

P.G

2019-21 Batch

6th BBS - 27.4.20



**BHAVAN'S VIVEKANANDA COLLEGE OF SCIENCE, HUMANITIES
AND COMMERCE, SAINIKPURI, SECUNDERABAD.**

Autonomous College

Affiliated to OSMANIA UNIVERSITY, Hyderabad.

(Accredited with 'A' grade by NAAC)

Department of Microbiology

M.Sc Microbiology CBCS Syllabus

Effective from 2019 onwards

Semester I

Syllabus Ref No	Subject	Credits	Teaching Hours	Marks		
				Internal Assessment	Semester Exam	Total
THEORY						
PMB 101	General Microbiology & Microbial Physiology (Core)	4	4	30	70	100
PMB 102	Virology (Core)	4	4	30	70	100
PMB 103	Research Methodology & Techniques (Core)	4	4	30	70	100
PMB 104	Microbial Biochemistry (Core)	4	4	30	70	100
PRACTICALS						
PMB 151	General Microbiology & Virology	4	8		100	100
PMB 152	Research Methodology & Techniques Microbial Biochemistry	4	8		100	100
		24	32	120	480	600

Semester II

Syllabus Ref No	Subject	Credits	Teaching Hours	Marks		
				Internal Assessment	Semester Exam	Total
THEORY						
PMB 201	Molecularbiology & Microbial Genetics (Core)	4	4	30	70	100
PMB 202	Environmental & Agricultural Microbiology (Core)	4	4	30	70	100
PMB 203	Immunology (Core)	4	4	30	70	100
PMB 204	Pharmaceutical Microbiology (Core)	4	4	30	70	100
PRACTICALS						
PMB 251	Molecularbiology, Microbial Genetics & Environmental & Agricultural Microbiology	4	8		100	100
PMB 252	Immunology & Pharmaceutical Microbiology	4	8		100	100
	Total	24	32	120	480	600


1


CHAIRPERSON
M.Sc in Microbiology
Bhavan's Vivekananda College
Sainikpuri

Dr. B. Bhima
Chairman, BBS

Semester III


Syllabus Ref No	Subject	Credits	Teaching Hours	Marks		
				Internal Assessment	Semester Exam	Total
THEORY						
PMB 301	Food Microbial technology (Core)	4	4	30	70	100
PMB 302	Medical bacteriology (Core)	4	4	30	70	100
PMB 303	DSE A. Microbial Ecology and Plant Microbe Interactions Or B. Advances in Biotechnology	4	4	30	70	100
PMB 304	DSC Industrial Microbiology	2	2	15	35	50
PMB 305	MOOCS on line course	2	2		50	50
PRACTICALS						
PMB 351	Food Microbial technology & Medical Bacteriology	3	6		75	75
PMB 352	Microbial Ecology and Plant Microbe Interactions; Industrial Microbiology Or Advances in Biotechnology	3	6		75	75
PMB 353	Project course work	2	4		50	50
Total		24	32	105	495	600

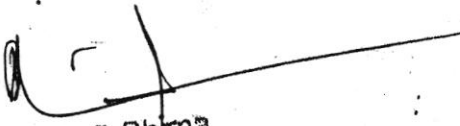

CHAIRPERSON
 BOS in Microbiology
 Bhavan's Vivekananda College
 Sainikpuri


Dr. B. Bhima
 Chairman, BoS
 Dept. of Microbiology
 Osmania University, Hyd.

Semester IV

Syllabus Ref No	Subject	Credits	Teaching Hours	Marks		
				Internal Assessment	Semester Exam	Total
THEORY						
PMB 401	Cell and Molecular Biotechnology (Core)	4	4	30	70	100
PMB 402	Medical virology and Parasitology (Core)	4	4	30	70	100
PMB 403	Microbial biotechnology(Core)	4	4	30	70	100
PMB 404	DSE A.Nanobiotechnology & Bioinformatics Or B.Microbial Proteomics	4	4	30	70	100
PRACTICALS						
PMB 451	Cell Molecular Biotechnology; Medical virology and parasitology	2	4		50	50
PMB 452	Microbial biotechnology & Nanobiotechnology	2	4		50	50
PMB 453	Project	4	8		100	100
	Total	24	32	120	480	600
	Grand Total	96	128	480	1920	2400


CHAIRPERSON
 BOS in Microbiology
 Phavan's Vivekananda College
 East Godavari


 Dr. B. Bhima
 Chairman, BoS
 Dept. of Microbiology
 Osmania University, Hyd.

Paper I PMB 101 General Microbiology (Core) (CBCS)

Month	Week	Unit	Sub. Unit	Detailed Topic	Periods	Total
Aug	1	1	A	Pioneers of Microbiology		
			A i	Anton Van Leewenhoek		
			A ii	Lious Pastuer	1	1
			A iii	Robert Koch		
			A iv	Edward Jenner	1	2
			A v	Winogradsky		
			A vi	Edward Jenner	1	3
			A vii	Winogradsky		
			A viii	Beijerinck	1	4
			A ix	Alexander Flemming		
Aug	2		A x	Selman Walkmann	1	5
			B	Microscopy		
				Principles, working and applications of		
			B i	Bright field microscope	1	6
			B ii	Flourescent microscope		
			B iii	Phase contrast microscope	1	7
			B iv	Electron microscope	1	8
Aug	3		B v	Microbial Cell Structure. Prokaryotic cell and Eukaryotic cell.	4	12
			B viii	Organisation & function of cellular organelles		
			C i	Bacterial endospore structure	1	13
eptembe	4		C ii	Biochemistry and genetics of sporulation	2	15
Sept	5	2	A	Methods of sterilization and disinfection		
			A i	Physical methods	2	17
			A ii	Chemical methods	2	19
			A iii	Containment facility.	1	20
			B	Microbiological media	2	22
			Bi	Autotrophic media		
			B ii	defined synthetic mineral media		
			B iii	heterotrophic media		
Sept	6		C	The concept of	2	24
			Ci	prototrophs		
			C ii	auxotrophs		
			C iii	prototrophic (minimal med)		
			C iv	complex media (undefined media)		
			D	Cultivation of		
				Bacteria		

Adhe

				Fungi		
				Algae	2	26
			E	Routine and special culture methods	2	28
				Agar slant		
				Agar stab		
				Agar plate		
				Rolled tube		
				Test tube, Flask,		
Sept	7		F	Aerobic and Anaerobic	1	29
			G	Isolation of pure cultures		
				Preservation and Maintenance	1	30
				Routine methods		
				Liquid nitrogen preservation		
				freeze-drying (Lyophilization)		
		3	A	Identification methods and classification of bacteria		
			A i	Microscopic identification characteristics		
			A ii	staining methods.		
Oct	8		A iii	Ecological identification methods	1	31
			A iv	Nutritional (cultural) identification characters	1	32
			A v	biochemical identification methods		
Oct	9		Avi	immunological characteristics	1	33
			Avii	Molecular and genetic characteristics identification (16s rRNA).	1	34
			B	Principles of bacterial taxonomy	1	35
			C	Numerical taxonomy	1	36
			D	Bergey's manual and its importance,	2	38
Oct	10		E	general properties of bacterial groups		
			F	Microbial nutrition and metabolism	3	41
				autotrophy		
				Photoautotrophy	1	42
				bacterial photosynthesis	1	43
Oct	11			Chemoautotrophy	1	44
				heterotrophic metabolism	1	45
Nov	12	4	A	Microbial growth		

Handwritten signature in blue ink.

