

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 organells		
			C i	Bacterial endospore structure	1	13
Aug	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
			C i	prototrophs		
			C ii	auxotrophs		
			C iii	prototrophic (minimal med)		
			C iv	complex media (undefined media)		
			D	Cultivation of		
				Bacteria		

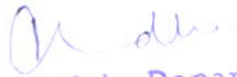


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				Fungi		
				Algae	2	26
			E	Routine and special culture methods	2	28
				Agar slant		
				Agar stab		
				Agar plate		
				Rolled tube		
				Test tube, Flask,		
Sept	7		F	Aerobic and Anaerobic	1	29
			G	Isolation of pure cultures		
				Preservation 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.		
Sept	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		



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				The concept of growth and definition, formation of protoplasm		
				, building of macromolecules from elemental nutrients		
				supramolecules	5	50
				organelles 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


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GENERAL MICROBIOLOGY PRACTICALS

SEMESTER I (2017)

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



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M.Sc. (Previous) I Semester Microbiology (CBCS) 2017

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
	2&3		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
	4		General idea about cyanophages, actinophages and mycophages.	2	13
			Metagenomics for virus characterization.	2	15
Aug/Septer	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
			Comparision of Lytic cycle and lysogeny cycle - Lambda	2	23
	6&7		T4 Bacteriophage,	2	25



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			Morphology, Ultrastructure, Genome organization and Replication strategies of Adenovirus	1	26
			Banana bunchy top virus	1	27
			Reovirus	1	28
	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
	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
	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
	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



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Virology Practicals


2017

Month	Week	Expt No.	Experiments	Classes	Total
August	1	1	Isolation of phage from soil samples using lab bacterial cultures Staphylococcus and Bacillus	4	4
	2	2	Isolation of Phage from sewage using Psuedomonas and E.coli as host.	4	8
	3	3	Cultivation and preservation of phages	4	12
	4	4	Quantitation of phages	4	16
September	5	5	Growth phases of phage and Burst size	4	20
	6	6	Phage induction	4	24
	7	7	Cultivation of animal viruses in egg,allantoic,amniotic,CAM	4	28
	8	8	Demonstration of cytopathological changes. Of animal viruses		
October	9	9	Symptomatic observations of plant viral infections.	4	32



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		Research Methodology			
		SEMESTER-I		2017	
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
	3&4		Electrophoretic techniques and a	3	14
			counter current distribution	1	15
		2	Separation methods:		
September	4&5		Chromatographic techniques -	2	17
			paper, thin layer	1	18
			ion exchange, gel filtration and a	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	1	25
			Radio isotopes		
			detection and measurement of radioactivity – scintillation counters, autoradiography	2	27
			Safety precautions		
			stable isotopes and their use	1	28
			General method of study of intermediary metabolism in microbes	1	29
	8		Uses of mutants in study of meta	1	30
		3	Biometry		
			Population, samples and sampling	1	31
			variables, variations and frequen	1	32
Oct	9		measures of central tendency and	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


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			Normal curve test, 't' test, 'F' test	2	40
	11		ANOVA, analysis of covariance	2	42
			Chi-square test, and confidence interval	2	44
Nov	12		Experimental designs using statistical methods	1	45
		4	Computers		
			Introduction to Windows	2	47
			Word Processing	1	48
Nov	13		Electronic Spread Sheet	1	49
			Data collection, Data representation	3	52
Nov	14		Manuscript preparation	2	54
			Research ethics	1	55
Nov	14&15		QA, QC	2	57
			GLP, GMP	2	59
			Patents & IPR	1	60



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I Semester Paper II MB152 Research Methodology and techniques (Practicals) CBCS
SEMESTER I **2017**

Month	Week	Expt. No	Experiment	No. of Period	Total
Aug	1	1	Creating documents using word processor	4	4
	2	2	Usage of spread sheet to biological applications	4	8
	3	3	Biological data analysis using software	4	12
	4	4	Absorption maxima of proteins, NA, Aromatic aa and riboflavin(Determination of molar extinction coefficient ,calculations based on	4	16
Sep	5	5	Estimation of inorganic and organic phosphate by Fiske -Subbarow method	4	20
	6	6	Estimation of protein concentration by UV-Vis spectrophotometry and Folin Lowry method.	4	24
	7	7	Differential centrifugation	4	28
	8	8	Paper chromatography of amino acids	4	32
Oct	9	9	Dialysis for desalting of proteins	4	36
	10	10	Demonstration of Gel filtration technique	4	40
	11	11	Demonstration of electrophoresis of proteins an	4	44



