

DEPARTMENT OF MICROBIOLOGY

YADAVA COLLEGE

(An Autonomous co-educational Institution “Re-Accredited with “A” grade by NAAC”)

“Affiliated to Madurai Kamarajar University”

Govindrarajan campus, Thiruppali, Madurai-625014



MICROBIOLOGY

UNDERGRADUATE PROGRAMME

COURSE CONTENT (CBCS) 2018 onwards

SYLLABUS UNDER CBCS PATTERN (2018-2019)
B.Sc., MICROBIOLOGY - PROGRAMME STRUCTURE

Sem	Subject Code	Title of the Papers	Teaching Hours	Credit	Duration Of Examination	Internal	External	Total
First		Tamil	5	3	3	25	75	100
		English	5	3	3	25	75	100
	Core subject	General Microbiology	4	4	3	25	75	100
	Core subject	Practical –I General Microbiology	2	1	3	40	60	100
	Allied 1	General Chemistry	5	5	3	25	75	100
	Allied2	General Biology	5	5	3	25	75	100
		Environmental Studies	2	2	3	25	75	100
		Skill Based Elective (Communicative English)	2	2	3	25	75	100
		NSS/NCC/Physical Education	-	-	-	-	-	-

Second		Tamil	5	3	3	25	75	100
		English	5	3	3	25	75	100
	Core	Microbial Physiology and Metabolism	4	4	3	25	75	100
		Practical-II Microbial Physiology And Metabolism	2	1	3	40	60	100
	Allied 1	Organic Chemistry	3	3	3	25	75	100
		Practical-I Qualitative analysis of Organic compounds	2	1	3	40	60	100
	Allied 2	Cell Biology	3	3	3	25	75	100
		Biology Practical I(General and Cell Biology)	2	1	3	40	60	100
		Value Education	2	2	3	25	75	100
		Skilled Based Elective (Communicative English)	2	2	3	25	75	100
		NCC/NSS/Physical Education	-	-	-	-	-	-

Third		Tamil	5	3	3	25	75	100
		English	5	3	3	25	75	100
	Core	Molecular Biology and Microbial Genetics	4	4	3	25	75	100
	Core	Practical III(Lab in Molecular Biology and Microbial Genetics)	2	1	3	40	60	100
	Allied 1	Industrial Chemistry	5	5	3	25	75	100
	Allied 2	Genetics	5	4	3	25	75	100
		Non Major Elective (Mushroom Cultivation)	2	2	3	25	75	100
	R4ECE3	Skill Based Elective (Communicative English)	2	2	3	25	75	100
		NSS/NCC/Physical Education	-	-	-	-	-	-
		Self study papers-Plant tissue Culture		3		25	75	100

Fourth		Tamil	5	3	3	25	75	100
		English	5	3	3	25	75	100
	Core	Industrial Microbiology I	4	4	3	25	75	100
	Core	Practical -IV Lab in Industrial Microbiology	2	1	3	40	60	100
	Allied 1	Biophysical Chemistry	3	3	3	25	75	100
	Allied 1	Chemistry Practical-II	2	1	3	40	60	100
	Allied 2	Biostatistics	3	3	3	25	75	100
	Allied 2	Genetics and Biostatics (Biology practical - 2)	2	1	3	40	60	100
		Non Major Elective (Catering and Food Processing Technology)	2	2	3	25	75	100
		Skill Based Elective (Communicative English-4)	2	2	3	25	75	100
		NSS/NCC/Physical Education	-	-	-	-	-	
		Self study paper-Proteomics and Genetic Engineering		3		25	75	100

Fifth	Core subject	Medical Microbiology	5	3	3	25	75	100
	Core subject	Bioinformatics	5	4	3	25	75	100
	Core subject	Principles of Immunology	5	4	3	25	75	100
	Core subject	Biochemistry	5	4	3	25	75	100
	Core subject	practical-V Lab in Medical Microbiology and Immunology	4	2	3	40	60	100
	Core subject	practical-VI Lab in Biochemistry and Bioinformatics	4	1	3	40	60	100
		Skill Based Elective (Communicative English)	2	2	3	25	75	100
		NCC/NSS/Physical education	-	-	-	-	-	-
		Self study paper-Genetic Engineering		3		25	75	100

	Subject code	Title of the paper	Teaching hours	Credit	Duration of Examination	Internal	External	Total
Sixth	Core subject	Microbial Biotechnology	5	4	3	25	75	100
	Core subject	Environmental and Agricultural Microbiology	4	4	3	25	75	100
	Core subject	Food and dairy Microbiology	4	4	3	25	75	100
	Core subject	Industrial Microbiology II	4	4	3	25	75	100
	Core subject	Medical Lab Techniques	5	4	3	25	75	100
	Core subject	Practical -VII Lab in food and dairy, agricultural & environmental microbiology	3	1	3	40	60	100
	Core subject	Practical –VIII Lab In Medical Lab Techniques, Microbial Biotechnology & Industrial Microbiology	3	1	3	40	60	100
		Skill Based Elective (Communicative English)	2	2	3	25	75	100
		NSS/NCC/Physical Education	-	1	-	-	-	-
		Self study paper- Aquaculture		3		25	75	100
		TOTAL	180	140				5100

Paper-1

GENERAL MICROBIOLOGY

Semester: I

Hours/Week : 4

Sub. Code:

Credit : 4

OBJECTIVES

- To acquire knowledge about microbial world
- To obtain knowledge on the contribution of Scientists to Microbial world
- To acquire fundamental knowledge on the classification of microbes.
- To achieve knowledge on the structure of microorganisms
- To acquire knowledge on the factors that influence growth of microorganisms

UNIT I

Definition and scope of Microbiology, History – spontaneous generation – Biogenesis, Contribution of Louis Pasteur, Leewen Hoek, Lazaro Spallanzani, John Tyndall, Joseph Lister, Robert Koch, Edward Jenner & Alexander Fleming.

