DEPARTMENT OF MICROBIOLOGY

B.SC
ACADEMIC
ORGANIZER
(THEORY & PRACTICAL)

2016-17

DEPARTMENT OF MICROBIOLOGY

B.Sc ACADEMIC ORGANIZER 2016-17

B.Sc SEMESTER - I Paper - I

INTRODUCTORY MICROBIOLOGY

MONTH (WORKING DAYS)	WEEK	UNIT	TOPIC	NO.OF CLASSES	TOTAL
		I	**History of microbiology**		
JUNE/JULY(13) OU HOLIDAYS-3	1		Meaning, Definition and Scope of Microbiology	1	1
			History of Microbiology– An overview till 21st century	2	3
	1,2&3		Contributions of Antony Von Leeuwenhoek, Edward Jenner, Louis Pasteur,Robert Koch, Iwanowsky, Beijerinck, Winogradsky, Selman Walksman, Paul Ehrlich, and Alexander Fleming.	9	12
JULY	4		Branches of Microbiology and Applications of Microbiology	3	15
		II	**Microscopy and Prokaryotic Cell**		
	4,5&6		Principles of Microscopy. Bright field, Dark field, Phase-contrast, Fluorescent and Electron microscopy (SEM and TEM). Micrometry -Units of microscopic measurements.	7	22
JULY/AUGUST (11) OU HOLIDAYS-5	6,7&8		Types of stains and Principles of staining - Simple stain, Differential stain, Negative stain, Structural stains - Spore, Capsule, Flagella and Storage granules	7	29
AUGUST	8		Motility in Bacteria. Hanging-drop method.	1	30
		III	**Microbial Sterilization Techniques**		
	8&9		Sterilization and Disinfection techniques. Principles and methods of Sterilization.	3	33
	9		Physical methods – Autoclave, Hot-air oven, Pressure cooker, Tyndallization	3	36
	10		Radiation methods – UV rays, gamma rays, Ultra sonic methods, Microwave.	3	39
SEP(12) OU HOLIDAYS-4	10,11&12		Chemical methods – Use of Alcohols, Aldehydes, Fumigants, Phenols, Halogens,	6	45
		IV	**General characters of viruses**		
	12,13&14		General characteristics, Cultivation, Maintenance and ICTV Classification of Viruses- Plant, Animal and Bacteriophage.	8	53
	14		Structure of TMV	1	54

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	14		Structure of HIV	1	55
	14		Structure of T2 bacteriophage	1	56
OCT	15		Structure and multiplication of lambda bacteriophage	4	60

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2016-17

SUBJECT -MICROBIOLOGY I SEMESTER PRACTICALS
(INTRODUCTORY MICROBIOLOGY- Paper I)

Month	Week	S.No	B.Sc I Year Practicals	Hrs	Total
July	1	1	Precautions to work in Microbiology laboratory	1	1
	1	2	Light compound microscope and its handling	1	2
	2	3	Calibration of microscopic measurements (Ocular, Stage micrometers)	2	4
	3	4	Measuring dimensions of Protozoa	1	5
	3	5	Microscope observation of bacteria (Gram +ve bacilli and cocci,Gram –ve bacilli), Cyanobacteria (Nostoc, Oscillatoria, Anaebena, Spirulina), Algae (Scenedesmus Sps., Diatoms),and Fungi (Saccharomyces, Rhizopus, Aspergillus, Penicillin,	1	6
Aug	4	6	Simple and Differential staining (Gram staining)	2	8
	5,6	7	Spore staining, Capsule Staining and Negative	3	11
	6	8	Sterilization techniques : Autoclaving, Hot-Air oven and Filtration	1	12
	7	9	Hanging drop technique for observation of motility in Bacteria.	2	14
Sep	8	10	Diagramatic or Electron photomicrographic observation of TMV, HIV, T2 Phage and Adeno virus)	1	15