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BIOCHEMISTRY THEORY

SEMESTER-I


Paper IV Biochemistry (Theory) CBCS restructured PMB 2017

Month	week	Unit	Detailed Topic	No of Periods
August	1	1	pH & its biological relevance. Determination of pH	2
			preparation of buffers Types of Buffers	2
	2		Concept of entropy, free-energy, free energy changes High energy compounds	2 1
			Equilibrium constraints	1
	3		Redox potentials Biological redox systems.	1 1
			Biological oxidation Biological redox carriers.	1 1
	4		Biological membranes Electron transport	1 2
			Oxidative phosphorylation & mechanism.	2
September	5		Lipid classification Bacterial lipids	2 2
			Prostaglandins: Structure & function.	1
			Major steroids of biological importance.	1
Sep	6	2	Carbohydrates: Classification basic chemical structure of monosaccharides	2
			aldoses & ketoses ,cyclic structure of monosaccharides.	
			stereoisomerism, anomers and epimers	2
			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
			Nucleic acids: *structure & properties of purines & pyrimidins.	2
			*nucleosides& nucleotides.	
			Metabolism of purines	
Sep	8		*biosynthesis & degradation of Pyrimidins	2



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			biosynthesis & degradation of Purines.	
		3	Proteins & Amino acids	
			*introduction	2
			*properties of amino acids	
Oct	9		Structure, conformation & properties of proteins	2
			Metabolism of amino acids	
Oct	9&10		Biosynthesis & degradation of amino acids -an overview	4
			Enzymes nomenclature, classification	2
Oct	11		Methods for determination of enzyme activity	2
			Isolation and purification of enzymes	
	11		Enzyme kinetics: Effect of pH, substrate concentration, temperature and inhibitors.	4
November	12	4	Mechanism of enzyme action – Action of Hydrolases, Oxidases and reductases	4
	13		Coenzyme catalysis(pyridoxal phosphate and TPP).	2
			Isoenzymes.	2
			Competitive and non-competitive inhibition	
	14		Methods for increased microbial enzymes production and activity.	2
	14& 15		Control of enzymes – Regulation of enzyme activity: allosteric enzymes and feed back mechanisms	4
			Metabolic compartmentalization in relation to enzyme,	
November	16		Enzymes and secondary metabolites	2


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BIOCHEMISTRY PRACTICALS

SEMESTER I

2017

I Semester Paper II MB 152 Biochemistry (Practicals) (CBCS)


Month	Week	Expt. No	Experiment	No. of	Total
August	1	1	Safety and good lab practice	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
	4	4	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
	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
	12	12	Effect of substrate concentration, pH, time & temperature on enzyme activity.	4	48
	13	13	Calculation of km for partially purified enzyme.	4	52
	14	14	Inhibition of enzyme activity.	4	56
			Record correction & certification		



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MOLECULAR BIOLOGY & MICROBIAL GENETICS THEORY
SEMESTER II Paper -I 201 2017

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 replication	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 Structure 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		
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		


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			A ii	Molecular Basis of Mutations.		
			A iii	Analysis of Mutations		
March	10		A iv	Site directed Mutagenesis & Reverse Genetics.	4	40
				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- defination	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 :	4	60
			C I	Transduction Phenomena		
			C ii	Methods of Transduction		
			C iii	Cotransduction		
April	16		C iv	Generalized, Specialed & Abortive Transduction.	2	62
			C v	Sex ductions .		



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Semester-II Molecular Biology and Microbial Genetics-2017


PMB-251

Month	Week	Expt.No	Experiment	No of periods	Total
December & January	1&2	1	Extraction of DNA of Genomic DNA from Bacteria and Yeast	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 Mutants.	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
March	14	11	Protoplast Preparation &	4	56




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ENVIRONMENTAL AND AGRICULTURAL MICROBIOLOGY THEORY					
SEMESTER II - 2017-18 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
			Aerobic sewage treatment	1	11
			Oxidation ponds, trickling filters	1	12
	4		Activated sludge treatment	1	13
			Anaerobic sewage treatment – Septic tank	2	15
	5	2	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
	7&8		Microorganisms and their roles in fundamental biogeochemical cycles.	4	30
		3	Degradation of carbonaceous materials in soil - Introduction	1	31
	9		Cellulose	2	33
			Hemicellulose	1	34
			Lignin	2	36
Mar.	10		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	46
			Asymbiotic nitrogen fixation	1	47
	13		Symbiotic nitrogen fixation	2	49
			Microbes involved in Nitrogen fixation	1	50
			Biochemistry of nitrogen fixation	1	51