				The concept of growth and definition, formation of protoplasm		
				, building of macromolecules from elemental nutrients		
				supramolecules	5	50
				orgnelles of cell and cellular components		
Nov	13			Cell cycle in microbes and generation time	2	52
Nov	13		B	Growth phases of bacteria	3	55
				Lag phase, exponential (logarithmic)		
				phase, stationary (ideo) phase		
				decline and survival of microbial cells		
Nov	14		C	Importance of each growth phase	2	57
Nov	15			Synchronous cultures		
				Methods of synchronous culturing	1	58
				Continuous culturing methods	1	59
			D	Methods of growth measurement	1	60

Adh

M.Sc. (Previous) I Semester Microbiology (CBCS) 2019-2020
PMB 102 Virology Theory

Month	Week	Unit	Detailed topic	No.of Periods	Total
August	1	1	History of virology (latest Scientific investigations),	2	2
			Viral classification and nomenclature (ICTV system of classification).	2	4
	2		Virus structure and morphology		
			Detection of viruses: physical, biological, immunological, serological and molecular methods.	3	7
			Isolation, purification, propagation, characterization, identification and quantification of bacteriophages, plant viruses and animal viruses	2	9
			Sub-viral particles: Discovery, structure, replication and diseases caused by satellites virus, viroids and prions.	2	11
Sep	4		General idea about cyanophages, actinophages and mycophages.	2	13
			Metagenomics for virus characterization.	2	15
Sep	4&5	2	Virus replication Strategies: Principal events involved in replication: Adsorption, penetration, uncoating nucleic acid and protein synthesis, intracellular trafficking, assembly, maturation and release.	2	17
			Viral-host interaction, Host response to viral infection.	2	19
Sep	6		An Overview of Cellular interactions—clathrin coated pits, lipid rafts, endocytosis and virus uncoating mechanisms.	2	21
			Comparison of Lytic cycle and lysogeny cycle - Lambda	2	23
	6&7		T4 Bacteriophage,	2	25



			Morphology, Ultrastructure, Genome organization and Replication strategies of Adenovirus	1	26
			Banana bunchy top virus	1	27
			Reovirus	1	28
Oct	8		TMV	2	30
			Influenza virus	1	31
			HIV	1	32
Oct	9		HBV	1	33
		3	Recombination in phages	3	36
			multiplicity reactivation	1	37
			phenotypic mixing	1	38
Oct	10&11		General account of Tumor virus (RNA and DNA).	2	40
			Viral Interference and Interferons	2	42
			Nature and source of interferons	1	43
			Classification of interferons	1	44
November	12		Induction of interferons.	1	45
			Antiviral agents (chemical and biological) and their mode of actions	3	48
Nov	13	4	Introduction to viral vaccines	1	49
			preparation of vaccines	1	50
			Viruses as cloning vectors	2	52
Nov	14		Vectors used for cloning and sequencing: λ phage, M 13, retro viruses.	2	54
			CaMV 35S promoter and its application	1	55
			Baculovirus System for insect cell	1	56
Nov	15		Silver lining: viruses as therapeutic	1	57
			viruses for gene delivery	1	58
			viruses to destroy other viruses	1	59
			Importance of studying modern virology	1	60

Handwritten signature

SEMESTER-I

2019-2020

Paper III MB 103 Research Methodology & Techniques (Theory) (CBCS)

Month	Week	Unit	Detailed Topic	No of Periods	Total
			Optical methods:		
Aug	1	1	colorimetry and spectrophotometry	2	2
			fluorimetry	1	3
			optical rotation	1	4
	2		Circular dichroism,	1	5
			NMR, ESR spectroscopy	3	8
	3		X-ray diffraction	1	9
			types of mass spectrometry.	2	11
Aug/Sep	3&4		Electrophoretic techniques and application	3	14
			counter current distribution	1	15
		2	Separation methods:		
September	4&5		Chromatographic techniques - HPLC, FPLC	2	17
			paper, thin layer	1	18
			ion exchange, gel filtration and affinity ch	2	20
Sep	6		Diffusion, dialysis	1	21
			cell disruption methods	1	22
			centrifugation techniques	2	24
Sep	7		cell free extracts and their use in metabolic studies.	1	25
			Radio isotopes		
			radioactivity – scintillation counters, autoradiography	2	27
			Safety precautions		
			stable isotopes and their use	1	28
Oct	8		General method of study of intermediary metabolism in microbes	1	29
			Uses of mutants in study of metabolism	1	30
		3	Biometry		
			Population, samples and sampling procedures	1	31
			variables, variations and frequency distributions	1	32
Oct	9		measures of central tendency and dispersion	2	34
			element of probability		

			gaussian or normal distribution, binomial distribution, poisson distribution, 't' distribution, 'F' distribution and Chi-square distribution	2	36
Oct	10		correlation and linear regression.	2	38
			Normal curve test, 't' test, 'F' test	2	40
Oct	11		ANOVA, analysis of covariance	2	42
			Chi-square test, and confidence intervals.	2	44
Nov	12		Experimental designs using statistical tools	1	45
		4	Computers		
			Introduction to Windows	2	47
			Word Processing	1	48
Nov	13		Electronic Spread Sheet	1	49
			Data collection, Data representation, Data analysis	3	52
Nov	14		Manuscript preparation	2	54
			Research ethics	1	55
Nov	15		QA, QC	2	57
			GLP, GMP	2	59
			Patents & IPR	1	60

[Handwritten signature]

[Handwritten scribble]

BIOCHEMISTRY THEORY

SEMESTER-I

Paper IV PMB 104 Biochemistry (Theory) CBCS restructured 2019-2020

Month	Week	Unit	Detailed Topic	No of Periods	Total
August	1	1	pH & its biological relevance.	2	2
			Determination of pH		
			preparation of buffers	2	4
			Types of Buffers		
August	2		Concept of entropy, free-energy, free energy changes	2	6
			High energy compounds	1	7
			Equilibrium constraints	1	8
August	3		Redox potentials	1	9
			Biological redox systems.	1	10
			Biological oxidation		
			Biological redox carriers.	1	11
			Biological membranes	1	12
September	4		Electron transport	2	14
			Oxidative phosphorylation & mechanism.	2	16
September	5		Lipid classification	2	18
			Bacterial lipids		
			Prostaglandins: Structure & function.	1	19
			Major steroids of biological importance.	1	20
Sep	6	2	Carbohydrates: Classification	2	22
			basic chemical structure of monosaccharides		
			aldoses & ketoses ,cyclic structure of monosaccharides.		
			stereoisomerism, anomers and epimers	2	24
			Sugar derivatives, deoxy sugars, amino sugars, and sugar acids		
Sep	7		Respiration (Aerobic and anaerobic) and fermentation. Glycolysis (EMP, HMP and ED) pathways. TCA Cycle and its integration	2	26
			Nucleic acids:		
			*structure & properties of purines & pyrimidines.	2	28
			*nucleosides& nucleotides.		
			Metabolism of purines		
Oct	8		*biosynthesis & degradation of Pyrimidines	2	30
			biosynthesis & degradation of Purines.		
		3	Proteins &Amino acids		
			*introduction	2	32



			*properties of amino acids		
Oct	9		Structure, conformation & properties of proteins	2	34
			Metabolism of amino acids		
Oct	9&10		Biosynthesis & degradation of amino acids -an overview	4	38
			Enzymes nomenclature, classification	2	40
Oct	11		Methods for determination of enzyme activity	2	42
			Isolation and purification of enzymes		
November	11		Enzyme kinetics: Effect of pH, substrate concentration , temperature and inhibitors.	4	44
November	12	4	Mechanism of enzyme action – Action of Hydrolases, Oxidases and reductases	4	48
	13		Coenzyme catalysis(pyridoxal phosphate and TPP).	2	52
			Isoenzymes.	2	54
			Competitive and non-competitive inhibition		
	14		Methods for increased microbial enzymes production and activity.	2	56
			Control of enzymes - Regulation of enzyme activity: allosteric enzymes and feed back mechanisms	2	58
			Metabolic compartmentalization in relation to enzyme,		
November	15		Enzymes and secondary metabolites	2	60

Chakraborty

10/10/10

GENERAL MICROBIOLOGY PRACTICALS

PMB 151

SEMESTER I (2019-2020)

