



Sri Y N College

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(Affiliated to Adikavi Nannaya University, Rajamahendravaram)

Thrice Accredited by NAAC with 'A' Grade

Narsapur - 534275, West Godavari District, Andhra Pradesh



DEPARTMENT OF MICROBIOLOGY

CURRICULAR PLAN - 2021-22

I B.Sc Paper-I, Semester -I

INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY

S.No	Month	Week	Syllabus	Additional input/ Value addition	Curricular Activity		Co-Curricular Activity	
					Activity	Hours Alloted	Activity	Hours Alloted
1.	June	I st week	History of Microbiology & Place of Microorganisms in the living world	scope of microbiology, Scientists,	Teaching	08	Assignment	1 1
		II nd 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.	July	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.	Aug	I st week	Morphology, Structure and replication of TMV and Lambda Bacteriophage.	Types of viruses. Various micro organisms	Teaching	24	Slip test Assignments Seminar	1 1 1
		II nd week	Eukaryotic microorganisms: Algae - Habitat, thallus organization, photosynthetic pigments, storage forms of food, reproduction.					
		III rd week	Fungi - Habitat, nutrition, vegetative structure and modes of reproduction; outline classification					
		IV th week	Protozoa – Habitat, cell structure, nutrition, locomotion, excretion, reproduction, encystment, outline classification					
4.	Sep	I st week	Isolation and Culture of Bacteria and Fungi: Growth media- Natural, synthetic and semi synthetic media. Selective, Enrichment, and Differential media.	Bacterial motility - hanging drop technique, cultivation of aerobes & anaerobes	Teaching	24	Slip test Assignments National Nutrition week	1 1
		II nd week	Pure culture techniques - dilution- plating, Streak-plate, Spread-plate, Pour-Plate and micromanipulator.					
		III rd week	Preservation of microbial cultures - sub culturing, overlaying cultures with mineral oils, lyophilization, sand cultures, storage at low temperature.					
		IV th week	Principles of Microscopy, Sterilization and Disinfection: Principles of microscopy - Bright field and Electron microscopy (SEM and TEM)					
5.	Oct	I st week	Staining Techniques - Simple and Differential staining techniques (Gram staining, Spore staining).	Microorganisms observation.	Teaching	10	Slip test Assignments	1 1
		II nd 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 methods - alcohols, aldehydes, fumigants, phenols, halogens and hypochlorite's.	Disinfection				



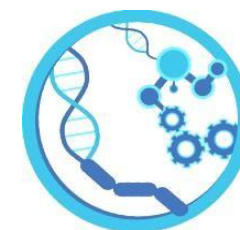
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DEPARTMENT OF MICROBIOLOGY

CURRICULAR PLAN - 2021-22

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.	Nov	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 FattyAcids)					
2.	Dec	I st week	Lipids (Simple & complex lipids) General characteristics of Amino Acids and Proteins. Structure of Nucleic acids.	enzyme activity	Teaching	24	Slip test Assignments Quiz Seminars World AIDS Day	1 1 1 1
		II nd week	Enzymes: Properties and classification of Enz Biocatalysis- induced fit and lock and key models. Coen					
		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.	Jan	I st week	Spectrophotometry (UV & visible), Centrifugation and Gel Electrophoresis (Agarose and SDS).	Biomolecules separation Techniques	Teaching	14	Slip test Assignments Immunization Day	1 1
		II nd week	Microbial Nutrition and growth: Nutritional requirements of Microorganisms.					
		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.	Feb	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, ED Pathway, Electron transport Oxidative and substrate level phosphorylations					
		III rd week	Anaerobic respiration (Nitrate and sulphate respiration)					
		IV th week	Fermentation- lactic acid and ethanol fermentations Outlines of oxygenic and anoxygenic photosynthesis in bacteria.					
5.	April	I st week	Structural polymorphism of DNA , HP-TLC	DNA polymorphism	Teaching	06	Slip test Assignments World health	1 1



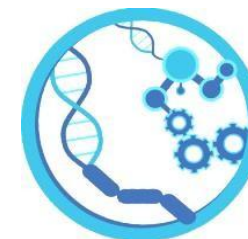
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DEPARTMENT OF MICROBIOLOGY

CURRICULAR PLAN - 2021-22

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.	June	I st week	Nucleic acids: DNA and RNA - Role in heredity	Structures of Nucleic acids.	Teaching	10	Assignment World Population day	1
		II nd week	The central dogma Watson and Crick model of DNA,					
2.	July	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 World Population day	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 DNA damage and repair mechanism.					

