



DEPARTMENT OF MICROBIOLOGY

SRI Y.N.COLLEGE (Autonomous),Narasapur
Affiliated to Adikavi Nannayya University
Thrice Accredited by NAAC with 'A' Grade

CURRICULAR PLAN – 2022-2023

I B.Sc Paper-I, Semester -I

INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY



S.No	Month	Week	Syllabus	Additional input/ Value add	Curricular Activity		Co-Curricular Activity	
					Activity	Hours Alloted	Activity	Hours Alloted
1.	Oct	II nd week	History of Microbiology & Place of Microorganisms in the living world	scope of microbiology, Scientists,	Teaching	08	Assignment	1 1
		III rd week	History of Microbiology in the context of contributions of Anton von Leeuwenhoek, Edward Jenner, Louis Pasteur Robert Koch, Ivanovsky, Martinus Beijerinck and Sergei Winogradsky.					
2.	Nov	I st week	Importance and applications of microbiology, Place of Microorganisms in the Living World Haeckel's three Kingdom concept, Whittaker's five kingdom concept, three domain concept of Carl Woese.	Four kingdom, Five kingdom	Teaching	24	Seminar Assignments World Population day	1 1
		II nd week	Prokaryotic microorganisms and Viruses Ultra-structure of Prokaryotic cell- Cell Wall, Cell Membrane, Cytoplasm, Nucleoid, Plasmid, Inclusion Bodies, Flagella, Pili, Capsule, Endospore.					
		III rd week	General characteristics of Bacteria (Size, shape, arrangement, reproduction.					
		IV th week	General characteristics of Rickettsia, Mycoplasmas, Cyanobacteria, Archaea General characteristics of viruses, Cultivation of Viruses (in brief)					
3.	Dec	I st week	Morphology, Structure and replication of TMV and Lambda Bacteriophage.	Types of virus	Teaching	24	World AIDS Day	1 1 1
		II nd week	Eukaryotic microorganisms: Algae - Habitat, thallus organization, photosynthetic pigments, storage forms of food, reproduction.					
							Slip test	

			Fungi - Habitat, nutrition, vegetative structure and modes of reproduction; outline classification	Various micro organisms			Assignments Seminar	
		III rd week	Protozoa – Habitat, cell structure, nutrition, locomotion, excretion, reproduction, encystment, outline classification					
		IV th week	Isolation and Culture of Bacteria and Fungi: Growth media- Natural, synthetic and semi synthetic media. Selective, Enrichment, and Differential media.					
4.	Jan	I st week	Pure culture techniques - dilution- plating, Streak-plate, Spread-plate, Pour-Plate and micromanipulator. Preservation of microbial cultures - sub culturing, overlaying cultures with mineral oils, lyophilization, sand cultures, storage at low temperature.	Bacterial motility - hanging drop technique, cultivation of aerobes & anaerobes Microorganism observation	Teaching	24	Slip test Assignments National Nutrition week	1 1
		II nd week	Principles of Microscopy, Sterilization and Disinfection: Principles of microscopy - Bright field and Electron microscopy (SEM and TEM)					
		III rd week	Staining Techniques - Simple and Differential staining techniques (Gram staining, Spore staining).					
		IV th week	Sterilization and disinfection techniques – Physical methods - autoclave, hot- air oven, pressure cooker, laminar air flow, filter sterilization, Radiation methods - UV rays, Gamma rays. Chemical					
5.	Feb	I st week	Mid exams					
		II nd week	Semester end exams					



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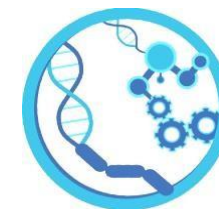
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CURRICULAR PLAN - 2022-2023

