria and applied areas of Microbiology

Unit –I: Introduction to Microbiology History of Microbiology:

Discovery of microscope and Microbial world: Micrographia of Anton von Leeuwenhoek and Robert Hooke. Controversy over Abiogenesis: Aristotle's notion about spontaneous generation, Redi's experiment, Louis Pasteur's. Theory of fermentation, Discovery of anaerobic life & physiological significance of fermentation. Germ theory of disease – Koch's postulates.

Unit –II. Basic and applied areas:

Medical Microbiology, Space microbiology, Soil and Agricultural Microbiology, Food and Dairy Microbiology, Geomicrobiology. Concept of Systematic and Classical taxonomy including Bergey's Manual of Bacteriology.

Unit-III: Morphology and Fine Structure of Bacteria Morphology of Bacteria,

Size and shape, Arrangements. Ultra structure of Bacteria Structure, function and chemical composition of Capsule, Flagella, Pili and Fimbriae, Cell Wall (Gram positive & Gram negative), Cell membrane, Mesosome, Cytoplasm, Nucleoid and ribosome's. Cytoplasmic inclusion – PHB granules, glycogen, carbohydrates, Magnetosome, Gas vesicles, chromosome, Sulphur, granules.

Unit –IV. Spore and Cyst-

Endospore and Exospores, Germination and Sporulation of endospore. Eukaryotic Cell Structure and function: Overview of eukaryotic cell structure.

Reference books:

1. General Microbiology-Powar and Daginawala- Himalya Publication
2. Fundamental Principles of Bacteriology- A.J.Salle- TATA-McGraw Hill
3. General Microbiology-Pelczar- Tata McGraw Hill
4. Text-book of Microbiology- Anantnarayan, C.K. Jayram, Panikar, Orient Longman.
5. General Microbiology- Stanier R.-. Macmillan Press Ltd.
6. Text Book of Microbiology- R.C. Dubey- S.Chand

Practical:

1. General Rules and Safety in Microbiology Laboratory.
2. Study of basic requirements in Microbiology Laboratory- Autoclave, Hot air oven & Incubator
3. Isolation of microorganisms from soil, water and air.
4. Detection of number of bacteria from milk by SPC

5. Microbiological examination of food
6. Simple staining
7. Gram staining
8. Measurement of size of microorganism by Micrometry method
9. Study of motility of Microorganisms by hanging drop method
10. Alcoholic fermentation

Business Communication-AECBT - 2A

Maximum Marks: 75 **Hours: 45** **Credits: 3**

Objective:

1. To enable students to utilize their knowledge of grammar effectively for communicative purposes.
2. To develop communicative skills of the learners in listening, speaking, writing and reading.
3. To focus on how English is used in real-life situations
4. To develop fluency in conversation and efficiency in interactional skills
5. To learn to use grammar communicatively so that they become effective and efficient communicators in English.

Outcome:

1. Understand and demonstrate Basic English usages for their different purposes.
2. Clear entrance examination and aptitude tests.
3. Write various letters, reports required for professional life.

Unit-I:

Day-to-Day-English **10 Lectures**

1.1 Describing persons, objects or things
1.2 Narrating Pictures
1.3 Talking about places and recipes
1.4 Expression opinions

Unit-II:

Vocabulary **10 Lectures**

2.1 Spellings: How to spell correctly
2.2. Idioms and Phrases
2.3 Synonyms and antonyms
2.4 One Word Substitution

Unit-III:

Reading Comprehension: **10 Lectures**

3.1 Basic Approaches for understanding English
3.2 Para Jumbles
3.3 Rearranging the jumbled parts of a sentence
3.4 Cloze Test

Unit-IV:

Writing Ability **15 Lectures**

4.1 Writing Research Papers- Introduction
4.2 Creative Writing- Writing Meeting Notices, Agenda and Minutes
4.3 Email Writing for day-to-day purpose: Emails for Jobs, Invitation and Complaint
4.4 Writing short moral stories

Reference Books:

1) Developing of Communication Skills -Krishna Mohan &Meera Banerji
2) A Practical English Grammar A.J. Thomson -Oxford
3) Mastering English Grammar – S.H.Burton
4) Technical Communication- Raman Sharma- Oxford
5) Written Communication in English – Sarah Freeman Orient Longman Pvt. Ltd.
6) A Course in Phonetics & Spoken English -J.Sethi & P.V.Dhamija.