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DEPARTMENT OF MICROBIOLOGY

B.Sc ACADEMIC ORGANIZER 2016-17

B.Sc SEMESTER - II Paper - II

GENERAL MICROBIOLOGY

MONTH	WEEK	UNIT	TOPIC	NO.OF CLASSES	TOTAL
		I	**Bacterial Taxonomy and General Characters of Prokaryotes & Eukaryotes**		
Dec	1	1	Outline classification of living organisms: Haeckel, Whittaker and Carl Woese System	2	2
Dec	1,2	2	Outline classification for bacteria as per the second edition of Bergey's Manual Of Systematic Bacteriology (up to section level).	3	5
Dec	2	3	Differentiation of Prokaryotes and Eukaryotes	1	6
Dec	2,3,4	4	Prokaryotes - General characteristics of Bacteria, Archaebacteria, Rickettsias, Mycoplasma, Cyanobacteria and Actinomycetes	6	12
Dec	4	5	Eukaryotes – General characteristics and classification (up to order level) of eukaryotic microorganisms – Protozoa, Microalgae, Molds and Yeast	3	15
		II	**Pure Culture Techniques & Preservation**		
Dec	4	1	Concept of Pure cultures	1	16
Jan	5,6	2	Isolation of Pure culture techniques – Enrichment Culturing, Dilution-Plating, Streak Plate, Spread Plate, Pour Plate, Single cell isolation and Micromanipulator	5	21
Jan	6,7	3	Culturing methods- Aerobic and Anaerobic methods	4	25
Jan	7,8	4	Preservation of microbial cultures – Sub culturing, Overlaying cultures with mineral oils, Lyophilization, Sand cultures, Storage at low temperature	5	30
		III	**Biomolecules**		
Jan	8	1	Biomolecules of microorganisms and their significance	1	31
Jan/Feb	8,9	2	Outline Classification and Properties of Carbohydrates (MonosaccharideDisaccharides and Polysaccharides).	4	35
Feb	9,10	3	Structure and properties of Amino acids and Proteins	4	39
Feb	10,11	4	Structure and properties of Nitrogenous bases, Nucleotides, Nucleic acids	3	42
Feb	11,12	5	Structure and Classification of lipids	3	45

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		IV	**Biochemical Techniques**		
Feb	12	1	Buffers- types of buffers and their use in biological reactions	3	48
March	13	2	Hydrogen ion concentration in biological fluids, pH measurement	2	50
March	13,14	3	Principle and application of Colorimetry	3	53
March	14,15	4	Chromatography - Paper and Thin layer	4	57
March	15	5	Electrophoresis – Paper electrophoresis, Agarose gel electrophoresis (AGE)	3	60

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2016-17

SUBJECT -MICROBIOLOGY II SEMESTER PRACTICALS
(GENERAL MICROBIOLOGY- Paper II)

Month	Week	B.Sc I Year Practicals	Hrs	Total
Dec	1	Isolation of single colonies on solid media	1	1
	2	Enumeration of bacterial numbers by serial dilution and plating	1	2
	3	Isolation of pure cultures by streak, spread and pour plate techniques	1	3
	4	Preparation of culture media: Solid / Liquid	1	4
Jan	5	Preparation of culture media: Defined / Complex	1	5
Jan	6&7	Preservation of microbial cultures – Slants, Stabs, Sand cultures, Mineral oil overlay- Glycerol stocks	2	7
Jan/Feb	8,9&10	Aerobic culturing methods –Shake flask, Anaerobic method -McIntosh Jar, Pyrogallol method.	3	10
Feb	11&12	Qualitative tests for Carbohydrates	2	12
Mar	13&14	Qualitative tests for amino acids	2	14
Mar	15	Verification of Beer Lambert's Law	1	15

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B.Sc ACADEMIC ORGANIZER 2016-17

