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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 - 2017-18

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	III rd week	History and mile stones in microbiology. Importance and applications of microbiology. of Carl Woese	scope of microbiology, Scientists, Four kingdom, Five kingdom	Teaching	08	Assignment	1 1
		IV th week	Contributions of Anton von Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch, Ivanowsky. Classification of microorganisms - Haeckel's three Kingdom concept, Whittaker's five kingdom concept, three domain concept					
2.	July	I st week	Outline classification of bacteria as per the second edition of Bergey's Manual of Systematic Bacteriology.	Types of viruses.	Teaching	24	Assignments World Population day	1 1 1
		II nd week	General characteristics of Bacteria, Archaea, Mycoplasmas and Cyanobacteria.	PPT				
		III rd week	Ultra structure of Prokaryotic cell- Variant components and invariant components.					
		IV th week	General characteristics of viruses. Morphology, Structure and replication of TMV and HIV.					

3.	Aug	I st week	General characteristics and outline classification of Fungi,.	Bacterial motility – hanging drop technique,	Teaching	24	Slip test Seminar. Slip test Assignments National Nutrition week	1 1 1
		II nd week	Mid exams					
		III rd week	General characteristics and outline classification of Algae and Protozoa					
		IV th week	Principles of microscopy - Bright field and Electron microscopy (SEM and TEM).					
4.	Sep	I st week	Staining Techniques –Simple and Differential (Gram Staining and Spore Staining).	Staining methods	Teaching	24	Slip test	1 1 1 1
		II nd week	Sterilization and disinfection techniques. Physical methods – autoclave, hot- air oven, pressure cooker, laminar air flow, filter sterilization.					
		III rd week	Radiation methods – UV rays, Gamma rays.	Sterilization				
		IV th week	Chemical methods – alcohols, aldehydes, fumigants, phenols, halogens and hypochlorites.					
5.	Oct	I st week	Isolation of Microorganisms from natural habitats. Pure culture techniques – dilution-plating	cultivation of aerobes & anaerobes.	Teaching ppt	24	Assignments	1 1 1
		II nd week	Streak-plate, Spread-plate, Pour-Plate and micromanipulator. Enrichment culturing.					
		III rd week	Preservation of microbial cultures – subculturing, overlaying cultures with mineral oils,					
		IV th week	lyophilization, sand cultures, storage at low temperature.					



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DEPARTMENT OF MICROBIOLOGY

CURRICULAR PLAN - 2017-18

I B.Sc Paper-II, Semester -II

MICROBIAL BIOCHEMISTRY & METABOLISM

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	Outline classification and General characteristics of Carbohydrates (Monosaccharides, Disaccharides, Polysaccharides)	Structure of Biomolecules.	Teaching	10	Assignment International Science Day	1
		IV th week	General characteristics of amino acids and proteins.					
2.	Dec	I st week	Structure of nitrogenous bases, nucleotides, nucleic acids. Fatty acids (saturated and un saturated). Lipids (spingolipids, sterols and phospholipids).	Analytical purification techniques Biomolecules separation Techniques	Teaching	24	Slip test Assignments Quiz Seminars World AIDS Day	1 1 1 1
		II nd week	Analytical Techniques: Principle and applications of – Colorimetry Chromatography (paper, thin-layer, and column),					
		III rd week	Spectrophotometry (UV & visible), Centrifugation and Gel Electrophoresis					
		IV th week	Properties and classification of enzymes. Biocatalysis-induced fit and lock and key models. Coenzymes and cofactors.	Enzyme activity				
3.	Jan	I st week	Factors affecting catalytic activity. Inhibition of enzyme activity-competitive, noncompetitive, uncompetitive and allosteric	Microbial Nutrition	Teaching	14	Slip test Assignments Immunization	1 1

		II nd week	Microbial Nutrition: nutritional requirements and uptake of nutrients by cells.	Microbial Growth			Day	
		III rd week	Nutritional groups of microorganisms- autotrophs, heterotrophs, mixotrophs.					
		IV th week	Growth media. synthetic, complex, selective, enrichment and differential media. 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
3.	March	II nd week	Aerobic respiration - Glycolysis, HMP pathway, ED pathway, TCA cycle, electron transport,	Microbial metabolism				
		III rd week	Oxidative and substrate level phosphorylation. Anaerobic respiration (Nitrate)	and Respiration				
		IV th week	Fermentation-alcohol & lactic acid fermentation.					
5.	April	I st week	Outlines of oxygenic & anoxygenic photosynthesis in bacteria	Microbial Respiration	Teaching	06	Slip test Assignments World health day	1



