

E-mail: sriynmcollege@rediffmail.com
Website: www.sriyncollege.org

Office: 08814 - 273246



Sri Y N College

(Autonomous)

(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 - 2020-21

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.	Feb	III rd week	History of Microbiology & Place of Microorganisms in the living world. History of Microbiology in the context of contributions of scientists.	scope of microbiology, Scientists, Four kingdom, Five kingdom	Teaching	12	Assignment	1
		IV th 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.					1
2.	March	I st week	Prokaryotic microorganisms and Viruses Ultra-structure of Prokaryotic cell- Cell Wall, Cell Membrane, Cytoplasm, Nucleoid, Plasmid, Inclusion Bodies, Flagella, Pili, Capsule, Endospore.	Types of viruses. PPT	Teaching	10	Seminar	1
		II nd week	General characteristics of Bacteria (Size, shape, arrangement, reproduction. General characteristics of Rickettsia, Mycoplasmas, Cyanobacteria, Archaea				Assignments	1
							World Population day	1

		III rd week	General characteristics of viruses, Cultivation of Viruses (in brief) Morphology, Structure and replication of TMV and Lambda Bacteriophage								
		IV th week	Eukaryotic microorganisms: Algae -. Fungi , Protozoa Habitat, thallus organization, photosynthetic pigments, storage forms of food, reproduction.								
3.	April	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	08	Slip test Assignments Seminar.	1 1 1 2			
		II nd week	Preservation of microbial cultures - sub culturing, overlaying cultures with mineral oils, lyophilization, sand cultures, storage at low temperature.						03	Slip test Assignments National Nutrition week	
		III rd week	Principles of Microscopy, Sterilization and Disinfection: Principles of microscopy - Bright field and Electron microscopy (SEM and TEM). Staining Techniques - Simple and Differential staining techniques (Gram staining, Spore staining).								02
		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 methods - alcohols, aldehydes, fumigants, phenols, halogens and hypochlorite's.								

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DEPARTMENT OF MICROBIOLOGY

CURRICULAR PLAN - 2020-21

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.	Aug	III rd week	Biomolecules: Outline classification and General characters and Carbohydrates (Monosaccharides, Disaccharides, Polysaccharides)	Structure of Biomolecules.	Teaching	10	Assignment International Science Day	1
		IV th week	General characteristics of amino acids and proteins. Properties and classification of enzymes. Biocatalysis-induced fit and lock and key models. Coenzymes and cofactors					
2.	Sep	I st week	Analytical Techniques: Principle and applications of - Colorimetry Chromatography (paper, thin-layer, and column), Spectrophotometry (UV & visible), Centrifugation and Gel Electrophoresis	Analytical purification techniques Biomolecules separation Techniques	Teaching	24	Slip test Assignments Quiz Seminars	1 1 1 1
		II nd week	Structure of nitrogenous bases, nucleotides, nucleic acids. Fatty acids (saturated and unsaturated). Lipids (phospholipids, sterols and phospholipids).					

		III rd week	Factors affecting catalytic activity. Inhibition of enzyme activity-competitive, noncompetitive, uncompetitive and allosteric	Enzyme activity				
		IV th week	Microbial Nutrition: nutritional requirements and uptake of nutrients by cells. Nutritional groups of microorganisms- autotrophs, heterotrophs, mixotrophs. Growth media. synthetic, complex, selective, enrichment and differential media. Microbial growth-different phases of growth in batch	Microbial cell count Microbial metabolism				
3.	Oct	I st week	cultures, synchronous, continuous, biphasic growth. Factors influencing microbial growth, Methods for measuring microbial growth - Direct microscopy, viable count estimates, turbidometry and biomass.	Microbial cell count	Teaching	14	Slip test Assignments Immunization Day	1 1
		II nd week	Aerobic respiration - Glycolysis, HMP pathway, ED pathway, TCA cycle, electron transport, oxidative and substrate level phosphorylation. Anaerobic respiration (Nitrate)	Microbial Nutrition				
		III rd week	. Fermentation-alcohol & lactic acid fermentation. Out lines of oxygenic & anoxygenic photosynthesis in	and Respiration				



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DEPARTMENT OF MICROBIOLOGY

CURRICULAR PLAN - 2020-21

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.	Nov	II nd week	Nucleic acids: DNA and RNA - Role in heredity. The central dogma Watson and Crick model of DNA	Structures of Nucleic acids. Dispersive and conservative models of DNA Replication.	Teaching	10	Assignment World Population day world donor day	1
		III rd week	Types of RNA, structure, and functions, Organization of DNA in prokaryotes					
		IV th week	Genetic material and replication: Experiments which established DNA as genetic material RNA as genetic material, Mechanism of DNA Replication in Prokaryotes					
2.	Dec	I st week	Proof of semi conservative mechanism of replication (Meselson - Stahl Experiment) Mutations, damage and repair: Outlines of DNA damage and repair mechanism.	DNA mutations	Teaching	24	Slip test Assignments World Population	1 1