B.Sc SEMESTER - III Paper - III

MICROBIAL PHYSIOLOGY

MONTH	WEEK	UNIT	TOPIC	NO.OF CLASSES	TOTAL
		I	**Nutrition and Growth**		
JUNE	1	1	Microbial Nutrition - Nutritional requirements and uptake of nutrients by cells	4	4
	2	2	Nutritional groups of microorganisms - Autotrophs, Heterotrophs, PhototrophsChemotrophs, Organotrophs, Lithotrophs, Mixotrophs, Methylotrophs. With example of each	3	7
	2&3	3	Growth media - Synthetic, Nonsynthetic, Selective, Enrichment and Differential media.	2	9
	3	4	Microbial growth - Different phases of growth in batch cultures	2	11
	3	5	Synchronous, continuous, biphasic growth	1	12
JULY	4	6	Factors influencing microbial growth	1	13
JULY	4	7	Methods for measuring microbial growth – Direct microscopy, Viable Count estimates, Turbidometry, Biomass. (DNA, Protein, Nitrogen content- Kjeldal method)	2	15
		II	**Enzymes**		
JULY	4&5	1	Enzymes - properties and classification, enzyme unit ,enzyme assay methods	5	20
JULY	6&7	2	Biocatalysis - Induced fit, Lock and key model, Types of catalysis, Coenzymes , Cofactors, Factors affecting catalytic activity of enzymes	5	25
JULY/AUG	7&8	3	Inhibition of enzyme activity –Reversible, Competitive, Non competitive, uncompetitive and Irreversible, Allosteric	5	30
		III	**Microbial Metabolism 1**		
AUG	8,9&10	1	Aerobic respiration - Glycolysis, HMP pathway, ED pathway, TCA cycle	7	37
AUG	10	2	Electron transport, Oxidative and Substrate-level Phosphorylation	5	42
AUG	11	3	β-Oxidation of fatty acids	2	44
SEP	12	4	Glyoxylate cycle	1	45
		IV	**Microbial Metabolism 2**		
SEP	12	1	Anaerobic respiration (nitrate, sulphate respiration).	2	47

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SEP	12,13&14	2	Fermentation - Common microbial fermentations with special reference to Ethyl alcohol, Butanol and lactic acid fermentations	6	53
SEP	14	3	Photosynthetic apparatus in prokaryotes	2	55
SEP	14&15	4	Outlines of oxygenic and anoxygenic photosynthesis in bacteria	5	60

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2016-17

SUBJECT -MICROBIOLOGY III SEMESTER PRACTICALS

Microbial physiology - Paper III)

Month	Week	B.Sc I Year Practicals	Hrs	Total
JULY	1&2	Preparation of media for culturing Autotrophic and Heterotrophic microorganisms - Algal medium, Mineral salts medium, Nutrient agar medium, McConkey agar, and Blood agar	2	2
JULY	3&4	Enrichment culturing and isolation of Phototrophs and Chemoautotrophs	2	4
AUGUST	5	Setting and observation of Winogradsky Column	1	5
AUGUST	6	Determination of viable count of bacteria	1	6
AUGUST	7	Turbidometric measurement of bacterial growth	1	7
AUGUST/SEP	8&9	Bacterial growth curve	2	9
SEP	10,11&12	Factors affecting bacterial growth – pH, temperature, salts	3	12
OCT	13	Sugar fermentation	1	13
OCT	14&15	Starch hydrolysis and amylase assay (Quantitative method).	2	15

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B.Sc ACADEMIC ORGANIZER 2016-17