UNIT II

Microbial taxonomy, Binomial nomenclature, species concept Hackel's & Whittaker kingdoms, Principles of Classification – morphological, physiological, biochemical, numerical, and molecular taxonomy, Classification of bacteria according to Bergey's manual.

UNIT III

Characteristic features of Prokaryotes and Eukaryotes: Prokaryotes – structure and function of cell wall, plasma membrane, flagella, slime, S layer, capsule, pili, cytoplasmic inclusion bodies, spore. Eukaryotes – structure & function of Cell Wall, Plasma Membrane, Cilia, Nucleus, Mitochondria, Chloroplast, Lysosome, Endoplasmic reticulum and Golgi complex.

UNIT IV

Microscopy – simple, compound, light & dark microscopy, phase contrast, fluorescence and electron microscopy. Stains and Staining – principles of staining, types and classification of stains, definition of auxochrome, chromophores, Acidic and Basic dyes; Simple and differential staining: theories of staining, mordant and its function.

UNIT V

Media – Types and preparation – Sterilization – Principle and methods – dry heat, moist heat, filtration, radiation, antiseptics and disinfectants. Types - methods preservation.

REFERENCE:

1. Brock TD, Smith DW and Madigan NT, 1987, *Biology of Microorganisms* edn, Eniglewood Cliffs, NJ Prentice Hall K.
2. Dubey RC and Maheswari DK, 2012, *A text of Microbiology (Revised edition)*. S.Chand and Company Ltd., New Delhi.
3. Geeta Sumbali and Mehrotra RS, 2009, *Principles of Microbiology*. First edition, Tata Mc Graw Hill P.Ltd., New Delhi.
4. John L. Ingraham, Catherine A. Ingraham, 2000, *Introduction To Microbiology – Second Edition*. Published by Brooks/Cole.
5. Nester EW Roberts CV and Nester N7T, 1995, *Microbiology A Human Perspectives* Iowa USA.
6. Pelczar J. Chen ECS. Krieg NR, 1986 , *Microbiology*, MC Grow Hill Company.
7. Powar CB and Dagainawala H F 2005, *General Microbiology* volume 1 and 2. Eighth edition, Himalaya publishing house, Mumbai
8. Prescott, Harley, Klein, 2003, *Microbiology International Edition*, fifth Edition, Published by McGraw-Hill Education.
9. Stainer R Y. Ingraham JL Wheels ML. Painter PR, 1999, *General Microbiology* MacMillan Educational Ltd, London.
10. Tortora, Funke, Case., *Microbiology An Introduction*, twelfth Edition, Published by Pearson Education.

PRACTICAL – I

GENERAL MICROBIOLOGY

Semester: I

Hours/Week : 2

Sub. Code:

Credit : 1

1. Laboratory safety measures
2. Principles and applications of microbiology laboratory instruments (Microscope Autoclave, Laminar air flow, PH Meter, Incubator)
3. Preparation of media and sterilization techniques
4. Preparation of slant, stabs & plating techniques
5. Pure culture techniques – streak, spread & pour plate techniques
6. Motility of bacteria – hanging drop, soft agar methods
7. Enumeration of bacteria and fungi from environmental samples
8. Staining techniques – Simple, Gram's, Negative, Capsule & Spore staining.
9. Observation of permanent slides to study the structural characteristics of algae, fungi & protozoan.

REFERENCE:

1. Atlas R.M., A.E.Brown and L.C. Parks, Mosby, St. Louis , 1995, Laboratory Manual of Experimental Microbiology
2. Cappuccino J.G. and N. Sherman 2002, Microbiology: A Laboratory Manual, Addison-Wesley.
3. Holt J.G, N.R.Krieg, 2000, Bergey's Manual of Determinative Bacteriology. Ninth edition, Lippincott Williams & Wilkin Publishers.
4. Kannan N, 2002, Laboratory Manual in General Microbiology, Panima Publishers.
5. Sundararaj T, 2003, Microbiology Laboratory Manual, 2nd Edition, A. Sundararaj No.5, I cross street, Thirumalai Nagar, Perungudi, Chennai 600 096.

Paper -2

MICROBIAL PHYSIOLOGY AND METABOLISM

Semester : II

Hours/Week : 4

Sub. Code :

Credit : 4

OBJECTIVES:

- To acquire knowledge about Nutritional requirements and Different phases of growth – of Microorganisms
- To understand the physiological and metabolic principles underlying microbial life.
- To obtain knowledge about respiration and Oxygenic and An oxygenic Photosynthesis of microbes

UNIT I

Nutrition – types of nutrition. Classification of microorganisms based on nutrient utilization – autotrophs, heterotrophs, photoautotrophs, photoheterotrophs, chemo-organotrophs and chemolithotrophs. Physiology of extremophiles – Thermophiles, halophiles, psychrophiles and methanogens.