I B.Sc Paper-II, Semester –II

MICROBIAL PHYSIOLOGY AND BIOCHEMISTRY



S.No	Month	Week	Syllabus	Additional input/ Value addition	Curricular Activity		Co-Curricular Activity	
					Activity	Hours Alloted	Activity	Hours Alloted
1.	Mar	III rd week	Biomolecules: General characters and outline classification of Carbohydrates (Monosaccharides- Glucose, Fructose, Ribose, Disaccharides- Sucrose, Lactose, Polysaccharides- Starch, glycogen, Cellulose)	Structure of Biomolecules.	Teaching	10	Assignment International Science Day	1
		IV th week	General characters and outline classification of fatty (Saturated & Unsaturated Fatty Acids)					
2.	April	I st week	Lipids (Simple & complex lipids) General characteristics of Amino Acids and Proteins. Structure of Nucleic acids.	enzyme activity Analytical purification techniques	Teaching	24	Slip test Assignments Quiz Seminars World AIDS Day	1 1 1 1
		II nd week	Enzymes: Properties and classification of Enzymes. Biocatalyzed fit and lock and key models. Coenzymes and Cofactors					
		III rd week	Inhibition of enzyme activity- competitive, noncompetitive, uncompetitive and allosteric. Factors effecting enzyme activity					
		IV th week	Analytical Techniques: Principle and applications of – Colorimetry, Chromatography (paper, thin-layer, and column),					
3.	May	I st week	Spectrophotometry (UV & visible), Centrifugation and Gel Electrophoresis (Agarose and SDS).	Biomolecules	Teaching	14	Slip test Assignments	1 1

		II nd week	Microbial Nutrition and growth: Nutritional requirements of Microorganisms.	separation Techniques			Immunization Day	
		III rd week	Nutritional groups of microorganisms- autotrophs, heterotrophs, lithotrophs, organotrophs, phototrophs, chemotrophs					
		IV th week	Microbial Growth- different phases of growth in batch cultures; Synchronous, continuous, biphasic growth. Factors influencing microbial growth,					
4.	June	I st week	Methods for measuring microbial growth - Direct microscopy, viable count estimates, turbidometry and biomass.	Microbial cell count	Teaching	24	Slip test Assignments National Science day	1 1
		II nd week	Microbial metabolism: Aerobic respiration - Glycolysis, TCA cycle,					
		III rd week	ED Pathway, Electron transport Oxidative and substrate level phosphorylations					
		IV th week	Anaerobic respiration (Nitrate and sulphate respiration)					
5.	July	I st week	Fermentation- lacticacid and ethanol fermentations.	Microbial Respiration	Teaching	06	Slip test Assignments day	1 1
		II nd week	Outlines of oxygenic and anoxygenic photosynthesis in bacteria				World Population day	
		III rd week	Structural polymorphism of DNA , HP-TLC	DNA polymorphism				



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CURRICULAR PLAN - 2022-2023

II B.Sc Paper-III, Semester –III

MOLECULAR BIOLOGY AND MICROBIAL GENETICS



S.No	Month	Week	Syllabus	Additional input/ Value addition	Curricular Activity		Co-Curricular Activity	
					Activity	Hours Alloted	Activity	Hours Alloted
1.	Oct	I st week	Nucleic acids: DNA and RNA - Role in heredity	Structures of Nucleic acids.	Teaching	10	Assignment	1
		II nd week	The central dogma Watson and Crick model of DNA,					
2.	Nov	I st week	Types of RNA, structure, and functions, Organization of DNA in prokaryotes	Dispersive and conservative models of DNA Replication.	Teaching	24	Slip test Assignments	1 1
		II nd week	Genetic material and replication: Experiments which established DNA as genetic material RNA as genetic material, Mechanism of DNA Replication in Prokaryotes.					
		III rd week	Proof of semi conservative mechanism of replication (Meselson - Stahl Experiment).					
		IV th week	Mutations damage and repair: Outlines of damage and repair mechanism.					
3.	Dec	I st week	Mutations - spontaneous and induced Chromosomal aberrations - deletions, inversions, tandem duplications, insertions .	DNA mutations.	Teaching	24	Slip test World AIDS Day	1 1 1