B.Sc SEMESTER - IV Paper - IV

MOLECULAR BIOLOGY

MONTH	WEEK	UNIT	TOPIC	NO.OF CLASSES	TOTAL
		I	**Fundamentals of Microbial Genetics**		
DEC	1	1	DNA and RNA as genetic materials	3	3
DEC	1	2	Structure of DNA – Watson and Crick model (B), A and Z forms of DNA	1	4
DEC	2	3	Super coiling of DNA (positive and negative coiling, Topoisomerases /Gyrase)	1	5
DEC	2	4	Replication of DNA – Semi conservative mechanism	2	7
DEC	2&3	5	Types of RNA and their functions	2	9
DEC	3	6	Outlines of RNA biosynthesis in prokaryotes	3	12
DEC	4	7	Genetic code. Structure of ribosomes and a brief account of protein synthesis	3	15
		II	**Mutation and Genetic variation**		
DEC/JAN	4&5	1	Mutations – spontaneous and induced, base pair changes, frame shifts, deletions,inversions, tandem duplications, insertions	3	18
JAN	5&6	2	Various physical and chemical mutagens, Biological agents, Overview of Site directed Mutagenesis	4	22
JAN	6&7	3	Outlines of DNA damage and repair mechanisms	3	25
JAN	7	4	Genetic recombination in bacteria – transformation, transduction and conjugation	3	28
JAN	8	5	Basic method of Genetic mapping using conjugation and transduction	2	30
		III	**Microbial Gene Expression**		
JAN	8	1	Concept of gene and its product,gene structure - Muton, Recon and Cistron	2	32
FEB	9	2	Operon concept. Regulation of gene expression in bacteria – lac operon	3	35
FEB	9&10	3	Extra chromosomal Genetic elements:a.Plasmids : Types F, R, Col Ti, Degradative etc, Properties and Functions	5	40
FEB	11&12	4	b.Transposons : IS, Composite, DNA , RNA and Retro transposons -b.Transposons : IS, Composite, DNA , RNA and Retro transposons -Structure and Functions	5	45
		IV	**Recombinant DNA Technology**		
FEB	12	1	Basic principles of genetic engineering	2	47

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FEB/MAR	12&13	2	Enzymes in Genetic engineering ,restriction endonucleases, DNA polymerases,ligases S1 nuclease ,Reverse transcriptase,Alkaline phosphatase, Methylase,	4	51
MAR	13&14	3	Outlines of gene cloning methods-random cloning,short gun ,PCR and cDNA	3	54
MAR	14&15	4	Genomic and c DNA libraries.- construction and applications	3	57
MAR	15	5	General account on application of genetic engineering in industry, agriculture ,Medicine, Environment	3	60

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2016-17

SUBJECT -MICROBIOLOGY IV SEMESTER PRACTICALS
MOLECULAR BIOLOGY - Paper IV)

Month	Week	B.Sc IV Year Practicals	Hrs	Total
Dec	1	Colorimetric estimation DNA by diphenylamine method.	1	1
Dec	2	Colorimetric estimation RNA by orcinol method	1	2
Dec	3	Colorimetric estimation of proteins by Biuret method	1	3
Dec/Jan	4,5&6	Paper chromatographic separation of sugars or amino acids	3	6
Jan/Feb	7,8&9	Extraction of Genomic DNA	3	9
Feb	10,11&12	Agarose gel Electrophoresis	3	12
Mar	13,14&15	Problems related to DNA and RNA characteristics, Transcription and Translation	3	15

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ACADEMIC ORGANIZER – 2016 -17
B.Sc III year Immunology and Medical Microbiology (Theory)

Month	Week	Unit	Detail/topic	No. of classes	Total
		I	**History of Immunology and Immune system**		
June	1		Development of immunology	2	2
	1&2		Types of immunity- innate and aquired, active and passive, humoral and cell mediated.	4	6
	3		Primary and secondary organs of immune system- thymus, bursa fabricus, bone marrow, spleen and lymph nodes	4	10
July	4&5		Cells of immune system- B and T-lymphocytes, null cells, monocytes, macrophages, neutrophil, basophiles and eosinophiles.	3	13
	5		Identification and function of B and T lymphocytes,Nullcells,monocytes,macrophages,Neutrophils,Basophils and eosnophils	2	15
		II	**Basics of Immunology**		
	6		Antigens-types, chemical nature antigenic determinants, haptens.	1	16
			Factors affecting antigenicity	1	17
	6&7		Antibodies- basic structure, types, properties and functions of immunoglobulins	3	20
	7&8		Components of complement and activation of complement	2	22
Jul/Aug	8&9		Types of antigen-antibody reactions-agglutination, blood groups, precipitation, neutralization, complement fixation.	4	26
	9&10		Labeled antibody based techniques- ELISA, RIA, immunofluorescence.	3	29
	10		Polyclonal and monoclonal antibodies-production and applications.	1	30
	11		Types of hyper sensitivity-Immediate and delayed	2	32
	11&12		Auto immunity and its significance	2	34
		III	**Clinical Microbiology**		
	12		History of medical microbiology	1	35
Aug/Sep	12&13		Normal flora of human body	4	39
sep	14		Definition of infection, non-specific defence mechanisms: (mechanical barriers, antagonism of indigenous flora)	1	40
			Anti-bacterial substances- lysozyme,	1	41