UNIT II

Different phases of growth – Growth curve – Generation time – factors influencing Microbial growth – Temperature, pH, Pressure, Salt concentration, Nutrients – synchronous growth and continuous cultivation, Diauxic growth.

UNIT III

Metabolism – EMP – HMP – ED pathways – TCA cycle- Electron transport chain – Oxidative and Substrate level phosphorylation.

UNIT IV

Anaerobic respiration – sulphur, nitrogenous compounds and CO_2 as final electron Acceptor - Fermentation – alcoholic, propionic and mixed acid fermentation,

UNIT V

Photosynthesis – Bacterial pigments – types, mechanism of photosynthesis – oxygenic and anoxygenic. Photophosphorylation – cyclic and non cyclic phosphorylation. Light and dark reaction, mechanism of sporogenesis

REFERENCE:

1. Albert G. Moat & John W. Foster ,2007, Microbial physiology, A John Wiley and sons, INC publications, New York.
2. Caldwell D.R. ,1995, Microbial Physiology and Metabolism , Brown Publishers.
3. Dubey R.C & Maheshwari D.K , 2009, A text book of microbiology, Chand & Company Ltd. New Delhi.
4. Geeta Sumbali and Mehrotra RS ,2009, Principles of Microbiology. First edition, Tata McGraw Hill P.Ltd., New Delhi.
5. Geoffrey M. Cooper ,2007, The cell, A molecular approach, 3rd Edition - ASM press, Washington.
6. Millian Meenakumari S , 2006 , Microbial physiology, MJP. Publishers, Chennai.
7. Moat G, John W. Foster and Michael P. Spector ,2002. Microbial physiology . Fourth edition, A John Wiley sons, Inc. publication. New Delhi.
8. Pelczar Jr.M.J,Chan E.C.S.& Kreig N.R, 2007, Microbiology, 5th Edition Mc.Graw Hill.
9. Robert F Boyd ,1984, General Microbiology. Times mirror / Mosby college publishers.

PRACTICAL– II
MICROBIAL PHYSIOLOGY & METABOLISM

Semester: II

Sub. Code:

Hours/Week : 2

Credit : 1

1. Growth curve and determination of generation time in *E. coli* and yeast.
2. Factors affecting growth - temperature and pH
3. **Microbial physiology of various bacteria - Bio Chemical test**
 - a. Acid and gas production
 - b. Starch hydrolysis
 - c. Lipid hydrolysis
 - d. IMViC test
 - e. Catalase test
 - f. H₂S production
 - g. Oxidase test
 - h. Urease test

REFERENCE:

1. Atlas R.M., A.E.Brown and L.C. Parks, Mosby, St. Louis, 1995, Laboratory Manual of Experimental Microbiology
2. Cappuccino J.G and N. Sherman, 2002, Microbiology: A Laboratory Manual, Addison-Wesley.
3. Holt J.G, N.R. Krieg, Lippincott, 2000, Bergey's Manual of Determinative Bacteriology. Ninth edition, Williams & Wilkin Publishers.
4. Kannan N, 2002, Laboratory Manual in General Microbiology, Panima Publishers.
5. Sundararaj. T, Microbiology Laboratory Manual, 2003, Published by A. Sundararaj No.5, I cross street, Thirumalai Nagar, Perungudi, Chennai 600 096 2nd Edition.

Paper- 3

MOLECULAR BIOLOGY & MICROBIAL GENETICS

Semester : III

Hours/week : 4

Sub. Code :

Credit : 4

OBJECTIVES:

- To understand the nature of genetic materials
- To Acquire Knowledge on Bacterial chromosome, Organization in prokaryotes and replication
- To acquire knowledge on gene alterations by gene mutation

UNIT I

DNA as genetic material (Griffith, Avery, Hershey and Chase experiments), Nucleic acids – definition and structure. Nucleoside, nucleotide: definition and structure. DNA & RNA: Double helical structure. A-DNA, B-DNA & Z-DNA (structure and differences). General structure and types of RNA (tRNA, mRNA, rRNA).

UNIT II

DNA Replication – conservative and semi conservative. Experimental proof for semi conservatives (Meselson-Stahl experiment), Mechanism of replication-Rolling-circle model. Enzymes involved in DNA replication, Process of prokaryotic transcription and translation.

UNIT III

DNA damage, Concept of mutations and mutagenesis, Molecular basis of spontaneous and induced mutations [physical and chemical mutagenic agents], types of mutation, DNA repair mechanisms - excision, mismatch, SOS, photoreactivation.

UNIT IV

Transformation, conjugation: Discovery, F⁺, F⁻ and Hfr cells and F⁻ genetic crosses. – Competent cells – mechanism, Transduction - generalised and specialized. Transposons- Transposition- Tn5, Tn3

UNIT V

Regulation of gene expression – structural and functional gene, operon – inducible operon – lac operon, repression operon – Trp operon.