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



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DEPARTMENT OF MICROBIOLOGY

CURRICULAR PLAN - 2020-21

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	III rd week	Immune System: Concept of Innate and Adaptive immunity. Primary and secondary organs of immune system - thymus, bursa fabricus, bone marrow, spleen, lymph nodes	Basics of immunology	Teaching	10	Slip test Assignments Seminars	1 1 2
		IV th 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) Immune response: Characteristics of antigen. Haptens. Antibodies - basic structure and types and functions					
2.	Dec	I st week	Generation of Humoral Immune Response. Generation of Cell Mediated Immune Response MHC- Functions of MHC I & II molecules Hypersensitivity-definition and types. Autoimmunity.	.	Teaching	32	Slip test Assignments Quiz World AIDS	1 1 1

		II nd week	Microbes in Health and Disease: Normal flora of human body. Definitions - Infection, Invasion, Pathogen, Pathogenicity, Virulence, Toxigenicity, Opportunistic infections, Nosocomial infections	Immunoglobulins			Day	
		III rd week	Diseases – causal organism, pathogenesis, epidemiology, diagnosis, prevention, and control of the following Bacterial diseases - Tuberculosis, Typhoid. Fungal diseases - Candidiasis. Protozoal diseases - Malaria.	Pathology.				
		IV th week	Principles of Diagnosis: General principles of diagnostic microbiology- Collection, transport of clinical samples,	Sample collection				
3.	Jan	I st week	Identification by Culturing & Biochemical characteristics (IMViC)	Immuno diffusion Test.	Teaching	32	Slip test Assignments Immunization	1 1
		II nd week	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- Production and application Antimicrobial agents- General modes of action of antibacterial (Penicillin), antifungal (Amphotericin), antiviral (Amantadine) agents Interferons.					
4.	Feb	I st week	Tests for antimicrobial susceptibility (Disc diffusion) Antibiotic resistance in bacteria.		Teaching	24	Slip test Assignments	1 1
		II nd week	revision					



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DEPARTMENT OF MICROBIOLOGY

CURRICULAR PLAN - 2020-21

III B.Sc Paper-V, Semester -IV

ENVIRONMENTAL & AGRICULTURAL 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	Terrestrial Environment: Soil profile and soil microflora. Aquatic Environment: Microflora of fresh water and marine habitats,	Microbial Ecology	Teaching	10	Assignments	1
		II nd week						
2.	Dec	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 Assignm	1 1

3.	Jan	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.	Feb	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
		II nd week	phosphate-solubilizers and Cyanobacteria. Outlines of biological nitrogen fixation (symbiotic, non-symbiotic). Biofertilizers - <i>Rhizobium</i> .					1
		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.		I st week	Principles of plant disease control.	Disease control in Plants.	Teaching	1	Slip test Assignments	1
		II nd week	Management of soil nutrients, Conversion of waste lands into fertile lands					1

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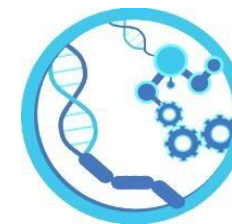
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DEPARTMENT OF MICROBIOLOGY

CURRICULAR PLAN - 2020-21

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.	Teaching	24	Slip test	1
		II nd week	Principles of food preservation - Physical and chemical methods. Fermented Dairy foods - cheese and yogurt.	Mushrooms cultivation.				2
		III rd week	Microorganisms as food - SCP, edible mushrooms (white button, oyster and paddy straw). Probiotics and their benefits.					1

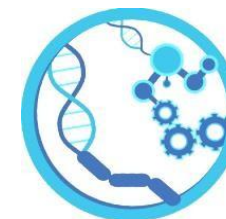
		IV th week	Microorganisms of industrial importance – yeasts,(<i>Saccharomyces cerevisiae</i>) moulds,(<i>Aspergillus niger</i>)Bacteria(<i>E.coli</i>), actinomycetes (<i>Streptomyces griseus</i>).					
3.	Jan	I st week	Outlines of Isolation and Screening and strain improvement of industrially-important 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
3.		III rd week	Basic concepts of Design of fermenter. Ingredients of Fermentation media.					2
		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.					2
		III rd week	Inter dependence of food production , food production					1
		IV th week	consumption pattern in different parts of india.					
5.		I st week	Revision		Teaching	6	Slip test	1



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III B.Sc Paper-VII, Semester -V

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,		24	Slip test Assignment	1 1

		II nd week	Immobilization methods and their application: Whole cell immobilization.		Teaching			
		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
		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.					
		I st week	Revision.		Teaching	6	Slip test Assignment	1 1