Month	Week	Exp No.	Experiments	Classes	Total
August	1	1	Handling of Microscopes	4	4
August	2	2	Calibration and Measurement of Objects	4	8
August	3	3	Staining techniques: Simple/Differential/Special	4	12
Sep	4	4	Sterilization procedures and methods	4	16
	5	5	Preparation of microbiological media	4	20
sep	6	6	Isolation and Cultivation of Pure Cultures	4	24
sep	7	7	Identification methods of bacteria	4	28
oct	8	8	Isolation and Culturing of Fungi and algae	4	32
Oct.	9	9	Culturing methods of microbes	4	36
Oct.	10	10	Anaerobic Culturing methods of microbes	4	40
oct	11&12	11	Microbial growth experiments	8	48
Nov	13	12	Study of bacterial growth curve	4	52
Nov	14&15	13	Factors effecting microbial growth	8	60

Virology Practicals
PMB 151

2019-2020

Month	Week	Expt No.	Experiments	Classes	Total
August	1	1	Isolation of phage from soil samples using lab bacterial cultures Staphylococcus and Bacillus	8	8
August	2	2	Isolation of Phage from sewage using Psuedomonas and E.coli as host.	8	16
August	3	3	Cultivation and preservation of phages	8	24
September	4	4	Quantitation of phages	8	32
September	5	5	Growth phases of phage and Burst size	8	40
September	6	6	Phage induction	8	48
September	7	7	Cultivation of animal viruses in egg,allantoic,amniotic,CAM	4	52
October	8	8	Demonstration of cytopathological changes. Of animal viruses	4	56
October/ November	9	9	Symptomatic observations of plant viral infections.	4	60

Handwritten signature

I Semester Paper II MB152 Research Methodology and techniques (Practicals) CBCS
PMB 152 **2019-2020**

Month	Week	Expt. No	Experiment	No. of Periods	Total
Aug	1	1	Creating documents using word processor	8	8
Aug	2	2	Usage of spread sheet to biological applicatio	8	16
Aug	3	3	Biological data analysis using software	8	24
Sep	4&5	4&5	Absorption maxima of proteins, NA, Aromatic aa and riboflavin(Determination of molar extinction coefficient ,calculations based on Beer Lambert's law)	8	32
Sep	6&7	6&7	Estimation of inorganic and organic phosphate by Fiske -Subbarow method	8	40
Sep	8	8	Estimation of protein concentration by UV-Vis spectrophotometry and Folin Lowry method.	4	44
Sep	9	9	Differential centrifugation	4	48
Oct	10	10	Paper chromatography of amino acids	4	52
Oct	11	11	Dialysis for desalting of proteins	4	56
Nov	12	12	Demonstration of Gel filtration technique	2	58
Nov	13	13	Demonstration of electrophoresis of proteins and DNA	2	60

A. S. S.

BIOCHEMISTRY PRACTICALS

SEMESTER I

2019-2020

Paper II PMB 153 Biochemistry (Practicals) (CBCS)

Month	Week	Expt. No	Experiment	No. of Periods	Total
August	1	1	Safety and good lab practices	4	4
	2	2	Preparation of buffers and adjustment of pH	4	8
	3	3	Qualitative and quantitative tests for carbohydrates and analysis of unknowns	4	12
Sep	4	4	Qualitative and quantitative tests for amino acids and analysis of unknowns	4	16
	5	5	Quantitative estimation of inorganic and organic phosphate	4	20
	6	6	Tests for lipids (qualitative and quantitative)	4	24
	7	7	Quantitative estimation of glucose and fructose	4	28
Oct	8	8	Determination of Saponification of Fat.	4	32
	9	9	Partial purification of Enzymes:	4	36
			*beta - amylase		
	10	10	*urease	4	40
	11	11	*catalase	4	44
			Effect of substrate concentration, pH, time & temperature on enzyme activity.		
Nov	12	12	Calculation of km for partially purified enzyme.	4	48
	13	13	Inhibition of enzyme activity.	4	52
	14	14	Inhibition of enzyme activity.	4	56
	15	15	Record correction & certification	4	60

MOLECULAR BIOLOGY & MICROBIAL GENETICS THEORY

Paper -I PMB 201

2019-2020

Month	Week	Unit	Sub.Unit	Detailed Topic	No.of Periods	Total
Dec	1		A I	Detailed Structure of DNA,Z-DNA,A & B DNA	2	2
			A ii	Denaturation & Melting Curves.	2	4
Jan	2		A iii	Genomic Organization in Prokaryotes & Eukaryotes.	2	6
			Aiv	Enzymes invovled in Replication.:	2	8
Jan	3		Av	Modes of DNA Replication: Detailed mechanism of Semiconservative	2	10
				Plasmids : Classification,Properties and replication.	2	12
			F	Eukaryotic telomeres & its Replication.		
Jan	4	II		Prokaryotic &Eukaryotic Transcription.	4	16
Jan	5		A	RNA Stucture and processing	4	20
			A i	m-RNA		
			Aii	r-RNA		
			A iii	t- RNA .		
			B	Ribozyme	2	22
			B I	The Genetic Code & Wobble Hypothesis.		
Feb	6		B ii	Post Translation Modification	2	24
			B iii	Translation in Prokaryotes & Eukaryotes.	2	26
			B iv	Gene regulation & expression		

M. dhu

Feb	7		C	Lac operon, arabinose and tryptophan Operon	2	28
			D	Gene regulation in eukaryotic systems	2	30
			E	repetitive DNA		
Feb	8		E I	Gene rearrangements	2	32
				Promoters		
			E ii	Enhancer elements		
Feb	9	III	A	Mutagenesis:	4	36
			A i	Types of Mutagens		
			A ii	Molecular Basis of Mutations.		
			A iii	Analysis of Mutations		
March	10		A iv	Site directed Mutagenesis &	4	40
				Reverse Genetics.		
				Detailed mutagenesis and repair mechanism of UV, Ethidium bromide and Nitrous oxide	2	42
March	11		A v	DNA damage & Repair Mechanisms	2	44
			B	Isolation and application of Mutants	2	46
March	12		C	Transposable elements- definition	2	48
			D ii	Types of bacterial transposons		
			E	Applications of Transposons	2	50
March	13	IV	A I	Bacterial Recombinations- Discovery, gene transfer, molecular mechanism, detection, efficacy calculation and application	2	52
			A iii	Bacterial Transformation- Competency and resistance		
March	14		B	Bacterial Conjugation:	4	56
			B I	Sex Factors in bacteria		

			B ii	F & Hfr transfer		
			B iv	Linkage mapping.		
March	15		C	Bacterial Transduction :	2	58
			C I	Transduction Phenomena		
			C ii	Methods of Transduction		
			C iii	Cotransduction		
April			C iv	Generalized, Specialized & Abortive Transduction.	2	60
			C v	Sex ductions .		

Adha

Adha

Semester-II Molecular Biology and Microbial Genetics - 2019-2020 - PRACTICALS
PMB 251

Month	Week	Expt.No	Experiment	No of periods	Total
December	1&2	1	Extraction of DNA of Genomic	8	8
January	3	2	Estimation of DNA.	4	12
January	4	3	Estimation of RNA.	4	16
January	5	5	Determination of Molecular Weight of DNA, resolved on agarose gel electrophoresis.	4	20
February	6	6	Determination of Molecular Weight of Protein by PAGE.	4	24
February	7&8	7	Induction of Mutations by Physical/ Chemical Mutagens Screening & Isolation of	8	32
February	9&10	8	Replica Plate Technique .	8	40
March	11&12	9	Transformation in Bacteria .	8	48
March	13	10	Conjugation in Bacteria.	4	52
April	14&15	11	Protoplast Preparation & Regeneration.	8	60

[Handwritten Signature]