REFERENCE:

1. David R Hyde, 2010, Genetics and Molecular biology. Special Indian edition, Tata Mc Graw Hill P.Ltd., New Delhi.
2. Friefelder David (Reprint) ,2007, Molecular Biology, 2nd Edition, MacMillan Pvt India Ltd, New Delhi.
3. Hancock J.T , 2008, Molecular Genetics, Viva books Pvt Ltd.
4. Lodish Berk, Matsudaira, Kaiser, Kreiger, Zipursky & Darnell ,2007, Molecular cell biology, 5th Edition, W.H. Freeman & company, New York.
5. Peter J.Russell,2000, Fundamentals of Genetics, 5th Edition, Benjamin/Cummings Publishers.
6. Peter Paoella ,2010, Introduction to Molecular Biology. First edition, Tata Mc Graw-Hill P. Ltd., New Delhi.
7. Peter Snustad D and Michael J Simmons, 2003, Principles of Genetics. Third edition, John Wiley and Sons, Inc. publication, New Delhi.
8. Ramawat and Shaily goyal ,2010, Molecular biology and Biotechnology. First edition S.Chand & Co.Ltd., New Delhi.
9. Stanley R. Maloy, John E. Cronan & David Freifelder ,2008, Microbial Genetics, 2nd Edition, Narosa Publishing House.
10. Turner P.C, Mc Lennan A.G, Bates A.D & White M.R.H ,2002, Instant Notes Molecular Biology, Viva books Pvt Ltd.

Practical-III

LAB IN MOLECULAR BIOLOGY & MICROBIAL GENETICS

Semester : III

Hours/Week : 2

Sub. Code :

Credit : 1

OBJECTIVES:

- To acquire knowledge about mutants
 - To acquire knowledge about effect of radiation on microorganisms
 - To acquire knowledge on isolation of mutants
 - To acquire knowledge on the models related to genetics
1. Determination of antibiotic resistance of a given bacterial culture by replica plating.
 2. Isolation of Genomic DNA from bacteria.
 3. Isolation of spontaneous drug resistant mutants of *E.coli*.
 4. Calculate the percentage killing of *E.coli* after exposure to UV radiation.
 5. Isolation of antibiotic resistant mutants of *E.coli* using EMS.
 6. Ampicillin selection for enrichment of Auxotroph.
 7. Determination of lac⁺ and lac⁻ organisms.
 8. Assay of β galactosidase under inducible and repressible state.

REFERENCE:

1. Atlas R.M., A.E.Brown and L.C. Parks, Mosby, St. Louis, 1995, Laboratory Manual of Experimental Microbiology
2. Cappuccino J.G and N. Sherman, 2002, Microbiology: A Laboratory Manual, Addison-Wesley.
3. Kannan N, 2002, Laboratory Manual in General Microbiology, Panima Publishers.
4. Murray, R.G.F., Wood, W.A. and Krieg, N.B, 1997, Methods for General and Molecular Bacteriology.
5. Sundararaj. T, Microbiology Laboratory Manual, 2003, Published by A. Sundararaj No.5, I cross street, Thirumalai Nagar, Perungudi, Chennai 600 096 2nd Edition.

PAPER-4

INDUSTRIAL MICROBIOLOGY- I

Semester - IV

Hours/week : 4

Sub. Code:

Credit : 4

OBJECTIVES:

- To acquire knowledge on media preparation in industrial Microbiology
- To acquire knowledge about media formulations
- To acquire knowledge on designing a fermentor
- To obtain knowledge on sterilization techniques used in fermentation process

UNIT I

Screening -Primary screening, crowded plate techniques, auxanography, enrichment culture techniques and secondary screening. Media – Media formulation – Energy sources- Carbon sources- Precursor, Regulator-, inhibitors, Inducers – Antifoams – Medium optimization.– Serum free media supplements protein free media – Trace elements – Osmolality- pH.

UNIT II

Design of fermenters: Aerobic – Anaerobic, Basic functions of fermenters, Aseptic operation and containment. Body construction – Agitators, Baffles, Sparger -types of Spargers, Pilot plant.

UNIT III

Fermentors type: Waldhoff type fermentor, Tower fermentors, Cyllindro – Conical vessel, Airlift fermentors, Deepjet fermentors, Cyclone column, Packed tower, Rotatory – Disc fermentors, Stirred fermentors,

UNIT IV

Industrial sterilization: Medium sterilization, Sterilization of fermentors, Sterilization of air, and feeds. Immobilization techniques.-bacteria

UNIT V

Methods of measuring process: Temperature flow, Pressure, Foam, Biomass, Dissolved Oxygen, pH Redox – Potential and chemical factor. manual control, Automatic control-computer application in fermentation technology- components of a computer – linked system-, Data logging - Data analysis – process control.

REFERENCE:

1. Agrawal AK & Pradeep Parihar, 2006, Industrial Microbiology. Student edition, Jodhpur.
2. Casida L.E., 1968, (Reprint 2008) Industrial microbiology, Wiley Eastern Ltd, New Delhi.
3. Demain AL., AL and Solman, NA, 1996, Manual of Industrial Microbiology, American Society of Microbiology, Washington DC.
4. Hugo WB and AD Russel, 1998, Pharmaceutical Microbiology. Sixth edition, Blackwell Scientific Company Ltd.
5. Old R.W & Primrose S.B, 2006, Principles of gene manipulation, 7th Edition, Blackwell Scientific, London.
6. Patel A.H, 1985, (reprint 1996), Text book of industrial microbiology, MacMillan India Ltd
7. Purohit SS, Saluja AK, Kakrani HN, 2004, Pharmaceutical Microbiology. First edition, Agrobios (India).
8. Russell and Ayliffe, G.A.J, 1982), Principles and practice of Disinfection, preservation and sterilization Oxford.
9. Sivakumar PK, Joe MM and Sukesh K, 2010, An introduction to Industrial Microbiology. First edition, S.Chand & Company Ltd, New Delhi.
10. Stansbury, P.R. and Whittaker A, 1987 Principles of fermentation technology, Pergamon Press, Oxford.