3.		II nd week	Point mutations- base pair changes, frame shifts Mutagens - Physical and Chemical mutagens.	Bacterial Recombination.			Assignments seminar	
		III rd week	Bacterial recombination-Transformation, Conjugation, Transduction (Generalized and specialized transductions)					
		IV th week	Genetic engineering: Basic principles of genetic engineering					
4.	Jan	I st week	Restriction endonucleases, DNA ligases.	Cloning vectors.	Teaching	24	Slip test Assignments	1 1
		II nd week	Vectors – plasmids (pBR322 & pUC8), Cosmids, Phagemids lambda phage vector, M 13 vectors.	Preparation of DNA libraries.				
		III rd week	Outlines of gene cloning methods. Polymerase chain reaction. Genomic and cDNA libraries					
		IV th week	General account on application of genetic engineering in industry, agriculture, and medicine.					
5.	Feb	I st week	Types of PCR and DNA fingerprinting. Mid exams		Blotting techniques	Teaching	10	Slip test Assignments
		II nd week	Semester end exams					



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CURRICULAR PLAN - 2022-2023

II B.Sc Paper-IV, Semester -IV

IMMUNOLOGY AND MEDICAL MICROBIOLOGY



S.No	Month	Week	Syllabus	Additional input/ Value addition	Curricular Activity		Co-Curricular Activity	
					Activity	Hours Alloted	Activity	Hours Alloted
1.	Mar	I st Week	Immune System: Concept of Innate and Adaptive immunity	Basics of immunology	Teaching	10	Slip test Assignments Seminars	1 1 2
		II nd Week	Primary and secondary organs of immune system - thymus, bursa fabricus, bone marrow, spleen, lymph nodes					
2.	April	I st week	Cells of immune system- Identification and function of B and T lymphocytes, null cells, monocytes, macrophages, neutrophils, basophils and esinophils Complement system (in brief)	immunoglobulins	Teaching	32	Slip test Assignments Quiz	1 1 1
		II nd week	Immune response: Characteristics of antigen (Foreignness, Molecular size, Heterogeneity and solubility) Haptens.					
		III rd week	Antibodies - basic structure and types and functions (Immune complex formation and elimination - Agglutination, Precipitation, Neutralization,					
		IV th week	Generation of Humoral Immune Response (Plasma and Memory cells) Generation of Cell Mediated Immune Response MHC- Functions of MHC I & II molecules Hypersensitivity- definition and types (in brief) Autoimmunity (in brief)					
3.	May	I st week	Microbes in Health and Disease: Normal flora of human body.		Teaching	32	Slip test Assignments Immunization	1 1

		II nd week	Definitions - Infection, Invasion, Pathogen, Pathogenicity, Virulence, Toxigenicity, Opportunistic infections, Nosocomial infections	Pathology.			Day		
		III rd week	General account on microbial diseases.						
		IV th week	Diseases – causal organism, pathogenesis, epidemiology, diagnosis, prevention, and control of the following Bacterial diseases - Tuberculosis, Typhoid. Fungal diseases - Candidiasis. Protozoal diseases - Malaria.						
4.	June	I st week	Principles of Diagnosis: General principles of diagnostic microbiology- Collection, transport of clinical samples,	Sample collection	Teaching	32	Slip test Assignments	1 1	
		II nd week	Identification by Culturing & Biochemical characteristics (IMViC), Identification by molecular assays (PCR, RT-PCR, DNA probes),						
		III rd week	Identification by serological tests (ELISA, Immunofluorescence, Agglutination based tests, Complement fixation)						
		IV th week	. Prevention and Treatment: Vaccines Monoclonal antibodies- antifungal (Amphotericin), antiviral (
			Vaccination.						
5.	July	I st week	Production and application Antimicrobial agents- General modes of action of antibacterial (Penicillin),	Immuno diffusion test	Teaching	10	Slip test Assignments	1 1	
		II nd week	Amantadine- agents Interferons.				World Population		
		III rd week	Tests for antimicrobial susceptibility (Disc diffusion) Antibiotic resistance in bacteria.						