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DEPARTMENT OF MICROBIOLOGY

CURRICULAR PLAN – 2017-18

II B.Sc Paper-III, Semester –III

MICROBIAL GENETICS AND MOLECULAR BIOLOGY

S.No	Month	Week	Syllabus	Additional input/ Value addition	Curricular Activity		Co-Curricular Activity	
					Activity	Hours Alloted	Activity	Hours Alloted
1.	June	II nd week	DNA and RNA as genetic material. Structure and organization of prokaryotic DNA.	Structures of Nucleic acids.	Teaching	10	Assignment World Population day world donor day	1
		III rd week	Extrachromosomal genetic elements – Plasmids and transposons in bacteria					
		IV th week	Replication of DNA – Semi conservative mechanism, Enzymes involved in replication					
2.	July	I st week	.Mutations – spontaneous and induced, base pair changes, frame shifts, deletions, inversions, tandem duplications, insertions	Dispersive and conservative models of DNA Replication.	Teaching	24	Slip test Assignments World Population day	1 1
		II nd week	Mutagens - Physical and Chemical mutagens					
		III rd week	Outlines of DNA damage and repair mechanisms.					

		IV th week	Genetic recombination in bacteria – Conjugation, Transformation and Transduction.					
3.	August	I st week	REVISION	DNA mutations. Bacterial Recombination.	Teaching	24	Slip test Assignments seminar	1 1 1
		II nd week	MID EXAMS					
		III rd week	Concept of gene- muton, recon, and cistron. One gene one enzyme and one gene one polypeptide hypothesis.					
		IV th week	Types of RNA and their functions. Genetic code. Structure of ribosome.					
4.	Sep	I st week	Types of genes- structure, constitutive regulatory.	Cloning vectors. Preparation of DNA libraries.	Teaching	24	Slip test Assignments National Nutrition week	1 1
		II nd week	Protein synthesis – Transcription and translation. Regulation of gene expression in bacteria – lac operon.					
		III rd week	Basic principles of genetic engineering. Restriction endonucleases, DNA polymerases and ligases.					
		IV th week	Vectors like Pbr 322, M13. Outlines of gene cloning methods.					
5.	Oct	I st week	Polymerase chain reaction. Genomic and cDNA libraries.	Types of PCR and DNA fingerprinting	Teaching	10	Slip test Assignments	1 1
		II nd week	General account on application of genetic engineering in industry, agriculture and medicine.					



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DEPARTMENT OF MICROBIOLOGY

CURRICULAR PLAN –2017-18

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		Types of immunity – innate and acquired; active and passive; humoral and cell-mediated immunity. Primary and secondary organs of immune system – thymus, bursa fabricus, bone marrow, spleen and lymph nodes.	Basics of immunology	Teaching	10	Slip test Assignments Seminars	1 1 2
			Cells of immune system. Identification and function of B and T lymphocytes, null cells, monocytes, macrophages, neutrophils, basophils and eosinophils.					
2.	Dec	I st week	Antigens – types, chemical nature, antigenic determinants, haptens. Factors affecting antigenicity	immunoglobulins	Teaching	32	Slip test Assignments Quiz World AIDS Day	1 1 1
		II nd week	. Antibodies – basic structure, types, properties and functions of immunoglobulins. Types of antigen-antibody reactions - Agglutinations, Precipitation, Neutralization, complement fixation, blood groups					
		III rd week	Labeled antibody based techniques – ELISA, RIA and Immunofluorescence. Monoclonal antibodies – production and applications.					
		IV th week	Concept of hypersensitivity and Autoimmunity.					

3.	Jan	I st week	Normal flora of human body.	Microbes in Health Disease Sample collection Pathology.	Teaching	32	Slip test Assignments Immunization Day	1 1
		II nd week	Host pathogen interactions: infection, invasion, pathogen, pathogenicity, virulence and opportunistic infection, General account on nosocomial infection.					
		III rd week	General principles of diagnostic microbiology- collection, transport and processing of clinical samples					
		IV th week	General methods of laboratory diagnosis - cultural, biochemical, serological and molecular methods.					
4.	Feb	I st week	Antibacterial Agents- Penicillin, Streptomycin and Tetracycline.	Immuno diffusion Prevention and Treatment	Teaching	32	Slip test Assignments National Science day	1 1
		II nd week	Antifungal agents – Amphotericin B, Griseofulvin Antiviral substances - Amantadine and Acyclovir					
3.	August	III rd week	Tests for antimicrobial susceptibility. Brief account on antibiotic resistance in bacteria - Methicillin-resistant Staphylococcus aureus (MRSA).					
		IV th week	Vaccines – Natural and recombinant					
5.	March	I st week	REVISION			10	Slip test Assignments	1 1