PRACTICAL IV

LAB IN INDUSTRIAL MICROBIOLOGY

Semester IV

Sub. Code:

Hours/week : 2

Credit : 1

1. Isolation of microorganisms from soil for morphological characterization
2. Isolation of microorganisms from soil for an antibiotic producing organisms
3. Isolation of microorganisms from soil for extra cellular enzyme (amylase) producing microorganisms
4. Isolation of yeast cells from flour and grapes.
5. Immobilization of yeast cells and bacteria using Sodium alginate –Agar-agar
6. Description of fermenters.

REFERENCE:

1. Bernad R Glick and Jack J Pasternak (1998). Molecular Biotechnology. Principles and Applications of Recombinant DNA. 2nd Edition. ASM Press, Washington, D.C
2. Casida L.E. Industrial Microbiology, Wiley Eastern Limited, New Delhi.
3. McNell B and Harve/L.M. Fermentation–A Practical Approach, IRL Press, New York.
4. Prescott S.C. and Dunn C.C. Industrial Microbiology, Tata McGraw-Hill Publishing Company limited, New Delhi.
5. Principles of Fermentation Technology. Manual of Industrial Microbiology and Biotechnology by Demain and Devis.

Paper -5

MEDICAL MICROBIOLOGY

Semester -V

Hours/week : 5

Sub. Code

Credit : 5

OBJECTIVES:

- To update the present modern aspects in medical microbiology
- To acquire knowledge on the collection and preservation of clinical samples
- To acquire the knowledge of microbes and molecular mechanism of microbial disease, pathogenesis.
- To understand idea of the development of modern laboratory and diagnostic techniques.

UNIT I

General approach to clinical specimen – collection and transport, microbiological examination, transport media for isolation. General principle – isolation techniques involved for anaerobic bacteria, normal micro flora of the human body.

UNIT II

Gram-positive bacteria: Morphology, Pathogenesis & lab diagnosis of *Staphylococcus*, *Streptococcus*, *Mycobacterium tuberculosis*, *Mycobacterium Leprae* .Gram negative bacteria: Morphology, Pathogenesis & lab diagnosis - of *E.coli*, , *Salmonella*, *pseudomonas*,

UNIT III

Fungus; superficial (*Pityriasis versicolor*), subcutaneous (*Sporothrix*), Opportunistic (*Candida albicans*), Cryptococcosis, blastomycosis, Rhino sporidiosis. Viruses: Pathogenesis and Lab Diagnosis of viral diseases - pox virus, herpes virus, HIV, influenza and rabies.

UNIT IV

Parasitology: Morphology, Pathogenesis – Lab diagnosis – Preventive measures of *Entamoeba histolytica*, *Plasmodium vivax* , *P.falciperum* *Giardia lamblia*, *Taenia solium*, *Ascaris lumbricoides*.

UNIT V

Antimicrobial chemotherapy – General Character – mechanism of action of drugs, Antimicrobial susceptibility test – Anti bacterial drug -Beta lactum, sulphadrug -Anti viral drug (amantadine) and Antifungal drug (ketoconazole), Drug resistance – mechanism, origin and transmission of drug resistance.

REFERENCE:

1. Anathanarayan R and Jeyaram Panikers C.K. 2013. Text Book of Microbiology.
2. Ninth Edition. Jain book depot, New Delhi.
3. Bailey & Scotts, Diagnostic Microbiology Elen JO Baron Lance R. Peterson, Sydney
M.Fine Gold 9th Edn., Pub Mosby.
4. Baron EJ, Peterson LR and Finegold SM, 1994, Bailey and Scotts diagnostic
microbiology. 9th edition, Mosby publications.
5. Chakraborty P ,2003, A Text book of Microbiology. Second edition, Published by New
Central Agency (P) Ltd., Kolkata.
6. Chatterjee KD, 1980, parasitology, Protozoology and Helmmthology – 12nd Edn
Chatterjee Medical Publisher
7. Cruickshnak R. 1975, Medical Microbiology. VoL I & II ELBS, Churchill Livingston
8. Jewetz and Melnich, 1986, Review of Medical Microbiology, Lenge Medical
Publications, Maurzon Go. Ltd.
9. Mackie & Mcpartney, 1997, Medical Microbiology – Vol. – I, Microbial – infection, 7th
Edn. Ed.–Jg. Collee A.G. Fraser B.P. Marimion, A. Simmons Churchill-Livingston
10. Rajan S ,2009, Medical Microbiology. First edition, MJP Publishers, Chennai. 6.
11. Satish Gupte ,2000,The Short Textbook of Medical Microbiology.Eighth edition,
Jaypee Brothers, Medical publishers (P) Ltd., New Delhi.

Paper-6

BIOINFORMATICS

Semester -V

Hours /week : 5

Sub. Code:

Credit : 4

OBJECTIVES:

- To give the symbiotic relationship between biological science and computational techniques
- It helps in gaining knowledge in the field of computer and well as in the field of biological sciences
- To acquire knowledge on searching databases through internet
- To obtain knowledge on predicting protein structure through bioinformatics tool
- To acquire knowledge on the packages used in the bioinformatic studies.