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CURRICULAR PLAN - 2019-20

II B.Sc Paper-V, Semester -IV

MICROBIAL ECOLOGY AND INDUSTRIAL MICROBIOLOGY



S.No	Month	Week	Syllabus	Additional input/ Value addition	Curricular Activity		Co-Curricular Activity	
					Activity	Hours Alloted	Activity	Hours Alloted
1.	Mar	I st Week	Microbial Ecology: Role of microorganisms in Biogeochemical cycles (Carbon, nitrogen,phosphorus)	Biogeochemical cycles.	Teaching	10	Assignments	1
		II nd Week	Microbe-microbe interactions - Synergism, mutualism, commensalism, antagonism, competition, parasitism.					
2.	April	I st week	predation Plant- Microbe interactions - Plant growth promotingMicroorganisms, Plant pathogens.	Microbiology of Solid waste Treatment.	Teaching	24	Slip test Assignments Quiz World Population day	1 1 1
		II nd week	Microorganisms in Environment: Microbes in waste management- solid and liquid waste. (aerobic and anaerobic) Microbes in degradation of Xenobiotics.					
		III rd week	Microbes in drinking water- detection of potability by (a) standard qualitative procedure: presumptive test/MPN test,					
		IV th week	confirmed and completed tests for faecal coli forms (b) Membrane filter technique Microbes in food - intrinsic and extrinsic parameters that affect microbial growth in food.					
3.	May	I st week	Industrial Microbiology: Industrial important Microorganisms-Yeasts &Moulds, Bacteria, Actinomycetes	Techniques involved in selection of industrially importance of Metabolites from-microbes.	Teaching	24	Slip test Assignments	1 1
		II nd week	Screening techniques. Strain improvement techniques.					
		III rd week	Fermentation processes: Design of fermented (for control of pH, temperature, dissolved oxygen,					
		IV th week	Types of fermentation processes - solid state, liquid state, batch, fed-batch, continuous.					

4.	June	I st week	Fermentation media (Carbon source, nitrogen source, minerals, vitamins & growth factors, Buffers, Precursors, Antifoam agents, water, oxygen)	Down-stream Processing	Teaching	24	Slip test Assignments Project works	1 1
		II nd week	Examples of Crude media; molasses, corn- steep liquor, sulphite waste liquor, whey.					
		III rd week	Downstream processing - filtration, centrifugation, cell disruption, solvent extraction.					
		IV th week	Microbial Productions: Microbial production of Industrial products: Citric acid, Ethanol, Penicillin, Glutamic acid,					
5.	July	I st week	vitamin B12, Amylase, Yogurt Microbial cells as food-SCP	Production of therapeutic enzymes	Teaching	06	Slip test Assignments World Population day	1 1
		II week	Revision.					



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CURRICULAR PLAN - 2022-2023

III B.Sc Paper-VI, Semester -V



MICROBIAL BIOTECHNOLOGY AND r-DNA TECHNOLOGY

S.No	Month	Week	Syllabus	Additional input/ Value addition	Curricular Activity		Co-Curricular Activity	
					Activity	Hours Alloted	Activity	Hours Alloted
1.	Oct	I st Week	Introduction to microbial biotechnology, Bacterial genes, genomes and genetics. Recombinant microbial biotechnology products, biotechnology regulation and ethics.	microbial bioteniues,	Teaching	10	Assignments	1
		II nd Week	Restriction and Modification: Classification of restriction endonucleases.					
2.	Nov	I st week	Enzymes used in molecular cloning; Polymerases, ligases, phosphatases, kinases and nucleases	Enzymes Cutting and joining DNA	Teaching	24	Slip test Assignments Quiz	1 1 1
		II nd week	Advanced Molecular biology techniques, Electrophoresis and Blotting techniques.					
		III rd week	Cutting and joining DNA: (cohesive end ligation, methods of blunt end ligation).					
		IV th week	Transfection and transformation. Selection of transformed cells. Screening methods (Genetic marker and blue white screening).					
3.	Dec	I st week	Cloning vehicles - Plasmid, Bacteriophage, Construction of genomic and cDNA libraries. Advantages of cDNA libraries.	Vectors involved in r-DNA technology. Cloning vectors Preparation	Teaching	24	Slip test Assignments	1 1
		II nd week	Concept of single cell proteins, probiotics and their applications					
		III rd week	production of fuels: alcohols, hydrogen and methane. Microbial production of polymers: xanthenes gums.					