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			complement, properdin, anti-viral substances, phagocytosis.		
			General principles of diagnostic microbiology	1	42
	15		collection transport and processing of clinical samples.	2	44
	15&16		General methods of laboratory diagnosis-cultural, biochemical, serological and molecular methods	3	47
	16		Tests for anti-microbial susceptibility	1	48
Oct	17		Anti-viral agents- interferons and base analogues	1	49
	17&18		Host-pathogen interactions. Bacterial toxins, virulence and attenuation	3	52
		IV	**Microorganisms and disease**		
	18		Elements of chemotherapy-therapeutic drugs. Drug resistance	2	54
Nov	19		Mode of action of penicillin and sulfa drugs and their clinical use	2	56
	19		Preventive control of diseases-active and passive immunization	1	57
	20		Vaccines- natural and recombinant	1	58
	20&21		General account of the following diseases-causal organisms, pathogenesis, epidemiology, diagnosis, prevention and control. **Air borne diseases** Tuberculosis Influenza	3	61
Nov/Dec	21&22 &23		**Food and water borne diseases** Cholera,Typhoid,Hepatitis-A,Poliomyelitis Amoebiasis	6	67
Dec	23&24		**Insect borne diseases** Malaria Filariasis Dengue fever	3	70
	24		**Contact diseases** Syphilis Gonnorrhoea	2	72
	25		**Zoonotic diseases** Rabies Anthrax	3	75
	26		**Blood borne diseases** Serum hepatitis AIDS	2	77
			General account of nosocomial infections	1	78

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ACADEMIC ORGANIZER (2016-17)
PAPER III -Immunology and Medical Microbiology
PRACTICAL

Month	Week	Sl.No.	Experiments	Number of Practical Classes	Total
June&July	1,2,3&4	1	Blood Tests-DC,TC and ESR	4	
	5	2.	Estimation of Blood Haemoglobin	1	5
	6	3.	Determination of Blood Groups and Rh Typing.	1	6
Aug	7,8,9&10	4.	Antigen-antibody Reactions; i. Widal test ii. VDRL Test iii. Precipitation-Ochterlony Double Diffusion Test	4	10
	11	5.	Acid Fast Staining of Mycobacteria.(Stained or Permanent slides.)	1	11
Sep/Oct/ Nov	12,13,14, 15, 16,17&18	6.	Isolation and identification of medically important bacteria(E.coli, Klebsiella,Pseudomonas,Staphylococcus, Streptococcus) by cultural, microscopic &biochemical tests.	7	18
Nov/Dec	19&20	7.	Antibiotic Sensitivity testing;Disc Diffusion Method	2	20
Dec	21&22	8.	Parasites ; Malarial Parasite,Entamoeba,(study of Permanent Slides)	2	22
Jan	23	9.	Observation of Fungal Pathogen(Candida)	1	23
	24&25	10	Tests for Disinfectant (Phenol Co-efficient)	2	25
	26	11	Pre-final Practical examination	1	26

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ACADEMIC ORGANIZER 2016-17
B.Sc III year- Applied Microbiology (Theory)