Unit I

Bioinformatics – Introduction, definition, scope, applications of bioinformatics, emerging areas of Bioinformatics

Unit II

Biological databases and its types – Nucleic acid databases (NCBI, DDBJ, and EMBL), Protein databases (Primary, Composite and Secondary), Specialized Genome databases – (SGD, TIGR, and ACeDB), Structural databases (CATH, SCOP, and PDB sum)

Unit III

Sequence alignment – Dot matrix, local alignment (Smith & Waterman algorithm), Global alignment (Needleman & Wunsch algorithm), similarity searching using FASTA and BLAST. Clustal W- Multiple sequence alignment – Progressive and iterative methods, alignment viewers, applications of multiple sequence alignment.

Unit IV

Phylogenetic analysis – Phylogenetic trees, Distance based and character based methods, automated tools for Phylogenetic analysis.

Unit V

Analysis packages-features of a standalone analysis, packages, selected popular commercial packages-GCG, EGCN. Staden. Special packages on DNA analysis, internet and intranet packages

REFERENCES:

- 1 Teresa K. Attwoods, Parry – Smith D.J ,2006, Introduction to Bioinformatics, Pearson Education Asia
- 2 Baxevanis , 2nd Edition, Bioinformatics - A Practical Guide to the Analysis of Genes and Proteins.
- 3.David W. Mount ,2001, Bioinformatics, Sequence and Genome Analysis, Cold Spring Harbor Laboratory Press.
- 4.Higginns D & Taylor W ,2000, Bioinformatics, Sequence, Structure and databanks – A Practical Approach, Oxford University Press.
5. Ignacimuthu. S, 2005, Basic Bioinformatics –. Narosa Publishing House
- 6 Irfan Ali Khan, Atiya Khanum ,2003, Fundamentals of Bioinformatics , Ukaaz publications.
- 7 Mani. K and Vijayaraj,2002, Bioinformatics for Beginners, Kalaikathir Achagam
8. Misener, Bioinformatic Methods and Protocols.
- 9.Peruski, Jr. and Peruske (ASM), 1997, The Internet and the new Biology: Tools for Genomics and Molecular Research
- 10.Stephen P Hunt and Rick Liveey (OUP) 2000, Functional Genomics. A Practical Approach.

Paper-7

PRINCIPLES OF IMMUNOLOGY

Semester -V

Hours /week : 5

Sub. Code:

Credit : 4

OBJECTIVES:

- To know the fundamental concepts in immunology
- To acquire knowledge on the origin of immune system
- To acquire knowledge on immuno-haematology
- To acquire knowledge on antigen –antibiotic reaction
- To acquire knowledge on transplantation technology

UNIT I

History and scope of Immunology - The basis of defense mechanisms - Cells and Organs involved in immune system - Phagocytosis.

UNIT II

Types of immunity – Antigen – Antibody – types - Complement pathways - Classical and Alternate, MBL Pathway – Immunoglobins - structure and functions.

UNIT III

Allergy and Hypersensitivity - Classification types and Mechanisms – Autoimmunity mechanisms and autoimmune response diseases: RA, SLE and Myasthenia Gravis, Diabetes Mellitus

UNIT IV

Quantitative study of Antigen - Antibody reactions –Agglutination: RPR and Hemaagglutination Precipitation: Double Immuno Diffusion, ELISA, Radio immune assay(RIA) - Monoclonal antibodies and its applications(Hybridoma technology)

UNIT V

Immunohematology - Blood transfusion - ABO grouping - RH factor - Tissue transplantation- HLA typing - Mechanism of acceptance and rejection.

REFERENCE:

1. Kuby.J.1997 . ,Immunology,W.H.Freeman,NY
2. Tizard,I R 1998.Immunology An Introduction ,Second edition.W.B.Saunders,Philadelphia.
3. Roitt, IM 1991.Essentials of Immunology,seventh edition Blackwell Scientific Publications.
4. Nandhini Shetti,1993.Immunology,Introductory Text Book.New Age International Limited

Paper-8

BIOCHEMISTRY

Semester -V

Sub. Code:

Hours /week : 5

Credit : 4

OBJECTIVES:

To enable the learners to understand:

- The chemical nature of Bio Molecules
- Acquire knowledge on the Classification and Properties of Biomolecules
- Have an idea on Macromoleclecular assemblies
- Gain Knowledge on Biosynthetic Pathway of Hormones.
- Familiarize with Enzymes and Their Applications.

UNIT I

Definition and scope of biochemistry , Basic concepts of atoms, molecules and types of bonding in biomolecules, Isomerism – types, structural – stereo and optical,pH, buffer.

UNIT II

Nomenclature, definition and classification of carbohydrates, structural characteristic, Properties of Monosaccharide, disaccharides and Polysaccharides with examples.

UNIT III

Amino acids – structure, classification and properties. primary, secondary, tertiary and Quaternary structure of proteins , Physical and chemical properties of protein.-HB ,Albumin, Globulin structures.

UNIT IV

Fatty acids – definitions and classification (Saturated and unsaturated), lipids- properties of lipids, Types of lipids, compound lipids – phospholipids and glycolipids, Derived lipids – steroids, terpenes and carotenoids.

UNIT V

Vitamins – source and classification, types – Water soluble (B, C) and fat soluble vitamins (A, D, E, K) Enzymes – Nomenclature, Classification and its Properties, mechanism of enzyme action, enzyme kinetics.