ENVIRONMENTAL AND AGRICULTURAL MICROBIOLOGY THEORY					
SEMESTER II - 2019-2020 - Paper-2 Code: PMB 202					
Month	Week	Unit	Detailed Topic	No. of Periods	Total
Dec	1	1	Microorganisms in air and their importance	2	2
			Microorganisms and water Pollution	2	4
Jan	2		Water-borne pathogenic microorganisms and their transmission	2	6
			Sanitary quality of water.	1	7
	3		Water pollution due to degradation of organic matter	2	9
			Sewage treatment - Overview	1	10
	4		Aerobic sewage treatment	1	11
			Oxidation ponds, trickling filters	1	12
			Activated sludge treatment	1	13
	5	2	Anaerobic sewage treatment – Septic tank	2	15
			Strategies for Bioremediation technologies	2	17
			Bioaugmentation	1	18
Feb	6		Methods of enumeration and activity of microbes in environment	3	21
			Microbial biodegradation of organic pollutants.	3	24
	7		A brief account of biodegradable plastics and superbug	2	26
			Microorganisms and their roles in fundamental biogeochemical cycles.	4	30
	9	3	Degradation of carbonaceous materials in soil - Introduction	1	31
			Cellulose	2	33
	10		Hemicellulose	1	34
			Lignin	2	36
Mar			Pectin	1	37
			Factors governing the decomposition and biochemistry of decomposition	1	38
			Soil humus formation	2	40
	11		Nitrification –Microbes involved, factors influencing nitrification, nitrifying bacteria and biochemical mechanism.	2	42
			Denitrification – microbes involved, factors influencing and the mechanism of denitrification	2	44
	12		Nitrate and Phosphate pollution	1	45
			4	Nitrogen fixation – Overview	1
	13		Asymbiotic nitrogen fixation	1	47
			Symbiotic nitrogen fixation	2	49
			Microbes involved in Nitrogen fixation	1	50
			Biochemistry of nitrogen fixation	1	51
			Measurement of Nitrogen fixation	1	52
	13&14		Genetics of Nitrogen fixation	1	53
			Ecological and economic importance of nitrogen fixation.	1	54

			Biofertilizers – bacterial fertilizers		
		4	Production of rhizobial inoculants	1	55
			Production of blue-green algae	1	56
April	15		Quality control tests	1	57
			Microbes and plant interactions		
			Rhizosphere	1	58
			Phyllosphere	1	59
			Mycorrhizae.	1	60

Handwritten signature

Handwritten signature

ENVIRONMENTAL AND AGRICULTURAL MICROBIOLOGY Practicals

Sem II -2019-2020, Paper-II, Code : PMB: 251

EXP NO	Month	Week	Unit	Experiments	No. of Periods	Total
1	Dec	1		Isolation and observation of air microflora	4	4
2	Jan	2		Enumeration of soil microorganisms (bacteria, actinomycetes, fungi) by standard plate count	4	8
3		3		Estimation of soil microbial activity by CO ₂ evolution	4	12
4		4		Estimation of BOD	4	16
5		5		Testing for microbial sanitary quality of water (coliform test)	4	20
6		6		Bioremediation plastics	4	24
7				Bioremediation of organic pollutants and their effect on soil microbial activity		
8	Feb	7		Isolation of cellulose decomposing microbes and estimation of cellulose activity	4	28
9		8		Estimation of ammonifiers, nitrifiers and denitrifiers in soil by MPN Method	4	32
10		9		Isolation and culturing of Rhizobium sp from root nodules and Azospirillum from grasses (Cyanodon)	4	36
11		10		Biological enrichment isolation of Rhizobium from soil by Leonard Jar experiment	4	40
12	Mar	11		Nodulation testing by tube/jar method	4	44
13		12		Observation and assessment of soil algae/algal biofertilizers	4	48
14				Estimation of N ₂ fixation (Micro Kjeldahl method/GC method)		
15		13		Isolation and observation for phyllosphere microflora	4	52
16		14		Isolation and observation for rhizosphere microflora	4	56
17	April	15		Observation for Mycorrhizae	4	60

M.Sc.(PREVIOUS) SEMESTER MICROBIOLOGY (CBCS)						
PAPER IV PMB 204 PHARMACEUTICAL MICROBIOLOGY (4 HPW-4 CREDITS)						
ACADEMIC YEAR 2019-2020						
Month	Week	Unit No	Sub Unit	Topic	No. of Periods	Total
DEC	1	1	A	Microorganisms affecting pharmaceutical industry		
				The atmosphere, water, skin & respiratory flora	1	1
				of personnel, raw-materials, packing, equipments, building, utensils etc.	1	2
			B	Types of microorganisms occurring in pharmaceutical products.	1	3
JAN	2		C	Microbiological spoilage	2	5
				prevention of pharmaceutical products.	2	7
			D	Preservation of pharmaceutical products		
				antimicrobial agents	1	8
JAN	3			used as preservatives	1	9
				evaluation of the microbial stability of formulation	2	11
				The sterilization in pharmaceutical industry	2	13
JAN	4		E	Good manufacturing practices	1	14
				in pharmaceutical industry	1	15
JAN	5	2	A	History of chemotherapy	2	17
		2		Inoculum media	2	18
				– plants and arsenicals as therapeutics,	2	19
					1	
				Paul Ehrlich and his contributions, selective toxicity	2	21
				target sites of drug action in microbes.		
			B	Development of synthetic drugs –	1	22
FEB	6			Sulphanamides, antitubercular compounds, nitrofurans	2	24
				nalidixic acid, metronidazole group of drugs,		
			C	Antibiotics - The origin, development	2	26
				definition of antibiotics as drugs		
FEB	7			types of antibiotics and their		
				Non-medical uses of antibiotics.		
FEB	8		D	Cosmetics microbiology	2	28
				testing methods and preservation		
			E	Antimicrobial preservation	1	29
				efficacy and microbial content testing	1	30
FEB	9	3	A	Principles of chemotherapy	2	32

				Clinical and lab diagnosis, sensitivity testing,	2	34
MAR	10			choice of drug, dosage, route of administration,	2	36
				combined/mixed multi drug therapy, control of antibiotic/drug usage.	2	38
MAR	11		B	Mode of action of important drugs	2	40
				Cell wall inhibitors (Betalactam – eg. Penicillin),	1	41
				membrane inhibitors (polymyxins),	1	42
				macromolecular synthesis inhibitors (streptomycin),		
MAR	12		C	antifungal antibiotics (nystatin)	3	45
		4	A	The drug resistance	3	48
MAR	13			The phenomenon, clinical basis of drug resistance, biochemistry of drug resistance, genetics of drug resistance in bacteria.		
			B	Microbiological assays:	3	51
				Assays for growth promoting substances, nutritional mutants and their importance		
				vitamin assay, amino acid assay		
MAR	14		C	Assay for growth inhibiting substances	3	54
				Assay for non-medicinal antimicrobials (Phenol coefficient/RWC). Drug sensitivity testing methods and their	2	56
APR	15			Assay for antibiotics – Determination of MIC, the liquid tube assay,	1	57
				solid agar tube assay, agar plate assay (disc diffusion, agar well and cylinders cup method).	1	58
			D	Introduction to pharmacokinetics and pharmacogenomics	2	60

Q. dlu

II SEMESTER PRACTICALS PAPER III PMB 252(8HRS PER WEEK)120PERIODS					
IMMUNOLOGY AND PHARMACEUTICAL MICROBIOLOGY (CBCS) ACADEMIC YEAR 2019-2020					
EXP NO	Month	Week	Experiments	No. of Periods	Total
1	DEC	1	Agglutination reactions-Widal	8	8
2			VDRL,		
3	DEC	2	HA, Blood typing	8	16
4			tube method Precipitation test: Ring interphase,		
			single radial diffusion.		
5	JAN	3	Ouchterlony double diffusion.	8	24
6	JAN	4	Immunoelectrophoresis	8	32
7			Neutralization test – Plaque neutralization, Haeme adsorption test.		
8	JAN	5	WBC and RBC count and differential blood p	8	40
9	JAN	6	Separation of serum proteins.	8	48
10			Blot transfer and detection of protein on blot by staining.		
11			ELISA		
12			Purification of IgG from serum		
13	FEB	7	Lymphocyte culture, viable staining and heamocytometer count.	8	56
14			Indirect agglutination (Pregnancy hCG Ag)		
15	FEB	8	Sterility testing methods for pharmaceutical a	8	64
16			Tests for disinfectants (Phenol coefficient/RWC)		
17	FEB	9	Determination of antibacterial spectrum of dru	8	72
18			Chemical assays for antimicrobial drugs		
19	MAR	10	Testing for antibiotic	8	80
20			drug sensitivity/resistance		
21	MAR	11	Determination of MIC valued for antimicrobia	8	88
22	MAR	12,13	Microbiological assays for antibiotics	16	104
23			Liquid tube assay,agar tuber,agar plate assay.		
24	APR	14,15	Efficacy testing of preservatives like parabens	16	120