Month	Week	Unit	Detail/topic	No. of classes	Total
June		I	**Agricultural Microbiology**		
	1		Physical and chemical characteristics of soil	1	1
	1		Rhizosphere and Phyllosphere	2	3
June/July	2,3,4,5		Plant growth promoting organisms (mycorrhizae, rhizobia, azospirillum, azatobacter, cyanobacteria, frankia and phosphate solubilizing organisms) Outlines of biological nitrogen fixation (symbiotic, non-symbiotic)	10	13
	5		Bio-fertilizers-Rhizobium	1	14
	5		Concept of disease in plants	1	15
	6		Symptoms of plant disease caused by fungi, bacteria and viruses.	3	18
	7		Plant diseases caused by fungi(Groundnut rust),Bacteria(angular Leaf spot of cotton) and Viruses(Tomato leaf curl)	3	21
	8		Principles of plant disease control	2	23
July/Aug	8,9		Biological control of plant diseases Biopesticides- bacillus thuringiensis, nuclear poly hedrosis virus (NPV),Trichoderma	2	25
		II	**Environmental Microbiology**		
Aug	9		Microorganisms of the environment (soil, water and air)	2	27
	10		Role of Microorganisms in nutrient cycling- carbon, nitrogen and phosphorus	3	30
	11		Microbial interactions- mutualism, commensalism, antagonism, competition, parasitism, predation	2	32
	11,12		Microbiology of potable and polluted waters. *Ecoli* and *Streptococcus faecalis* as indicators of water pollution Sanitation of potable water	3	35
Aug/Sep	12,13		Sewage treatment(primary, secondary and tertiary)	3	38
Sep	13,14		Outlines of biodegradation of environmental pollutants- pesticides	3	41
			Solid waste disposal- sanitary land fills, composting		
	14,15		Microbiology of air and air sampling	2	43

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			complement, properdin, anti-viral substances, phagocytosis.		
			General principles of diagnostic microbiology	1	42
	15		collection transport and processing of clinical samples.	2	44
	15&16		General methods of laboratory diagnosis-cultural, biochemical, serological and molecular methods	3	47
	16		Tests for anti-microbial susceptibility	1	48
Oct	17		Anti-viral agents- interferons and base analogues	1	49
	17&18		Host-pathogen interactions. Bacterial toxins, virulence and attenuation	3	52
		IV	**Microorganisms and disease**		
	18		Elements of chemotherapy-therapeutic drugs. Drug resistance	2	54
Nov	19		Mode of action of penicillin and sulfa drugs and their clinical use	2	56
	19		Preventive control of diseases-active and passive immunization	1	57
	20		Vaccines- natural and recombinant	1	58
	20&21		General account of the following diseases-causal organisms, pathogenesis, epidemiology, diagnosis, prevention and control. **Air borne diseases** Tuberculosis Influenza	3	61
Nov/Dec	21&22 &23		**Food and water borne diseases** Cholera,Typhoid,Hepatitis-A,Poliomyelitis Amoebiasis	6	67
Dec	23&24		**Insect borne diseases** Malaria Filariasis Dengue fever	3	70
	24		**Contact diseases** Syphilis Gonnorrhoea	2	72
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	26		**Blood borne diseases** Serum hepatitis AIDS	2	77
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ACADEMIC ORGANIZER 2016-17
B.Sc III year- Applied Microbiology (Theory)

Month	Week	Unit	Detail/topic	No. of classes	Total
June		I	**Agricultural Microbiology**		
	1		Physical and chemical characteristics of soil	1	1
	1		Rhizosphere and Phyllosphere	2	3
June/July	2,3,4,5		Plant growth promoting organisms (mycorrhizae, rhizobia, azospirillum, azatobacter, cyanobacteria, frankia and phosphate solubilizing organisms) Outlines of biological nitrogen fixation (symbiotic, non-symbiotic)	10	13
	5		Bio-fertilizers-Rhizobium	1	14
	5		Concept of disease in plants	1	15
	6		Symptoms of plant disease caused by fungi, bacteria and viruses.	3	18
	7		Plant diseases caused by fungi(Groundnut rust),Bacteria(angular Leaf spot of cotton) and Viruses(Tomato leaf curl)	3	21
	8		Principles of plant disease control	2	23
July/Aug	8,9		Biological control of plant diseases Biopesticides- bacillus thuringiensis, nuclear poly hedrosis virus (NPV),Trichoderma	2	25
		II	**Environmental Microbiology**		
Aug	9		Microorganisms of the environment (soil, water and air)	2	27
	10		Role of Microorganisms in nutrient cycling- carbon, nitrogen and phosphorus	3	30
	11		Microbial interactions- mutualism, commensalism, antagonism, competition, parasitism, predation	2	32
	11,12		Microbiology of potable and polluted waters. *Ecoli* and *Streptococcus faecalis* as indicators of water pollution Sanitation of potable water	3	35
Aug/Sep	12,13		Sewage treatment(primary, secondary and tertiary)	3	38
Sep	13,14		Outlines of biodegradation of environmental pollutants- pesticides	3	41
			Solid waste disposal- sanitary land fills, composting		
	14,15		Microbiology of air and air sampling	2	43