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DEPARTMENT OF MICROBIOLOGY

CURRICULAR PLAN - 2017-18

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.	June	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	Atmosphere: Aeromicroflora and dispersal of microbes.					
2.	July	I st week	Role of microorganisms in nutrient cycling (Carbon, nitrogen, phosphorus). Treatment and safety of drinking (potable) water.	Quality of water analysis	Teaching	24	Slip test	1
		II nd week	methods to detect potability of water samples: (a) standard qualitative procedure: presumptive test/MPN test, confirmed and completed tests for faecal coliforms (b) Membrane filter technique					
		III rd week	Microbial interactions -mutualism, commensalism, antagonism, competition, parasitism, predation.					
		IV th week	REVISION					

3.	August	I st week	Outlines of Solid Waste management: Sources and types of solid waste, Methods of solid waste disposal (composting and sanitary landfill).	Solid and liquid waste management.	Teaching	16	Slip test Assign	1
		II nd week	Liquid waste management: Composition and strength of sewage (BOD and COD),					1
		III rd week	Primary, secondary (oxidation ponds, trickling filter, activated sludge process and septic tank) and					1
		IV th week	tertiary sewage treatment.					1
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	16	Slip test Assignments QUIZ CONDUCTED	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.					1
		IV th week	Plant diseases - groundnut rust, Citrus canker and tomato leaf curl.					1
5.	Oct	I st week	Principles of plant disease control. Management of soil nutrients, Conversion of waste lands into fertile lands	Disease control in Plants.	Teaching	1	Slip test Assignments	1
		II nd week	REVISION					1

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CURRICULAR PLAN - 2017-18

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	Hour Allote
1.	June	I st week	Intrinsic and extrinsic parameters that affect microbial growth in food Microbial spoilage of food - fruits, vegetables, milk, meat, egg, bread and	Bacterial growth curve	Teaching	10	Assignment	1
		II nd week	Food intoxication (botulism). Food-borne diseases (salmonellosis) and their detection.					
2.	July	I st week	Principles of food preservation - Physical and chemical methods	Mushrooms cultivation.	Teaching	24	Slip test	1
		II nd week	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	Revision					

3.	Aug	I st week	Microorganisms of industrial importance – yeasts,(<i>Saccharomyces cerevisiae</i>) moulds,(<i>Aspergillus niger</i>)	Screening techniques	Teaching	18	Slip test Guest Lecture	1 1
		II nd week	Mid exams					
		III rd week	Bacteria(<i>E.coli</i>), actinomycetes (<i>Streptomyces griseus</i>)					
		IV th week	Outlines of Isolation and Screening and strain improvement of industrially-important microorganisms					
4.	Sep	I st week	Types of fermentation processes – solid state, liquid state, batch, fed-batch, continuous.	Principles of fermentation.	Teaching	18	Slip test	1
		II nd week	Basic concepts of Design of fermenter. Ingredients of Fermentation media.					
		III rd week	Downstream processing - filtration, centrifugation, cell disruption, solvent extraction	Fermentation methods				
		IV th week	Microbial production of Industrial products - Citric acid, Ethanol, amylases, penicillin, glutamic acid and vitamin B12.					
5.	Oct	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 1
		II nd week	Over view of production and applications of Microbial polysaccharides, Bioplastics and Microbial biosensors					
		III rd week	Microbial based transformation of steroids and sterols					

		IV th week	Bio-catalytic processes and their industrial applications: Production of high fructose syrup and production of cocoa butter substitute.					
3.	Jan	I st week	Immobilization methods and their application: Whole cell immobilization.	SCP production,	Teaching	24	Slip test Assignment	1 1
		II nd week	Bio-ethanol and bio-diesel production: commercial production from lignocellulosic waste and algal biomass.					
		III rd week	Biogas production: Methane and hydrogen production using microbial culture.					
		IV th week	Microorganisms in bioremediation: Degradation of xenobiotics					
4.	Feb	I st week	Mineral recovery, removal of heavy metals from aqueous effluents.	Flocculation, chemical Precipitation.	Teaching	24	Slip test Assignment Project works	1 1
		II nd week	Outlines of Intellectual Property Rights: Patents, Copyrights, Trademarks					
		III rd week	Bioenergetics – concept of free energy , entropy, enthalpy, & Redox potential.					
		IV th week	Revision					
5.	March	I st week	Revision.			6	Slip test Assignment	1 1