IMMUNOLOGY
PMB-203 SEMESTER II - 2019-2020

Month	Week	Unit	Detailed Topic	No. of Periods	Total
Dec	1	1	History of immunology. Hematopoiesis, Cell lineage, components of immune system, cells and organs of immune system	4	4
Jan	2		Antigens –Nature, properties and types. Haptens	2	6
	2		Antibody -Structure , functions and classification. Isotypes, allotypes and idiotypes	2	8
	3		Immunoglobulin genes. Generation of antibody diversity. Clonal nature of the immune response - clonal selection theory.	3	11
	3&4		Generation of T cell receptor diversity by genomic rearrangement	2	13
	4		Structure of B and T cell receptors	2	15
	4	2	Overview of Innate and adaptive immunity	1	16
	5		Toll-like receptors, cell-mediated and humoral immune responses,	2	18
Jan/Feb	5&6		Major Histocompatibility Complex (MHC). Human leucocyte antigen (HLA) restriction Processing and presentation of antigen by MHC. Transplantation immunity,	4	22
	6		Immunosuppression and its mechanism of action	2	24
	7		Immune response during bacterial (tuberculosis), parasitic (malaria) and viral (HIV) infections, Immune evasion by bacteria and viruses.	2	26
	7		Congenital and acquired immunodeficiencies	2	28
	8		Immunological tolerance-central and peripheral	2	30
	8	3	Auto immunity and Hypersensitivity - immediate and delayed type hypersensitivity reactions.	2	32
	9		Classical and alternate Complement pathways	2	34
Feb/Mar	9,10&11		Antigen and antibody reactions–Agglutination, Precipitation, neutralization, and function. Labeled antigen-antibody reactions- ELISA, RIA, immune blotting, CFT, immunofluorescence. Flow cytometry (Fluorescence activated cell sorter), ChIP, Surface Plasma Resonance and its applications in Immunology	9	43
	11&12		Development Of immuno diagnostic kits.	2	45
	12	4	Types of conventional vaccines and principles of Immun	2	47
	12&13		Modern vaccines; peptide, DNA, recombinant / vector, and anti-idiotypic vaccines Schedules of common vaccination, Benefits and adverse consequences of vaccination	4	51
	13&14		Production of polyclonal antibodies; Animals models for production of antibodies	3	54

	14&15	Hybridoma techniques and monoclonal antibody production. Applications of monoclonals in biomedical research, clinical diagnosis and treatment. Chimeric Antibodies.	3	57
April	15	Tumor immunology. Immuno diagnosis and immune therapy of cancer	3	60

[Handwritten signature]

[Faint handwritten mark]

PMB 301 FOOD MICROBIAL TECHNOLOGY						
SEMESTER III Theory 2019-2020						
Month	Week	Unit	Sub.U nit	Detailed Topic	No. of Periods	Total
June	1	1	A	Introduction to Fermented foods	1	1
			A i	Microbial Product of Milk	1	2
			A ii	Microbiology of Cheese	1	3
			A iii	Microbiology of Butter	1	4
June	2		A iv	Microbiology of Yogurt	1	5
			A v	Microbiology of Bread.	1	6
			A vi	Microbiology Saurkraut	1	7
			A vii	Microbiology of Idly.	1	8
July	3		B	Microbial Spoilage of Foods.	1	9
			B i	Factors Influencing the Spoilage.	2	11
			B ii	Food safety issues	1	12
			C	Food Preservation Methods.	3	15
July	4		D	Health aspects of fermented foods	1	16
		2	A	Diary Microbiology.	1	17
			Ai	Types of Microbes In Milk	2	19
July	5		Aii	Significance of Microbes in Milk	1	20
			Aiii	Microbial examination of milk	3	23
Aug	6/7		Aiv	Control of Microbial Flora of Milk.	2	25
			B	Microbes & Animal Interaction.	1	26
			Bi	Rumen Microbiology.	3	29
			C	Production of silage	2	31
			Ci	Importance of silage	1	32
Aug	8	3	A	Probiotics, prebiotics, synbiotics	1	33
			Ai	Probiotics properties	3	36
Aug	9		Aii	Beneficial effects of probiotics	2	38
			Aiii	Screening methods of probiotics	2	40
Sep	10		Aiv	Genetically modified probiotics	1	41
			B	Edible mushrooms	1	42
			Bi	Therapeutic value of mushrooms	2	44
Sep	11		Bii	Cultivation of mushrooms	4	48
Oct	12	4	A	Bacterial examination of fresh foods	1	49
			Ai	Bacterial examination of canned food	1	50
			B	Food borne infections-Intro	1	51
Oct	13/14		Bi	Food intoxication	1	53
			Biii	Food poisoning	1	54
			Biv	Risks and hazards	1	55
			C	Mycotoxins	1	56
Nov	15		Ci	Effect on human health	1	57
			D	Detoxification methods	1	58
			E	Mechanism of toxicity	2	60

Handwritten signature

FOOD MICROBIAL TECHNOLOGY-PRACTICALS					
SEMESTER-III 2019-2020					
PMB 351					
Month	Week	S.No	Experiment	No.of periods.	Total
JUNE	1/2	1	Microbiological examination of fresh & Canned foods & Mushrooms.	8	8
JULY	3	2	Microbial examination of spoilage foods and fruits	4	12
JULY	4	3	Microbiological examination of milk & milk products.	4	16
JULY	5	4	Microbiological quality testing of milk (MBRT test).	4	20
AUG	6/7	5	Isolation & cultivation of anaerobes from rumen & termites.	8	28
AUG	8	6	Isolation of probiotics-LAB	4	32
AUG	9	7	Isolation of probiotic-Yeast	4	36
SEPT	10/11	8	Production of mushrooms	8	44
OCT	12	9	Screening of probiotic organisms	4	48
OCT	13	10	Production of probiotic biomass	4	52
NOV	14/15	11	Isolation & analysis of mycotoxins.	8	60

Handwritten signature

Handwritten signature

PMB 302 MEDICAL BACTERIOLOGY THEORY
SEMESTER III (2019-2020)

Month	Week	Unit	Sub.Unit	Detailed Topic	Periods	Total
June	1	1	A	Principles of Medical Microbiology : Classification of Medically important Microbes.	4	4
June	2	1	B I	Normal flora of Human Body-Origin of Normal Flora, Role of the Resident Flora , Effect of Antimicrobial agents on Normal Flora, Characteristics of Normal Flora.	4	8
July	3		B ii	Distribution & Occurrence of Normal Flora-Skin, Conjunctiva, Nose, Nasopharynx, Sinuses, Mouth, Upper Respiratory Tract, Urogenital Tract.	4	12
July	4		B iii	Bacteria in Blood & Tissues, Factors Influencing Normal Flora.	4	16
July	5	2	A	Properties of Pathogenic Microbes .	2	18
			B	Factors That Influence Pathogenicity		
			C I	Types of Infections	2	20
			C ii	Source of Infection		
			C iii	Different modes / Means of Infection.		
July	6		D	Diagnostic Microbiology- Types of specimen, specimen collection , Transportation of specimen, Processing, Laboratory investigation, Specific Laboratory test, Non-specific Laboratory test, Diagnosis & Report.	4	24
August	7		E	Use of animals in Diagnostic Microbiology.	2	26
		3	A	Systemic bacteriology: Detailed study of Morphology , Cultural Characteristics, Antigenic structure, Pathogenesis, Diagnostic lab tests, Epidemiology, Prevention & Treatment of the following Bacterial Pathogens.	2	28
August	8		B	Bacterial Air Borne Infection:		
			B I	β - Hemolytic Streptococci	2	30
			B ii	Pneumococci	1	31
Aug	9		B iii	Corynebacterium diptheriae	1	32
			B iv	Mycobacterium tuberculosis	3	35
Aug	10		B v	Mycobacterium leprae	1	36
			B vi	Neisseria meningitidis.	1	37
Aug	11		B vii	Hemophilus influenzae.	2	39
			C	Sexually transmitted diseases caused by bacteria;	2	41