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



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DEPARTMENT OF MICROBIOLOGY

CURRICULAR PLAN - 2021-22

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.	Nov	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.	Dec	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	24	Slip test Assignments Quiz World AIDS Day	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 complexformation and elimination - Agglutination, Precipitation, Neutralization,					
		IV th week	Generation of Humoral Immune Response Generation ofCell Mediated Immune Response MHC- Functions of MHC I & II molecules Hypersensitivity-definition and types ,bAutoimmunity					

3.	Jan	I st week	Microbes in Health and Disease: Normal flora of human body.	Pathology.	Teaching	24	Slip test Assignments Immunization Day	1 1
		II nd week	Definitions - Infection, Invasion, Pathogen, Pathogenicity, Virulence, Toxigenicity, Opportunistic infections, Nosocomial infections					
		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.	Feb	I st week	Principles of Diagnosis: General principles of diagnostic microbiology- Collection, transport of clinical samples,	Sample collection	Teaching	20	Slip test Assignments National Science day	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)	Vaccination.				
		IV th week	. Prevention and Treatment: Vaccines Monoclonal antibodies- Production and application Antimicrobial agents- General modes of action of antibacterial (Penicillin), antifungal (Amphotericin), antiviral (Amantadine) agents Interferons.					
5.	March	I st week	Tests for antimicrobial susceptibility (Disc diffusion) Antibiotic resistance in bacteria.	Immuno diffusion test	Teaching	10	Slip test Assignments	1 1



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DEPARTMENT OF MICROBIOLOGY

CURRICULAR PLAN – 2021-22

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.	Jun	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.	Jul	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.	Aug	I st week	Industrial Microbiology: Industrial important Microorganisms- Yeasts & Moulds, Bacteria , Actinomycetes .	Techniques	Teaching	24	Slip test Assignments	1 1

		II nd week	Screening techniques. Strain improvement techniques.	involved in selection of industrially importance of Metabolites from-microbes.				
		III rd week	Fermentation processes: Design of fermented (for control of pH, temperature, dissolved oxygen, foaming and					
		IV th week	Types of fermentation processes - solid state, liquid state, batch, fed-batch, continuous.					
4.	Sep	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
3.	October	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.	Nov	I st week	vitamin B12, Amylase, Yogurt Microbial cells as food-SCP	Production of therapeutic enzymes	Teaching	06	Slip test Assignments	1 1
		II week	Revision.					

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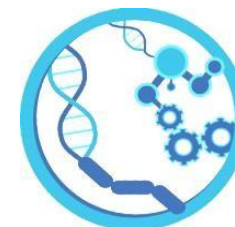
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DEPARTMENT OF MICROBIOLOGY

CURRICULAR PLAN – 2021-22

III B.Sc Paper-V, Semester -V

ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY

S.No	Month	Week	Syllabus	Additional input/ Value addition	Curricular Activity		Co-Curricular Activity	
					Activity	Hours Alloted	Activity	Hours Alloted
1.	June	I st week	Terrestrial Environment: Soil profile and soil microflora.	Microbial Ecology	Teaching	10	Assignments	1
		II nd week	Aquatic Environment: Microflora of fresh water and marine habitats,					
2.	July	I st week	Atmosphere: Aeromicroflora and dispersal of microbes.	Quality of water analysis	Teaching	24	Slip test	1
		II nd week	Role of microorganisms in nutrient cycling (Carbon, nitrogen, phosphorus). Treatment and safety of drinking (potable) water,					
		III rd week	methods to detect potability of water samples: (a) standard qualitative procedure: presumptive test/MPN test,					
		IV th week	confirmed and completed tests for faecal coliforms (b) Membrane filter technique.					
		I st week	Microbial interactions –mutualism, commensalism, antagonism, competition, parasitism, predation.	Solid and liquid waste management.	Teaching	24	Slip test Assignments	1
		II nd week	Outlines of Solid Waste management: Sources and types of solid waste, Methods of solid waste disposal (composting and sanitary landfill).					1

		III rd week	Liquid waste management: Composition and strength of sewage (BOD and COD),						
		IV th week	Primary, secondary(oxidation ponds, trickling filter, activated sludge process and septic tank) and tertiary sewage treatment.						
4.	Sep	I st week	Plant Growth Promoting Microorganisms - Mycorrhizae, Rhizobia, <i>Azospirillum</i> , <i>Azotobacter</i> , <i>Frankia</i> ,	Micro organisms in agriculture.	Teaching	24	Slip test Assignments	1	1
		II nd week	phosphate-solubilizers and Cyanobacteria. Outlines of biological nitrogen fixation (symbiotic, non-symbiotic). Biofertilizers - <i>Rhizobium</i> .						
		III rd week	Concept of disease in plants. Symptoms of plant diseases caused by fungi, bacteria and viruses.						
		IV th week	Plant diseases - groundnut rust, Citrus canker and tomato leaf curl.						
5.	Oct	I st week	Principles of plant disease control.	Disease control in Plants.	Teaching	1	Slip test Assignments	1	1
		II nd week	Management of soil nutrients , Conversion of waste lands in to fertile lands						



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DEPARTMENT OF MICROBIOLOGY

CURRICULAR PLAN – 2021-22

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, () Bacteria 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
		II nd week	Types of fermentation processes – solid state, liquid state, batch, fed-batch, continuous.					1

		III rd week	Basic concepts of Design of fermenter. Ingredients of Fermentation media.					
		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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DEPARTMENT OF MICROBIOLOGY

CURRICULAR PLAN - 2021-22

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 Microbial biosensors					
		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 and production 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 and algal 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 1
3.	August	II nd week	Mineral recovery, removal of heavy metals from aqueous effluents.					
		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