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		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


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ENVIRONMENTAL AND AGRICULTURAL MICROBIOLOGY THE PRACTICALS

Sem II -2017-18, Paper-II, Code : PMB: 252

EXP NO	Month	Week	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		6	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

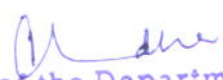

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M.Sc.(PREVIOUS) SEMESTER MICROBIOLOGY (CBCS)

PAPER IV PMB (A)303 PHARMACEUTICAL MICROBIOLOGY (4 HPW-4 CREDITS)

ACADEMIC YEAR 2017-2018

Month	Week	Unit	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	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
				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, nitrofurons	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 classification.		
				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



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				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,		
			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 importance		
				Assay for antibiotics – Determination of MIC, the liquid tube assay,		
				solid agar tube assay, agar plate assay (disc diffusion, agar well and		
				cylinders cup method).	3	57
APR	15		D	Introduction to pharmacokinetics and pharmacogenomics	3	60




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II SEMESTER PRACTICALS PAPER IV PMB 353					
IMMUNOLOGY AND PHARMACEUTICAL MICROBIOLOGY (CBCS) ACADEMIC YEAR 2017-2018					
EXP NO	Month	Week	Experiments	No. of Periods	Total
1	DEC	1	Agglutination reactions		
			– Widal	5	5
		2	VDRL,	5	10
	JAN		HA, Blood typing		
			tube method Precipitation test: Ring interphase,		
			single radial diffusion.	5	15
2		3	Ouchterlony double diffusion.	5	20
3	JAN		Immunoelectrophoresis	5	25
4		4	Neutralization test – Plaque neutralization, Haeme adsorption test.	5	30
5		5	WBC and RBC count and differential blood picture.	2	32
6	JAN	6	Separation of serum proteins.	3	35
7		7	Blot transfer and detection of protein on blot by staining	2	37
8		8	ELISA		
9		9	Purification of IgG from serum		
10		10	Lymphocyte culture, viable staining and haemocytometer count	3	40
11	JAN	11	Indirect agglutination (Pregnancy hCG Ag)	5	45
12		12	Sterility testing methods for pharmaceutical and cosmetic	5	50
13	FEB	13	Tests for disinfectants (Phenol coefficient/RWC)	5	55
14		14	Determination of antibacterial spectrum of drugs/antibiotics		
15	FEB	15	Chemical assays for antimicrobial drugs	5	60
16		16	Testing for antibiotic	5	65
			drug sensitivity/resistance	5	70
17		17	Determination of MIC valued for antimicrobial chemicals		
18		18	Microbiological assays for antibiotics		
	FEB		Liquid tube assay	5	80
		14	agar tube assay	2	55
	FEB		agar plate assays)	5	85
19	MARCH	19	Efficacy testing of preservatives like parabens	5	90


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IMMUNOLOGY
PMB-203 SEMESTER II - 2017-18

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 Immunizat	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


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	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



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III SEMESTER - 2017 - 18 .

PMB 301		FOOD MICROBIAL TECHNOLOGY				
SEMESTER III Theory 2017						
Month	Week	Unit	Sub.Unit	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
	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
	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
	4		D	Health aspects of fermented foods	1	16
July		2	A	Diary Microbiology.	1	17
			Ai	Types of Microbes In Milk	2	19
	5		Aii	Significance of Microbes in Milk	1	20
			Aiii	Microbial examination of milk	3	23
	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
	9		Aii	Beneficial effects of probiotics	2	38
			Aiii	Screening methods of probiotics	2	40
	10		Aiv	Genetically modified probiotics	1	41
			B	Edible mushrooms	1	42
			Bi	Therapeutic value of mushrooms	2	44
	11		Bii	Cultivation of mushrooms	4	48
	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
Sep	13/14		Bi	Food intoxication	1	53
			Biii	Food poisoning	1	54
			Biv	Risks and hazards	1	55
	15		C	Mycotoxins	1	56
			Ci	Effect on human health	1	57
			D	Detoxification methods	1	58
			E	Mechanism of toxicity	2	60



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FOOD MICROBIAL TECHNOLOGY-PRACTICALS