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			methods		
		III	**Food Microbiology**		
	15		Microorganisms of food spoilage and their sources	1	44
Sep	15,16		Spoilage of different materials (fruits, vegetables, meat, fish)	4	48
Oct	17,18		canned foods -Food intoxication(Botulism and staph poisoning), food borne diseases (salmonellosis and shigellosis)and their detection	4	52
	18		General account of food preservation	2	54
Nov	19		Microbial production of fermented foods- Bread, cheese, yoghurt	3	
	20		Biochemical activities of microbes in milk	1	55
	20		Microorganisms as food- SCP, edible mushrooms(white button,oyster and paddy straw)	2	57
	21		Concept of probiotics	2	59
		IV	**Industrial Microbiology**		
	21,22		Microorganisms of industrial importance- yeast and moulds, bacteria, actinomycetes	2	61
	22		Screening and isolation of industrially useful microbes	2	63
Dec	23		Outlines of strain improvement	2	65
	23,24		Types of fermentation- aerobic, anaerobic, batch, continuous, sub-merged, surface and solid state	4	69
	25		Design of a stirred tank fermentor. Fermentation media	2	71
Dec,Jan	25,26, 27,28		Industrial production of A. Alcohol- ethyl alcohol B. Beverages-beer C. Enzymes-amylases D. Antibiotics- penicillin E. Amino acids- Glutamic acid F. Organic acid- citric acid G. Vitamins- B_{12} H. Biofuels- biogas(methane)	8	79

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Sainikpuri, Secunderabad - 500 094.

Applied Microbiology (paper IV) (2016-17)
PRACTICAL

Month	Week	S.No.	Experiments	Number of Practical Classes	Total
June	1 &2	1	Isolation and identification of Rhizhosphere & Phyllosphere microorganisms	2	
July	3	2.	Study of root nodules and isolation of Rhizobium from legume root nodules	1	3
	4&5	3.	Isolation of Azospirillum or Azotobacter	2	5
		4.	Staining and observation of Vesicular Arbuscular Mycorrhizal(VAM)fungi	1	6
		5.	Observation of plant diseases of local importance: Rusts, Smuts, Powdery mildews, Tikka disease of ground nut, Citrus canker, Bhendi yellow vain mosaic, Tomato leaf curl Little leaf of brinjal	1	7
	6	6.	Isolation of antagonistic micro organisms by crowded plate technique	1	8
Aug	7 & 8	7.	Isolation of Microorganisms of air by Petri plate exposure method.	1	9
Aug & Sep	9,10& 11	8.	Determination of Biological Oxygen Demand (BOD) of water.	2	11
Sep& Oct.	12,13, 14,15 &16	9.	Microbiological testing of water by coliform test (multiple tube fermentation method)	2	13
Nov	16	10	Determination of Microbiological quality of milk-MBRT	1	14
	17	11	Isolation of Fungi and bacteria from Spoiled fruits and vegetables	1	15
	18 &19	12.	Observation of different Spoiled Foods	1	16
Dec	20,21 &22	13.	Alcohol production and estimation; calculation of fermentation efficiency	3	19
Dec &Jan	23&24	14.	Isolation of amylase producing organisms.	2	21
Jan	25	15.	Citric acid production and estimation.	2	23
	26		Estimation of ascorbic acid	1	24
	27	16.	Pre-final Practical examination	1	25

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