Sep	12		C I	Treponema pallidum	2	43
			C ii	Neisseria gonorrhoea	2	45
		4	A	Systemic bacteriology: Detailed study of Morphology , Cultural Characteristics, Antigenic structure, Pathogenesis, Diagnostic lab tests, Epidemiology, Prevention & Treatment of the following Bacterial Pathogens.		
SEP	13		B	Water Borne Infections:	1	46
			B I	E.coli	1	47
			B ii	Salmonella typhi	2	49
OCT	14		B iii	Shigella dysenteriae	1	50
			B iv	Vibrio cholera	2	52
			C	Wound Infections	1	53
NOV	15		C I	Staphylococcus aureus	2	55
			C ii	Clostridium tetani	2	57
			C iii	Clostridium welchii	2	59
			C iv	Pseudomonas	1	60

[Handwritten signature]

Medical Bacteriology - Practicals
SEMESTER III (2019-2020)
PMB 352

Month	Week	S.No.	Experiments	No. of classes	Total periods
June	1	1	Preparation of different types of culture media/observation	4	4
			Types of culture media.		
			*Blood Agar, Chocolate agar		
			*Mannitol salt agar.		
			*Baired parker media.		
June	2		*MacConkey agar.	4	8
			*Lowenjein.		
			*Jensen media.		
			*Wilson & Blair bismuth sulphite media		
July	3		*Biochemical media.	4	12
July	4	2	Staining technique		
July	5		*Gram staining	4	16
July	6		*A F B staining	8	24
August	7		*Albert staining	4	28
August	8		*Capsular staining	4	32
August	9&10	3	pathogenic bacteria by microscopic, macroscopic, biochemical, enzymatic & serological tests (coagulase, catalase,	8	40
Sept	11,12	4	Bacteriological examination of different specimens from patients for diagnosis.	8	48
September	13		*Urine	4	52
Oct	14		*Pus/Throat Swab	4	56
Nov	15		PCR demonstration -Diagnosis	4	60



M.Sc.(FINAL) SEMESTER MICROBIOLOGY (CBCS)

PAPER II PMB (A)303 MICROBIAL BIOTECHNOLOGY (DSE (A) :ELECTIVE -1) (4 HPW-4 CREDITS)

ACADEMIC YEAR -2019-2020

Month	Week	Unit No	Sub Unit	Topic	No. of Periods	Total
JUNE	1	1	A	Introduction to Industrial Microbiology		
				Definition ,Scope and History	1	1
				Properties of Industrial Microorganisms Industrial Products	1	2
			B	Screening for microbes of Industrial importance		
				Primary Screening- Screening for Amylase Organic acid , Antibiotic, Amino acid & Vitamin producing Microorganisms..	1	3
				Secondary Screening	1	4
JUNE	2			Further evaluation of Primary isolates.	1	5
			C	Detection and assay of Fermentation Products		
				Physico chemical methods &	1	6
				Biological assay	1	7
			D	Fermentation equipment and its use.		
				Design of Fermentor	1	8
JULY	3			Types of Fermentor	1	9
				Agitation	1	10
				Aeration	1	11
				Antifoam	1	12
				pH and temperature control.	1	13
JULY	4		E	Strain development : strategies Environmental factors for improvement	1	14
				Genetic factors for improvement	1	15
JULY	5	2	A	Inoculum media AND Inoculum preparation	2	17
			B	Raw materials	2	19
			C	Solid state Fermentation Surface Fermentation	2	21
				Fermentation media & Sterilization.	1	22
JULY	6		D	Types of Fermentation Processes:		
				Solid State, Surface and Submerged Fermentations.	2	24
AUGUST	7			Batch , Fed- batch and Continuous Fermentations.	2	26
T						

				Direct, Dual or multiple Fermentation		
				Scale up of fermentations		
AUGUS	8			Product recovery methods.	2	28
			E	Fermentation type reactions :		
				Alcoholic Type	1	29
				Lactic Acid Type	1	30
AUGUS	9	3	A	Fermentative production and down stream processing of Citric acid.	2	32
			B	Fermentative production and down stream processing of Vitamin B12.	2	34
AUGUS	10		C	Fermentative production and down stream processing of Glutamic acid.	2	36
			D	Comercial production of Benzyl Penicillin, Semisynthetic penicillins.	2	38
AUGUS	11		E	Comercial production of Tetracyclines.	2	40
				Fermentative production of Beer-Medium components, Malt, Malt adjuncts, Hops Water.	1	41
				Preparation of Wort , mashing, Wort boiling, Microorganisms, Inoculum preparation Fermentation, Cold Storage maturationn, Carbonation, Packing & preservation.	1	42
SEPTE	12		F	Principles of Wine making -Fruit Selection, Picking, Crushing, Sulphite addition, Pressing, Fermentation ,Aging & Botling.	3	45
		4	A	Production & applications of Microbial enzymes- Amylases & Proteases, Uses.	3	48
SEPT	13		B	Steroid Bio- transformations .Substrates, Typical Structure, Microbes, Inoculum Preparation, 11-Hydroxylation, Process & Recovery.	3	51
oct	14		C	Microbial Bio-Pesticides.	3	54
NOV	15		D	Microbial Products from Genetically Modified (cloned) organisms Ex: Insulin.	3	57
			E	Immobilization methods :	3	60
				Advantages and disadvantages		
				Adsorption		
				Covalent linkage		
				Cross linkages		
				Entrapment		

Handwritten signature

M.Sc.(FINAL) III SEMESTER-MICROBIOLOGY

2019-2020

PMB: 352 APPLIED MICROBIOLOGY (Practicals)

Month	Week	Experiments	No. of Periods	Total
JUNE	1&2	Screening for Amylase producing organisms	8	8
JULY	3&4	Isolation of Antibiotic producing organisms by crowded plate technique	8	16
JULY	5&6	Screening for Organic acid producing organisms	4	20
AUG	7	Isolation & Culturing of Yeasts .	4	24
AUG	8	Seperation of amino acids by chromatography	4	28
AUG	9	Estimation of glucose by DNS method	4	32
AUG/SEPT	10,11&12	Estimation of Ethanol by Dichromate method	12	44
SEPT/OCT	13	Estimation of maltose	4	48
OCT/NOV	14&15	Immobilisation of microbial cells by Entrapment method.	12	60



Microbial Ecology and Plant Microbe Interaction					
PMB 304 DSE-A					
Semester III 2019-2020					
Month	Week	Unit	Detailed Topic	No. of Periods	Total
June	1	1	Microbial Ecology:		
			Concept of habitat and niche	4	4
			Concept of population and community		
			Development of microbial communities		
June	2		Microbial growth curve representing r and k reproductive	4	8
			Planktonic growth and Biofilm formation		
			Concept of plant probiotics (Seed endophytes and plant endophytes).		
July	3		Microbial communities of spermosphere, rhizosphere,	4	12
			Microbial community diversity analysis:		
			Phylogenetic based approach (16s rRNA, Internal transcribed region),		
July	4		Taxon based approach (gene diversity index, Shannon's diversity index),	4	16
			Sequence based approach (Pyrosequencing, NGS).		
		2	Plant growth promoting microorganisms (PGPM):		
July	5		Plant growth promoting rhizobacteria	4	20
			Direct and Indirect mechanisms of plant growth promotion		
July	6		Microbial formulations (peat, lignite, talc) and mode of inoculation in soil conditions.	4	24
			Detection of microbial inoculants by staining, biochemical and molecular methods.		
August	7		Plant-microbe beneficial interactions	4	28
			Pseudomonas-Plant Interaction and		
			and Bacillus Plant Interactions		