REFERENCE:

1. Cantor C.R. and P.R.Schimmel, Biophysical Chemistry,1980, Part I: The Conformation of Biological Macromolecules, Part II: Techniques for the Study of Biological Structure and Function.
2. Deb AC ,2007, Concepts of Biochemistry, (Theory and Practical) Books and Allied (P) Ltd., Kolkata.
3. Jain JL, 2003, Fundamentals of Biochemistry. S. Chand and Company Ltd., New Delhi.
4. Keith Wilson and Jon Walker ,Practical Biochemistry, Cambridge University Press.
5. Murray RK, DK Granner, PA Mayes and VW Rodwell ,1999,. Harper's Biochemistry. 27th Edition, Large Medical Publication.
6. Satyanarayana.U,2005,.,Essentials of Biochemistry,Books and Allied (P) Ltd.,Kolkata.
7. Stryer. L. et al., 2006, Biochemistry, 5th edition, WH Freeman publication.
8. Van Holde K.E, W.C.Johnson, and P.S.Ho, 1998,Principles of Physical Biochemistry.
9. Veerakumari L ,2007, Biochemistry. MJP Publishers, A Unit of Tamil Nadu Book House, Chennai.
10. Voet, D., and Voet JG. 1995, Biochemistry, Wiley publication

PRACTICAL -V
LAB IN MEDICAL MICROBIOLOGY AND IMMUNOLOGY

Semester-V

Hours/ week :4

Sub.Code:

Credit :1

1. Microbes causing sore throat - *Streptococcus aureus*
2. Isolation of microbes causing urinary tract infection- *E.coli*
3. Isolation of microbes from wounds and pus-*Streptococcus pyogenes*
4. Isolation of lymphocytes from Human Peripheral Blood Mono nuclear Cells.
5. Blood cell counts - Total RBC, WBC and differential count of WBC.
6. Agglutination reactions- Haemagglutination, ABO blood grouping
7. Precipitation reactions -Precipitin ring test, single and double diffusion test
8. Widal test.
9. Description of HIV - Structure

REFERENCE:

1. Abbas Abul K. Lightman Andrew K. and Pober Jordan S. Cellular and Molecular immunology W.B Saunders Company, Philadelphia.
2. Gold by Richard A. KindtThomas J and Osborne Barbara A. Kuby Immunology, W.H.Freeman and Company, New York.
3. Jawetz Me hick, Adel berg Brooks, Butel and Orston, Medical Microbiology, Prentice Hail Incorporated London.
4. Rastogi S.C.1996. Immunodiagnostics Principles and Practice, New Age International (P) Ltd., New Delhi.
5. Monica Cheesbrough, 2000. District Laboratory Practice in Tropical Countries, Part – 2, Cambridge University Press, Cambridge, U.K.

PRACTICAL -VI
LAB IN BIOCHEMISTRY AND BIOINFORMATICS

Semester-V
Sub.Code:

Hours /week : 4
Credit : 1

1. Preparation of buffers (Phosphate Buffer and Tris Buffer)
2. Biochemical characterization of a bacterium *-E.coli*
3. Estimation of Proteins by Lowry's method
4. Extraction and Identification of lipids by TLC
5. Separation of amino acids mixture using paper chromatography technique.–Ascending and descending
6. Demonstration of Lignolytic activity of microorganisms.
7. Accessing EBI Web Site for Down Loading an Entry of Human Lysosomal Alpha Glucosidase Gene
8. Searching data bases using search Tools.(BLAST,FASTA)
9. Using Pubmed to find a journal using author's name.

REFERENCE

1. Jeyaraman, J.1985, Laboratory Manual in Biochemistry, Wiley Eastern Limited, New Delhi.
2. Palanivel U.P., 2000. Laboratory manual for analytical biochemistry & separation techniques. School of Biotechnology, Madurai Kamaraj University, Madurai.
3. Williams, B.L. and K.Wilson, 1983, A Biologist's Guide to Principles and Techniques of Practical Biochemistry, Edward Arnold Publishers Ltd., London
4. A. P.Gunasekaran 1996 laboratory manual in microbiology New age international publisher ISBN . 81-224-0783-8 ed.2.
5. Sathish Gupta Practical microbiology Second edition 1998 Jaypee brother medical Pub:pvt ltd New Delhi ISBN -81-7179-579-9..
6. Gand R.S and Gupta G.D1998 Practical microbiology First edition Pub Nirali Prakashan.

PAPER -9

MICROBIAL BIOTECHNOLOGY

Semester-VI
Sub.Code-

Hours /week : 5
Credit : 4

OBJECTIVE

- To learn about biotechnological advancement in microbiology
- Assessment of biotechnology and its impacts on man, society and Environment
- To acquire new techniques to analysis DNA
- To acquire knowledge on biosafety rules

UNIT I

Introduction to gene manipulation, Restriction enzyme- Nomenclature, Properties, Application- Techniques-DNA amplification- PCR, Electrophoresis-Agarose- SDS- PAGE and Pulsed field Electrophoresis

UNIT II

Cloning vectors- Plasmid- Types- pBR322, pUC vector, Cosmid- Bacteriophage- λ Phage, M13, Expression vector: Shuttle vector, Broad host range vector- Yeast, artificial Chromosome vector.

UNIT III

Cloning strategies, cloning and selection of individual gene, Gene Libraries: Genomic libraries- c DNA libraries – Short gun methods, Genetic analysis of Microbes- *E.Coli* and *Bacillus*- Selection of Recombinants

UNIT IV

DNA sequencing methods: Sanger's method, sequence analysis- Automated sequencing, Gene expression pathway: Post transcriptional (RNA splicing) and Post translational (Protein Folding) Processes.