SEMESTER-III 2017

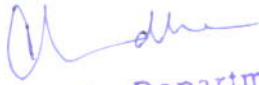
Month	Week	S.No	Experiment	No.of periods.	Total
JUNE	1/2	1	Microbiological examination of fresh & Canned foods& Mushrooms.	2	8
	3	2	Microbial examination of spoilage foods and fruits	1	12
	4	3	Microbiological examination of milk & milk products.	1	16
JULY	5	4	Microbiological quality testing of milk (MBRT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



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PMB 302 MEDICAL BACTERIOLOGY THEORY
SEMESTER III (2017)

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
June	3		B ii	Distribution & Occurrence of Normal Flora-Skin, Conjunctiva, Nose, Nasopharynx, Sinuses, Mouth, Upper Respiratory Tract, Urogenital Tract.	4	12
June	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
July	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
July	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


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Aug	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.		
Aug	13		B	Water Borne Infections:	1	46
			B I	E.coli	1	47
			B ii	Salmonella typhi	2	49
Sep	14		B iii	Shigella dysenteriae	1	50
			B iv	Vibrio cholera	2	52
			C	Wound Infections	1	53
Sep	15/16		C I	Staphylococcus aureus	2	55
			C ii	Clostridium tetani	2	57
			C iii	Clostridium welchii	2	59
			C iv	Pseudomonas	1	60

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Medical Microbiology - Practicals
SEMESTER III (2017)

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		
June	3		*Biochemical media.	4	12
June	4	2	Staining technique		
July	5		*Gram staining	4	16
July	6		*A F B staining	8	24
July	7		*Albert staining	4	28
July	8		*Capsular staining	4	32
August	9&10	3	pathogenic bacteria by microscopic, macroscopic, biochemical, enzymatic & serological tests (coagulase, catalase,	8	40
August	11,12	4	Bacteriological examination of different specimens from patients for diagnosis.	8	48
August	13		*Urine	4	52
September	14		*Pus/Throat Swab	4	56
September	15/16		PCR demonstration -Diagnosis	4	60



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

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


ACADEMIC YEAR 2017-2018

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
JUNE			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
	2			Further evaluation of Primary isolates.	1	5
JUNE			C	Detection and assay of Fermentation Products		
				Physico chemical methods & Biological assay	1	6
					1	7
JUNE			D	Fermentation equipment and its use.		
				Design of Fermentor	1	8
	3			Types of Fermentor	1	9
				Agitation	1	10
				Aeration	1	11
				Antifoam	1	12
				pH and temperature control.	1	13
	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
JULY			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:		



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				Solid State, Surface and Submerged Fermentations.	2	24
	7			Batch , Fed- batch and Contineous Fermentations.	2	26
				Direct, Dual or multiple Fermentation		
				Scale up of fermentations		
	8			Product recovery methods.	2	28
JULY			E	Fermentation type reactions :		
				Alcoholic Type	1	29
				Lactic Acid Type	1	30
AUGUST	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
	10		C	Fermentative production and down stream processing of Glutamic acid.	2	36
			D	Comercial production of Benzyl Penicillin, Semisynthetic penicillins.	2	38
	11		E	Comercial production of Tetracyclines.	2	40
AUGUST				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
AUGUST	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
AUG/SEPT	13		B	Steroid Bio- transformations .Substrates, Typical Structure, Microbes, Inoculum Preparation, 11-Hydroxylation, Process & Recovery.	3	51
SEPT	14		C	Microbial Bio-Pesticides.	3	54
SEPT	15		D	Microbial Products from Genetically Modified (cloned) organisms Ex: Insulin.	3	57


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M.Sc.(FINAL) III SEMESTER-MICROBIOLOGY
PMB:303 Microbial biotechnology (Practicals)

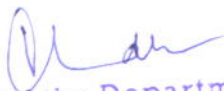
Month	Week	Experiments	No. of Periods	Total
JUNE	1&2	Screening for Amylase producing organisms	8	8
	3&4	Isolation of Antibiotic producing organisms by crowded plate technique	8	16
JULY	5&6	Screening for Organic acid producing organisms	4	20
	7	Isolation & Culturing of Yeasts .	4	24
	8	Seperation of amino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




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			Plant defense mechanisms (induced systemic resistance (ISR); systemic acquired resistance (SAR)).	4	64
	16				

Microbial Ecology and Plant Microbe Interaction					
304 Semester III 2017					
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		
	2		Microbial growth curve representing r and k reproductive strategies.	4	8
			Planktonic growth and Biofilm formation		
			Concept of plant probiotics (Seed endophytes and plant endophytes).		
	3		spermosphere, rhizosphere, phyllosphere.	4	12
			Microbial community diversity analysis:		
			Phylogenetic based approach (16s rRNA, Internal transcribed region),		
	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		
	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.		
	7		Plant-microbe beneficial interactions	4	28
			Pseudomonas-Plant Interaction and		