List of Practical:

1) Preparing Individual Resume
2) Curriculum Vitae
3) Presenting Prepared Speeches
4) Handling Tele-interviews
5) Email Drafting, Cover Letter Writing and Sending error free emails
6) Organizing Conference and dealing with oral presentations
7) Art of Oratory and Video conferencing
8) Delivering speeches, lectures using technology like you-tube and other social media

Principles of Genetics- CCBT-1B

Maximum Marks: 75 **Hours: 45** **Credits: 3**

Objective:

To understand Mendelian genetics, Microbial genetics, concept of Genes and Human population Genetics

Outcome:

Students will learn the Mendel's laws of Inheritance and will acquire the laboratory skills of microbial recombination.

UNIT 1

Mendel's law of Inheritance – principal of segregation, independent assortment, Dominance, Mendelian genetics in humans.
Varity of gene expression –modifiers, suppressors, pleiotropic gene, multiple allele, interaction of gene-Epistasis, complimentary gene, supplementary gene, duplicate gene

UNIT 2

Linkage –definition, coupling and repulsion hypothesis, linkage groups; Crossing over –Mechanism and theory; Structural and numerical changes in chromosomes; Extra chromosomal inheritance-mitochondrial and plastids; Karyotype study

UNIT 3

Concept of Gene, Classical & modern gene concepts, Mapping of gene, Mutation-Basic Concept, Types –Spontaneous, Induced ; Mechanism of mutagenesis – Base analogues, Nitrous acid hydroxyl amine, alkyl ting agent, Acridine dyes, U. V. light

UNIT 4

Plasmid- Structure, Types, properties and applications; Transposable elements; genetic recombination in bacteria – definition, transformation, Conjugation, transduction, mechanism of recombination

Text & References

1. Genetics, M.W., Strickberger, Prentice Hall College Division
2. Microbial Genetics- David Friefelder- Narosa Publications
3. Stanier "General Microbiology"
4. Genetics, P.K. Gupta- Rastogi Publication.
5. C. Sarin "Genetics"
6. Larry Snyder Wendy Champness "Molecular Genetics of Bacteria"
7. Genetics-Arora-Himalaya Publications
8. Genetics –B.D. Singh –Himalaya Publication

Practical:

1. Two examples on Dihybrid cross
2. Two examples on Monohybrid cross.
3. One example each on interaction of genes.
4. Study of Karyotype.
5. Study of Human blood group.
6. Study of special types of chromosomes.

Biomolecules-CCBT-2B

Maximum Marks: 75 **Hours: 45** **Credits: 3**

Objective:

To focus on the basic concept of Biomolecules & their physiological role in life.

Outcome: Students will analyze the structure and functions of biomolecules in life forms. They will acquire the lab skills for the estimation of biomolecules.

UNIT-I: Carbohydrate:

Nomenclature, Classification (Monosaccharide's, oligosaccharides, polysaccharide), structure & functions, chemical properties and structural aspects of Monosaccharide's (Glucose),Disaccharides (Sucrose, Lactose) and polysaccharides (Starch, Glycogen).

UNIT-II: Amino Acid:

Classification and Structure, Physical and Chemical properties. Peptides- Nomenclature, Classification and examples. **Proteins-** Classification (on the basis of solubility, molecular weight, shape, composition) Properties and Structure (Primary, Secondary, Tertiary and Quaternary) with examples. Role in biological system. **Enzyme-** Nomenclature and Classification. Role of enzymes.

UNIT-III: Nucleic Acid:

Structure of nucleic acid – Nitrogenous bases, pentose, nucleotides, nucleosides, nucleoside di and triphosphate. Basic structure of DNA & RNA, Forms of DNA, Types of RNA, physicochemical properties and biological function of nucleic acids.