			Trichoderma-Plant Interactions.		
Aug	8		Role of biotic and abiotic factors in plant- microbe interactions	4	32
		3	Plant Pathology and pests		
Aug	9		Introduction to Phytiatary science and its importance	4	36
			Plant Disease Triangle		
Aug	10		Diseases caused by fungi: <i>Sclerotium rolfsii</i> and <i>Macrophomina phaseolina</i> (collar rot disease, charcoal rot),	4	38
			bacteria: <i>Xanthomonas campestris</i> (black rot), actinomycetes: <i>Streptomyces scabies</i> (common scab).		
Aug	11		Infections caused by pest: <i>Helicoverpa armigera</i> and	4	42
Sep	12		Biological and chemical control methods for plant diseases and pest management.	4	46
		4	Molecular plant microbe-interactions		
Sep	13		Impact of root-beneficial microbe interactions on aboveground plant phenotypic plasticity	4	50
Sep	14		Two-component signal transduction system (Gac S and Gac A) in plant growth promoting bacteria	2	52
			Cell signaling and Quorum sensing in		
			Gram negative bacteria, acylated homoserine lactones (AHLs),	2	54
			Gram positive bacteria (peptides), yeast (Farnesols), Fungi (Oxylipins).	2	56
			Intra and inter species communication, Inter-kingdom signaling.		
			Host-pathogen interactions.		
Sep	15		Basic concept of plant immunity (MAMPs, PAMPs).	2	58
Oct/Nov			Plant defense mechanisms (induced systemic resistance (ISR); systemic acquired resistance (SAR).	2	60

Microbial Ecology and Plant Microbe Interactions - Practicals					
			PMB 353		
			Semester -III	2019-2020	
Month	Week	EXP.NO	Detailed Topic	No. of Periods	Total
June	1	1	Isolation of plant growth promoting bacteria (PGPB) from soil, compost, vermicompost	4	4
June	2	2	Screening PGPB for nitrogen fixation, P-solubilisation, Siderophore production on selective medium	4	8
July	3	3	Isolation of Pseudomonas on Kings B medium and microscopic identification	4	12
July	4	4	Isolation of Actinomycetes on selective medium and microscopic identification	4	16
July	5	5	Isolation of Trichoderma on selective medium and microscopic identification	4	20
July	6	6	Isolation of bacteria with ability to produce plant growth hormone Indole acetic acid (IAA)	4	24
August	7	7	Quantification of IAA by spectrophotometric method	4	28
August	8	8	Quantification of phosphate by spectrophotometric method	4	32
August	9	9	Isolation of antagonistic microbes using dual-culture method	4	36
August	10	10	Pseudomonas and its metabolites for anti-fungal activity	4	40
Sept	11	11	Bacillus and its metabolites for anti-fungal activity	4	44
Oct	12	12	Trichoderma and its metabolites for anti-fungal activity	4	48
Oct	13	13	Isolation of plant pathogenic fungi <i>S. rolfsi</i> , <i>Fusarium</i> spp. etc. on specific media	4	52
Nov	14&15	14	Detection of QS compounds in Bacteria.	8	60



M.Sc. III Semester Microbiology (CBCS) 2019-2020

Microbiological Quality Control and Quality Assurance in Food & Pharma Industry

PMB 305B SEC

ACADEMIC YEAR 2019-2020

Month	Week	Unit No	Sub Unit	Topic	No. of Periods	Total
JUN	1& 2	1	1	Concept of Good Manufacturing Practices (GMP), Good Laboratory Practices (GLP) and Standard Operating Practices (SOP)	4	4
JULY	3&4		2	Overview of Quality Control (QC) in fermentation processes: Principles of validation for Food and pharmaceutical industry	4	8
AUG	5&6		3	Tests used for quality assurance (QA) of finished product.	4	12
AUG	7&8			Microbial Standards for Different Foods and Water – BIS standards for common foods and drinking water.	4	16
SEPT	9&10	2	4	Culture and microscopic methods - Standard plate count, Most probable numbers, Direct microscopic counts, Limulus lysate test for Endotoxin detection, gel diffusion, sterility testing for pharmaceutical products.	4	20
SEPT	11		5	Enrichment culture technique, Detection of specific microorganisms on selective media like XLD agar, Mannitol salt agar, EMB agar, McConkey Agar, Sabouraud Agar.	2	22
OCT	12&13		6	Microbial quality testing of milk by MBRT, DMC and Plat form tests like COB, 10 min Resazurin assay .	4	26
OCT/N OV	14&15		7&8	Microbial quality testing of water by coliform test, Pathogen detection in water samples.	4	30

CELL AND MOLECULAR BIOTECHNOLOGY THEORY						
		PMB 401				
SEMESTER IV			2019-2020			
Month	Week	Unit	Sub.Unit	Detailed Topic	No.Of Periods	Total
Nov	1	1	a	Cell cycle: Cell division regulation and cancer	4	4
			b	Role of protein Kinases in cell cycle		
Nov	2		d	Programmed cell death	4	8
			e	Geno toxicity assays.		
Dec	3		f	Signal transduction : G- Protein linked receptors	4	12
			g	Concept of second messenger, cAMP & cGMP.		
Dec	4		h	Steroid/peptide hormone regulation	4	16
			i	tissue specific regulation		
			j	Protein folding and the roles of Molecular chaperones.		
Dec	5	2	a	Vectors in Molecular Biology	4	20
			b	Artificial chromosomes		
			c	Enzymes		
			d	Polymerase chain reaction	2	22
Dec	6		e	DNA/Protein sequencing	2	24
			f	rRNA/ Genomic/ c DNA Library construction and screening.	2	26
Dec	7		g	Cloning Techniques: cloning in <i>E-coli</i>	2	28
			h	Cloning in <i>Bacillus subtilis</i>	2	30
Jan	8		i	Cloning in Yeast	2	32
Jan	9		j	promoters, Vectors, cloning strategy, Transformation, Selection, Expression and detection of cloned genes.	4	36
		3	a	Production of recombinant antibodies,	2	38
			b	Protein-protein and protein-DNA interactions		
Jan	10		c	Biochips (DNA chips and Protein chips)	2	40
			d	Pharmacogenomics		
			e	Molecular diagnostics		
			f	DNA markers: rRNA		
Jan	11		g	Molecular hybridization	4	44

Adhe

			h	RAPD, AP-PCR, DAF AFLP and analysis		
			i	Simple sequence repeat markers		
			j	DNA fingerprinting		
Jan	12		k	Gene knock out – RNAi and Gene silencing,	4	48
			l	Gene therapy		
			m	Metagenomics.		
Feb	13	4	a	Bioinformatics -Databases,	4	52
			b	Primer Design		
Feb	14		c	finding and multiple sequence alignment	4	56
			d	Protein structure analysis-Modeling.		
			e	Protein engineering and drugs design		
Mar/ Apr	15		f	Rational of protein engineering, steps involved in protein engineering and drug design.	4	60

[Handwritten signature]

Semester-IV Cell and Molecular Biotechnology AY 2019-2020.**PMB 451**

Month	Week	Expt.No.	Experiment	No of periods	Total
November	1,2 & 3	1,2,3	Isolation of DNA ,RNA and protein from bacteria	12	12
December	4	4	Restriction Mapping.	4	16
December	5	5	PCR Technique - Demonstration.	4	20
December	6		Gene cloning in bacteria - Demonstration	4	24
December	7	6	Southern Transfer.- Demonstration.	4	28
January	8	7	Demonstration of RFLP	4	32
January	9	8	Recombinant confirmation (gel shift assays,blue white seletion)	4	36
January	10	9	Separation of Proteins by Column Chromatography	4	40
January	11	9& 10	Data base searching ,BLAST & MSA	4	44
February	12 & 13	11	Primer design	8	52
March.	14& 15	12& 13	Protein Modeling	8	60