		IV th week	Biomass and bio fuels: plant biomass (cellulose, starch, pectin, gum materials). Animal biomass(chitin, milk, whey, slaughter, house waste).					
4.	Jan	I st week	Microbial biomass (algal blooms, in fresh and sea water), fungal mushrooms, fermentation waters by yeasts, and bacterial biomass.	Microbial biomass fermentation Methods of gene transfer	Teaching	24	Slip test Assignments Project works	1 1
		II nd week	Methods of gene sequencing – Maxam - Gilberts and Sanger's dideoxy chain termination methods; Polymerase chain reaction technique (Components in PCR and PCR conditions).					
		III rd week	Methods of gene transfer in fungi, yeast and higher plants using microinjection, microprojectile bombardment (gene gun method, Electroporation and <i>Agrobacterium</i>					
		IV th week	Expression of cloned genes in bacteria, yeast, plant and animal cells. Basic principles and application of biosensors. Nucleic acid probe technology.					
5.	Feb	I st week	Concept of genetically modified microorganisms. Bt cotton : production, advantages and limitations.	genetically modified microorganisms	Teaching	10	Assignments	1
		II nd week	Probable advantages and disadvantages of genetically modified crops..					
		III rd week	Role of microorganisms in creation of transgenic animals and plants					



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CURRICULAR PLAN - 2022-2023

III B.Sc Paper-VII, Semester -V

BIostatistics AND Bioinformatics



S.No	Month	Week	Syllabus	Additional i Value additi	Curricular Activity		Co-Curricular Activity	
					Activity	Hours Alloted	Activity	Hours Alloted
1.	Oct	I st week	Definition, nature and scope of bioinformatics. Bioinformatics versus computational biology. Branches bioinformatics. Basic concepts in bioinformatics	Data Bases	Teaching	10	Assignments	1
		II nd week	Biological data bases: NCBI, EMBL, EXPASY, PIR, Pfam. Concept of World Wide Web: HTML, HTTP.					
2.	Nov	I st week	Searching sequence data bases using BLAST. Multiple sequence alignment– progressive alignment–profiles– multi dimensional dynamic programming	Mean,mode Standard dev Anova test	Teaching	24	Slip test	1
		II nd week	Biostatistics: Measures of Central tendency and distribution– mean, median, mode, range, standard deviation, variance.					
		III rd week	Basic principles of probability theory, Bayes theorem, Normal distribution, statistical inference –Types of errors and levels significance.					
		IV th week	. Comparison of variance (F-test), small sample test, t- test for comparison of means, chi square test					
3.	Dec	I st week	Analysis of variance–one way and two way, multiple comprises.	Genomics, proteomics	Teaching	24	Slip test Assignm World AIDS day	1 1 1
		II nd week	<i>Correlation and Linear regression. Sequence Analysis: Introduction to hidden Markov models.</i>					
		III rd week	Genomics and proteomics: Molecular phylogenetics:					

		IV th week	Construction of Phylogenetic trees using parsimony method and branch & bound method.					
4.	Jan	I st week	Clustering methods– UPGMA & neighbor-joining. Fragment assembly, peptide sequencing using mass and spectroscopy data	. UPGMA	Teaching	24	Slip test Assignments	1 1
		II nd week	Comparative genomics					
		III rd week	Modeling: Protein secondary structure prediction–Chou Fasman rules– Neural networks– discriminant analysis..					
		IV th week	Prediction of transmembrane segments in Membrane proteins	proteins				
5.	Feb	I st week	Protein 3D structure prediction– homology– threading – Potential energy functions–energy minimization–	. Protein 3D structure	Teaching	1	Slip test Assignments	1 1
		II nd week	Revision					



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CURRICULAR PLAN - 2019-20
III B.Sc Paper-VI, Semester -V
FOOD AND INDUSTRIAL MICROBIOLOGY