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			Trichoderma-Plant Interactions.		
	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		
	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).		
	11		Infections caused by pest: <i>Helicoverpa armigera</i> and <i>Spodoptera litura</i>	4	42
	12		Biological and chemical control methods for plant diseases and pest management.	4	46
		4	Molecular plant microbe-interactions		
	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.		
	15		Basic concept of plant immunity (MAMPs, PAMPs).	4	60
	16		Plant defense mechanisms (induced systemic resistance (ISR); systemic acquired resistance (SAR).	4	64


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Microbial Ecology and Plant Microbe Interactions - Practicals					
Semester -III					
Month	Week	Unit	Detailed Topic	2017	
				No. of Periods	Total
June	1	1	Isolation of plant growth promoting bacteria (PGPB) from soil, compost, vermicompost	4	4
	2	2	Screening PGPB for nitrogen fixation, P-solubilisation, Siderophore production on selective medium	4	8
	3	3	Isolation of Pseudomonas on Kings B medium and microscopic identification	4	12
	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
	6	6	Isolation of bacteria with ability to produce plant growth hormone Indole acetic acid (IAA)	4	24
	7	7	Quantification of IAA by spectrophotometric method	4	28
	8	8	Quantification of phosphate by spectrophotometric method	4	32
August	9	9	Isolation of antagonistic microbes using dual-culture method	4	36
	10	10	Pseudomonas and its metabolites for anti-fungal activity	4	40
	11	11	Bacillus and its metabolites for anti-fungal activity	4	44
	12	12	Trichoderma and its metabolites for anti-fungal activity	4	48
	13	13	Isolation of plant pathogenic fungi <i>S. rolfsii</i> , <i>Fusarium</i> spp. etc. on specific media	4	52
Septemb	14	14	Detection of QS compounds in Bacteria.	4	56



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Sc. III Semester Microbiology (CBCS) 2017

Quality Assurance in Food & Pharma Industry (Elective-I) (2 HPW-1Credits)

ACADEMIC YEAR 2017-2018						
Month	Week	Unit No	Sub Unit	Topic	No. of Periods	Total
JUNE/JULY	1&2	1	1	Concept of Good Manufacturing Practices (GMP), Good Laboratory Practices (GLP) and Standard Operating Practices (SOP)	4	4
JULY	3&4	1	2	Overview of Quality Control (QC) in fermentation processes: Principles of validation for Food and pharmaceutical industry	4	8
JULY	5&6	1	3	Tests used for quality assurance (QA) of finished product.	4	12
JULY/AUGUST	7&8	1		Microbial Standards for Different Foods and Water – BIS standards for common foods and drinking water.	3	15



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MICROBIAL BIOTECHNOLOGY THEORY

SEMESTER IV , PMB-401

2017-18

Month	Week	Unit	Detailed Topic	No.Of Periods	Total
NOV	1	1	Cell cycle: Cell division regulation and cancer	4	4
			Role of protein Kinases in cell cycle		
	2		Programmed cell death	4	8
			Geno toxicity assays.		
	3		Signal transduction : G- Protein linked receptors	4	12
			Concept of second messenger, cAMP & cGMP.		
DEC	4		Steroid/peptide hormone regulation	4	16
			tissue specific regulation		
			Cancer biology and genetics: role of oncogenes and tumor suppressor genes – examples, Myc, ras, src, p53, RB, BCR-Abl		
	5	2	Vectors in Molecular Biology	4	20
			Artificial chromosomes		
			Enzymes		
			Polymerase chain reaction	2	22
	6		DNA/Protein sequencing	2	24
			rRNA/ Genomic/ c DNA Library construction and screening.	2	26
	7		Cloning Techniques: cloning in <i>E-coli</i> and <i>tobacco</i>	2	28
			Cloning in Yeast and insects,	2	30
JAN	8		mammalian cells	2	32
			cloning strategy, Transformation, Selection, Expression and detection of cloned genes.	4	36
		3	Polymerase chain reaction and Quantitative real time PCR	2	38
			DNA fingerprinting and DNA markers: RAPD, RFLP, AFLP, Simple sequence repeat (SSR) markers.		
	10		Site directed mutagenesis	2	40
			Reverse Genetics		
			epigenetics		



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Sainikpuri, Secunderabad-500 084.