MEDICAL VIROLOGY & PARASITOLOGY THEORY

SEMESTER IV 2019-2020, PMB-402

Month	Week	Unit	Sub.Uni	Detailed Topic	No.of Periods	Total
NOV	1	1	A	Diagnostic Virology	1	1
			A1	Cultivation of Pathogenic Viruses in lab ,Animals & Tissue culture,	1	2
NOV	2		A2	Identification of pathogenic Viruses & establishment of Viral etiology	3	5
			B	Air Borne Viral Infections (detailed study)	1	6
			B I	Influenza virus	2	8
DEC	3		B ii	Rhino virus	1	9
			B iii	Rubella virus	1	10
DEC	4		B iv	Adeno virus (type 2)	1	11
			B v	Mumps virus	2	13
			B vii	Measles virus.	2	15
DEC	5	2	A	Detailed study of Viruses transmitted by Water	2	17
			A I	Hepatitis (HAV)	2	19
DEC	6		A ii	Polio myelitis	3	22
			B	Detailed study of Viruses transmitted by Zoonosis	2	24
DEC	7		B I	Rabies	4	28
JAN	8		B ii	Japanese encephalitis.	2	30
		3	A	Detailed study of Contact & Sexually transmitted Viral Diseases:	2	32
JAN	9		A I	Small pox	2	34
			A ii	Herpes (Herpes simplex Virus)	3	37
JAN	10		Bii	Hepatitis Viruses & their Diseases.	4	41
JAN	11		Bii	Acquired Immunodeficiency Syndrome (AIDS).	4	45
JAN	12	4	A	Detailed study of Parasitic Diseases	1	46
			Ai	Malaria, Trichomonas	2	48
			A ii	Amoebiasis	1	49
FEB	13		B	Helmentheic infections	1	50
			Bii	Round worm	1	51
			Bii	Hook worm	1	52
FEB	14		C	Medical Mycology	3	55
MAR	15		Ci	Dermatomycosis	3	58
MAR			Cii	Systemic mycosis	2	60

Adha

Medical Virology & Parasitology
Nanobiotechnology
SEMESTER - IV 2019-2020
Practicals
PMB 452

MONTH	Week	Experiment	No.of Periods	Total
NOV	1,2	Tissue culture techniques (demonstration), Microscopic studies of viruses infected materials (demonstration)	8	8
NOV/DEC	3,4	Examination of pathogenic fungi, Examination of stool for Hookworm, Round worm, Examination of stool for Entamoeba histolytica	8	16
DEC	5,6	Examination of blood smear by Leishman stain for Malarial parasites, Immunodiagnosis - Tridot test for HIV, Hepstic test for HBV, ELISA.	8	24
DEC/JAN	7,8	Chemical Synthesis of Nano Biomaterials, Microbiological Synthesis of Nano Biomaterials	8	32
JAN	9,10	Green synthesis of metal nanoparticles - Copper, Zinc and Silver using plants extracts	8	40
JAN/Feb	11,12	Characterization of Nanoparticles by UV spectrometry, SEM Analysis of nanoparticles	8	48
FEB/Max	13,14,15	Antimicrobial effect of Ionic silver and Nanosilver prepared by above methods.	12	60

[Handwritten Signature]

BIOINFORMATICS
PMB-403 DSE-B; Paper-III; SEMESTER IV - 2019-2020

Month	Week	Unit	Detailed Topic	Periods	Total
		1	Bioinformatics and genomics		
NOV	1		Introduction to Bioinformatics and Molecular Databases	2	2
NOV	2		Primary Databanks – NCBI, EMBL, DDBJ; Secondary Databases – UNIPROT; Structural Database –PDB	2	4
DEC	3&4		Database similarity search (FastA, BLAST); Alignment: Pairwise and Multiple sequence alignment, Phylogenetics analysis and Tree construction	3	7
	4&5		Genomics and whole genome sequencing	2	9
DEC	5&6		HGP, Genome Annotation and Gene Prediction	2	11
DEC	6&7		Primer Designing	2	13
JAN	7&8		SNPs, WGA (WGS) (Whole genome analysis and whole genome studies)	2	15
		2	Transcriptomics and proteomics		
	9		Transcriptomics and sequencing a transcriptome, microarr	3	18
	10		ENCODE	1	19
JAN	10&11		Proteomics and sequencing a proteome	2	21
JAN	11&12		Protein folding <i>in vivo</i> and the roles of Molecular chaperones	2	23
FEB	12&13		Protein Sequence Analysis; Approaches for Protein Structure Prediction (folding <i>in silico</i>)-Homology modeling of protein; Energy Minimization Methods; Active site identification	3	26
FEB	14		Protein engineering	2	28
MAR	15		Structure Based Drug Design and Ligand-based drug Design; Docking studies	2	30



M.Sc. (Final) IV Semester Microbiology (CBCS)
Paper IV PMB 404 Nanobiotechnology (Theory)-CBCS
(4 HPW-4Credits) 2019-2020

Month	Week	Unit	Topic	No.of periods	Total
		I	Basic concepts of Nanobiotechnology		
NOV	1	1	Nanobiotechnology-Introduction	1	1
	1	2	Development of nanobiotechnology	2	3
NOV	1,2	3	Nanoparticles -Origin and their classification, Nanoscale systems	3	6
NOV	2,3	4	Nano structures-Carbon nanotubes, quantum dots,Semiconductor nano particles, metal based nanostructures, nanowires- polymerbased nanostructures, gold nanostructres.	4	10
NOV/DEC	3,4	5	Protein based Nanostructures: Nanomotors-Bacterial E.coli, Mammalian myocin family	3	13
DEC	4	6	Properties of nanomaterials	2	15
		II	Synthesis and Characterization		
DEC	4,5	1	Synthesis of nanostructures – physical, chemical and biological	2	17
DEC	5	2	Methods of biological synthesis- Use of plants, bacteria,algae, fungi, actinomycetes for nanoparticle synthesis.	3	20
		3	Characterization techniques for nanaomaterials		
			Optical- UV–Visible spectroscopy, X-ray diffraction		
DEC	6,7		Imaging and Size- Scanning Electron Microscope (SEM), Transmission,Electron Microscopy (TEM), Atomic Fluorescence Microscopy (AFM),STEM	5	25
		4	Surface and composition-ECSA,EDAX		
DEC/JAN	7,8		Vibrational analysis- FTIR Spectroscopic analysis, SERS , Magnetic, electrical and electrochemical	5	30
		III	Environmental Nanotechnology		
JAN	8	1	Nano fibres and nanobiocides in water purification, Nanomembranes in Sea desalination.	2	32
JAN	9	2	DNA based biosensors for heavy metal complexing with DNA, Use of these in water and food sample analysis.	3	35
JAN	9,10	3	Biosensors: different classes –molecular recognition elements and Transducing elements.	3	38
	10	4	Miniaturized devices in nanobiotechnology –Types and applications	2	40



	11	5	Nanobiotechnological applications in Environmental Bioremediation	2	42
JAN	11,12	6	Environmental implication of nanomaterials – Occurrences, Fate and Characterization of Nanomaterials in the environment	3	45
		IV	Nanotechnology in Pharma and Medicine		
JAN	12	1	Applications of Nanostructures in drug discovery , drug delivery and its controlled release	3	48
FEB	13	2	Studies on Nanoparticles for antimicrobial properties	1	49
	13	3	Nanostructures in cancer research and therapy	3	52
FEB	14		Nanotechnology for tissue engineering- Use of synthetic nanocomposites for bone, teeth replacement	2	54
MAR	14,15	4	Diseased tissue destruction using nanoparticles	3	57
MAR	15	5	Cytotoxicity and genotoxicity of Nanoparticles	3	60

Handwritten signature

MICROBIOLOGY AND HUMAN HEALTH
PMB-403 GE-A; PAPER III; SEMESTER IV - 2019-2020

Month	Week	Unit	Detailed Topic	No. of Periods	Total
NOV	1	1	Health and hygiene	2	2
DEC	2		Bacterial, Viral, fungal, Parasitic.	2	4
	3		Normal flora of human body and its significance.	2	6
	4,5		Infection: Types of Infections, Sources of infections, Mode of infections.	4	10
	6,7		Concept of Immunity, Immunization, Vaccines and vaccination schedule.	3	13
JAN	8		Prevention, control and treatment of infectious diseases.	2	15
	9	2	Food and water borne Infections	2	17
Feb	10		Air borne Infections	2	19
	11		Zoonotic Infections	2	21
Mar	12		Contact/sexually transmitted Infections	2	23
	13,14		Nosocomial Infections	4	27
Apr	15		Insectborne Infections	3	30