S.No	Month	Week	Syllabus	Additional input/ Value addition	Curricular Activity		Co-Curricular Activity	
					Activity	Hours Alloted	Activity	Hours Alloted
1.	Nov	I st week	Intrinsic and extrinsic parameters that affect microbial growth in food.	Bacterial growth curve	Teaching	10	Assignment	1
		II nd week	Microbial spoilage of food - fruits, vegetables, milk, meat, egg, bread and canned foods Food intoxication (botulism).					
2.	Dec	I st week	Food-borne diseases (salmonellosis) and their detection.	Principles of fermentation. Mushrooms cultivation.	Teaching	24	Slip test	1
		II nd week	Principles of food preservation - Physical and chemical methods.Fermented Dairy foods – cheese and yogurt.					
		III rd week	Microorganisms as food – SCP, edible mushrooms (white button, oyster and paddy straw). Probiotics and their benefits.					
		IV th week	Microorganisms of industrial importance – yeasts,(Saccharomyces cerevisiae) moulds,(Aspergillus niger) Bacteria(E.coli), actinomycetes (Streptomyces griseus).					
3.	Jan	I st week	Outlines of Isolation and Screening and strain improvement of industrially-important microorganisms	Types of fermentation.	Teaching	24	Slip test Guest Lecture	1 1
		II nd week	Types of fermentation processes – solid state, liquid state, batch, fed-batch, continuous.					
		III rd week	Basic concepts of Design of fermenter. Ingredients of Fermentation media.					
3.	August							

		IV th week	Downstream processing - filtration, centrifugation, cell disruption, solvent extraction.					
4.	Feb	I st week	Microbial production of Industrial products - Citric acid, Ethanol,	Production of therapeutic enzymes	Teaching	24	Slip test	1
		II nd week	amylases, penicillin, glutamic acid and vitamin B12.					
		III rd week	Inter dependence of food production , food production					
		IV th week	consumption pattern in different parts of india.					
5.	Mar	I st week	Revision		Teaching	6	Slip test	1



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CURRICULAR PLAN - 2019-20
III B.Sc Paper-VIII, Semester –VI
MICROBIAL BIOTECHNOLOGY



S.No	Month	Week	Syllabus	Additional input/ Value addition	Curricular Activity		Co-Curricular Activity	
					Activity	Hours Alloted	Activity	Hours Alloted
1.	Nov	I st Week	Microbial biotechnology: Scope and its applications in human therapeutics, agriculture(Biofertilizers, PGPR, Mycorrhizae), environmental, and food technology.	Importance of microorganisms.	Teaching	10	Assignments	1
		II nd Week	Genetically engineered microbes for industrial application: Bacteria and yeast.					
2.	Dec	I st week	Recombinant microbial production processes in pharmaceutical industries - Streptokinase,recombinant vaccines (Hepatitis B vaccine).	Antibiotic production	Teaching	24	Assignments Quiz	2
		II nd week	Over view of production and applications of Microbial polysaccharides,					1
		III rd week	Bioplastics and Microbialbiosensors					
		IV th week	Microbial based transformation of steroids and sterols.					
3.	Jan	I st week	Bio-catalytic processes and their industrial applications: Production of high fructose syrup andproduction of cocoa butter substitute.	SCP production,	Teaching	24	Slip test Assignment	1
		II nd week	Immobilization methods and their application: Whole cell immobilization.					1
		III rd week	Bio-ethanol and bio-diesel production: commercial production from lignocellulosic waste andalgal biomass.					

		IV th week	Biogas production: Methane and hydrogen production using microbial culture.					
4.	Feb	I st week	.Microorganisms in bioremediation: Degradation of xenobiotics	Flocculation, chemical precipitation.	Teaching	24	Slip test Assignment Project works	1
3.	August	II nd week	Mineral recovery, removal of heavy metals from aqueous effluents.					1
		III rd week	Outlines of Intellectual Property Rights: Patents, Copyrights, Trademarks					
		IV th week	Bioenergetics – concept of free energy , entropy, enthalpy, & Redox potential.					
5.	March	I st week	Revision.		Teaching	6	Slip test Assignment	1 1