UNIT-IV: Lipid-

Classification (Saturated and Unsaturated fatty acid) structure and Biological role, Cholesterol. **Vitamin**- Definition and classification of Vitamins, Water soluble Vitamins:- Structure ,Function and properties of Vit. B1, B2, B6 and C. Deficiency, Disorder and clinical Significances. Fat soluble Vitamin:- Structure ,Function and properties of Vit, A, D, E, K. Deficiency, disorder and clinical Significances.

Text & References:

1. Biochemistry- U. Satyanarayana & Chakrapani- New Age
2. General Biochemistry- J.H. Weil- New Age
3. Fundamentals of Biochemistry- A.C. Deb- Central publication
4. Lehniger Biochemistry- Kalyani Publication
5. Principle of Biochemistry- Cohn and Stumpf.
6. Biochemistry- Powar & Chatawal- Himalaya
7. Biochemistry- J.L Jain- S.Chand
8. Biochemistry- Rastogi- Tata Mcgraw Hill
9. General Microbiology- Powar & Daginawala- Himalaya Publication.

Practical:

1. General and Safety Rules of Laboratory
2. Preparation of Standard solutions – Molar, Molal, Normal, Percent.
3. Identification of Bio molecules by Spot test.
4. Study of Lambert Beer's Law
5. Estimation of Carbohydrate by DNS Reagent.
6. Estimation of Protein by Biuret method.
7. Qualitative estimation of DNA by Diphenylamine method.

8. Determination of acid value of oil and fat.
9. Estimation of vitamin by DNPH/ Iodometric method.
10. Preparation of Buffers Solutions
11. Study of Enzymes

Microbiology II -CCBT-3B

Maximum Marks: 75 **Hours:** 45 **Credits**: 3

Objective:

To understand basic concepts in Microbiology. To know the Microbial Nutrition and growth kinetics of bacteria.

Outcome:

Students will learn the microbial nutrition & cultivation.They will understand bacterial growth and various methods of sterilization.

UNIT-I:

Microbial Nutrition, cultivation Nutritional requirements – Major and Minor elements and growth factors. Nutritional types of microorganisms. Nutrient uptake mechanisms: Active and passive Diffusion, Osmosis. Types of Culture media with examples (Defined, Selective, natural, Differential, enrichment, Synthetic). Pure culture techniques (Streak, pour, Spread plate and roll tube method)

UNIT-II:

Bacterial Growth: Growth Kinetics and growth curve; Generation time, Growth rate, specific growth rate. Methods of Enumeration -Microscopic methods, Plate counts, Biomass, Chemical methods, Optical density. Continuous culture – Chemo stat and Turbido stat models, Diauxic growth and Synchronous culture.

Unit-III:

Control of Microorganisms by physical methods. Concept of Pasteurization, Tyndallization, Sterilization. Physical methods of Microbial Control: Heat: Moist & Dry, Low temperature, Filtration, High pressure, Desiccation, Osmotic pressure Radiations.

Unit-IV:

Control of Microorganisms by chemical methods. Chemical methods of Microbial Control: Phenolics , Biguanides- Chlorohexidine, Alcohols, Halogens, Heavy Metals, Quaternary ammonium compounds, Surface active agents, Aldehydes, Sterilizing gases, Peroxygens, chemotherapeutic agents.

Text & References:

1. General Microbiology-Powar and Daginawala- Himalya Publication

2. Fundamental Principles of Bacteriology- A.J.Salle- TATA-McGraw Hill

3. General Microbiology-Pelczar- Tata McGraw Hill

4. Text-book of Microbiology- Anantnarayan, C.K. Jayram, Panikar, Orient Longman.

5. General Microbiology- Stanier R.-. Macmillan Press Ltd. 6. Text Book of Microbiology- R.C. Dubey- S.Chand

Practicals:

1) Preparation of solid and liquid media

2) Isolation of Mos from Soil, Water and Air

3) Isolation of microorganisms by using selective media.

4) Isolation of bacteria by spread plate, streak plate and pours plate method.

5) Study of bacterial growth curve.

6) Maintenance of Pure Culture

7) Detection of Pathogens from water Samples

6) Detection of number of bacteria from milk by breed method.