	11		Simple sequence repeat markers DNA fingerprinting	4	44
	12		Gene knock out – RNAi and Gene silencing,	4	48
FEB	13	4	Gene therapy : vectors, safety considerations (SCID	4	52
	14		Transgenic and knockout plants and animals – vectors, : i) Retroviral method ii) DNA microinjection method iii) Engineered Embryonic Stem cell method, selection, Bt cotton, Transgenic cattle, Transgenic birds, Transgenic fish, Transgenic mice	4	56
	15		Stem Cell Technology, Cloning techniques Applications	4	60
			Genome engineering (ZFNs, TALENs, CRISPR)		



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Semester-IV Cell and Molecular Biotechnology -2017-18.


Month	Week	Expt.No.	Experiment	No of weeks	Total
NOV	1	1	Isolation of DNA from bacteria	4	4
	2	2	Isolation of RNA from bacteria	4	8
	3	3	Isolation of protein from bacteria	4	12
December	4	4	Restriction Mapping.	4	16
	5	5	PCR Technique - Demonstration.	4	20
	6	5	Gene cloning in bacteria - Demonstration	12	32
	7	6	Southern Transfer.- Demonstration.	4	36
January	8	7	Demonstration of RFLP	4	40
	9	8	Recombinant confirmation (gel shift assays, blue white selection)	4	44
	10	9	Separation of Proteins by Column Chromatography	4	48
	11	9	Data base searching	4	52
February	12	10	BLAST and MSA	4	56
	13	11	Primer design and protein modeling	4	60



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MEDICAL VIROLOGY & PARASITOLOGY THEORY
SEMESTER IV 2017-2018, 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
NOV	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
FEB	15		Ci	Dermatomycosis	3	58
			Cii	Systemic mycosis	2	60


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Medical Virology & Parasitology.

SEMESTER - IV 2017-18

Practicals

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, Hepatic 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	11,12	Characterization of Nanoparticles by UV spectrometry, SEM Analysis of nanoparticles	8	48
FEB	13,14,15	Antimicrobial effect of Ionic silver and Nanosilver prepared by above methods.	12	60

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BIOINFORMATICS

PMB-403;Paper-III; SEMESTER IV - 2017-18

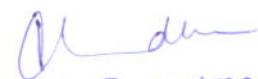
Month	Week	Unit	Detailed Topic	No. of Periods	Total
		1	Bioinformatics and genomics		
NOV	1		Introduction to Bioinformatics and Molecular Databases	2	2
	2		Primary Databanks – NCBI, EMBL, DDBJ; Secondary Databases – UNIPROT; Structural Database –PDB	2	4
NOV/DEC	3&4		Database similarity search (FastA, BLAST); Alignment: Pairwise and Multiple sequence alignment, Phylogenetics analysis and Tree construction	3	7
	4&5		Genomics and whole genome sequencing	2	9
	5&6		HGP, Genome Annotation and Gene Prediction	2	11
	6&7		Primer Designing	2	13
DEC/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, microarra	3	18
	10		ENCODE	1	19
	10&11		Proteomics and sequencing a proteome	2	21
	11&12		Protein folding <i>in vivo</i> and the roles of Molecular chaperones	2	23
JAN/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
	14		Protein engineering	2	28
	15		Structure Based Drug Design and Ligand-based drug Design; Docking studies	2	30




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

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
	1,2	3	Nanoparticles -Origin and their classification, Nanoscale systems	3	6
	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
	4	6	Properties of nanomaterials	2	15
		II	Synthesis and Characterization		
	4,5	1	Synthesis of nanostructures – physical, chemical and biological	2	17
	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		
	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		
	8	1	Nano fibres and nanobiocides in water purification, Nanomembranes in Sea desalination.	2	32
	9	2	DNA based biosensors for heavy metal complexing with DNA, Use of these in water and food sample analysis.	3	35
	9,10	3	Biosensors: different classes –molecular recognition elements and Transducing elements.	3	38


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	10	4	Miniaturized devices in nanobiotechnology –Types and applications	2	40
	11	5	Nanobiotechnological applications in Environmental Bioremediation	2	42
	11,12	6	Environmental implication of nanomaterials – Occurrences, Fate and Characterization of Nanomaterials in the environment	3	45
		IV	Nanotechnology in Pharma and Medicine		
	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
	14		Nanotechnology for tissue engineering- Use of synthetic nanocomposites for bone, teeth replacement	2	54
	14,15	4	Diseased tissue destruction using nanoparticles	3	57
	15	5	Cytotoxicity and genotoxicity of Nanoparticles	3	60


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