UNIT V

Recombinant DNA technology- Agriculture- Role of Ti plasmid in Plant biotechnology, Transgenic Plants- Herbicide and Disease resistant developed plant Medical: Insulin-Vaccine. Industrial: Amino acid, Protein, Vitamin. Development and uses of transgenic animals- Disease resistant, meat and milk Production,

REFERENCE:

1. Brown,T.A. 2000.Gene Cloning, Fourth Edition,Chapman and Hall Publication, USA.
2. Glick, B.K. and Pasternak, J.J. 2002. Molecular Biotechnology Principles and Applications of Recombinat DNA, ASM Press, Washington.
3. Jogdan S.N ,1997, Gene Biotechnology, Himalaya Publishing House, New Delhi.
4. Jogdand SN, 2005, Gene biotechnology. Himalaya Publishing House, Mumbai.
5. Murugesan AG and Rajakumari C ,2005, . Environmental Science and Biotechnology. First edition, MJP Publishers, Chennai.
6. Primrose S.B, 2001, Molecular Biotechnology, 2nd Edition, Panima Publishing Corporation, New Delhi.
7. Purohit SS, Saluja AK, Kakrani HN,2004, Pharmaceutical Biotechnology. First edition, Agrobios (India).
8. Ramawat and Shaily goyal ,2010, Molecular biology and Biotechnology. First edition S.Chand & Co.Ltd., New Delhi.
9. Satyanarayana,2005, Biotechnology. First edition, Books and Allied (P) Ltd., Kolkata.
10. Singh BD, 2005, Biotechnology. Second revised and enlarged edition, Kalyani Publishers, Chennai

PAPER-10

ENVIRONMENTAL AND AGRICULTURAL MICROBIOLOGY

Semester: VI

Hours /week :4

Sub. Code :

Credit :4

OBJECTIVES:

- To Acquire knowledge on the role of soil in agriculture
- To obtain knowledge about the use of microbes in the beneficial aspects to create a hazardous free environment
- To obtain knowledge on the role of microorganisms in biogeochemical cycle
- To acquire knowledge on water and aero microbiology

UNIT I

Soil Microbiology Physical and chemical characteristics and microflora of various soil types Rhizosphere – Phyllosphere – Microbial interaction symbiosis, neutralism, mutualism commensalisms, competition Amensalism synergisms, parasitism and predation. Biological N₂ fixation – Diazotrophs, Associative symbiosis – Rhizobium, Azospirillum – Azotobacter, Phospho bacteria- mycorrhizae- VAM and Ecto & Endo – mycorrhizae

UNIT II

Microbes in biogeochemical cycle –C,N,P&S Bio-degradation- Xenobiotics, Bio accumulation, Biomagnification & Bioleaching.

Air microbiology, atmospheric layers and microbes -microbes in aerosol- assessment of quality of air- Air borne disease caused by bacteria, fungi and viruses- symptoms and preventive measure.

UNIT III

Aquatic Microbiology :EcoSystem – Microbes in fresh and Marine – Eutrophication- water zonation- potability of water- microbial quality testing of water- water purification- water borne disease and preventive measures.

Water treatment – characteristic of solid and liquid waste – BOD - & COD gasification composing – aerobic & anaerobic treatment method.

UNIT IV

Plant disease caused by bacteria: Xanthomonas, mycoplasma, spiroplasma. Fungi: Pyricularia, Phytophthora, Fusarium. Virus: TMV, CMV, Viroids- mechanism of pathogen, establishment and symptoms.

UNIT V

Disease control- fungicide- bacterial disease control- insecticide – bio pesticides- Bio-fertilizers - nematicide and weedicide, control & viral disease.

REFERENCE:

1. Alexander, M. 1971, Microbial Ecology John-Wiley & Sons, inc. New York.
2. Alexander, M. 1977, Introduction to Soil Microbiology, John Wiley & Sons, New York.
3. Baker, K.H and-Herson D,S. 1994, Bioremediation, McGraw Hill, inc. New York.
4. Marshall K.C 1985., Advances in Microbiology Ecology Vol.8, Phenum Press
5. Burns, R.G/&Slater JH; 1982, Experimental Microbial Ecology- Blackwell scientific Publications,-Oxford .London.
6. Vanghan, D and Malcolm RE, 1985, Soil Organic Matter and Biological Activity. Martinus Nighoff W.Junk Publishers.
7. Michel R 1999, Introduction to Environmental Microbiology.
8. Boyd R.F., General Microbiology, 2nd Edition, Times Mirrof/Mosby College Publishing St. Louis.1988.
9. Alexander, M 1977, Introduction to Soil Microbiology, John Wiley & Sons, inc. York.
10. Norris JR. and Pettipher, GL. 1987, Essays in Agricultural and Food Microbiology, JohnWileyandSons, Singapore.
11. Burges, A and Raw, F. 1967, Soil Biology, Academic Press, London.
12. Martin-Alexander Wiley, 1961, Introduction to Soil Microbiology. International Ed New York.
13. Vanghan, D. and Maleolm, R.F: 1985; Organic Matter and biological activity, Martinus Nighoff, W. junk Publishers.
14. Harry Bukman and Nyle C. Brady, 1960: The Nature and Properties of soil Eurasis Pub House (Pvt) Ltd, New Delhi.

PAPER-11

FOOD AND DAIRY MICROBIOLOGY

Semester: VI

Hours /week :4

Sub. Code:

Credit :4

OBJECTIVES:

- To study the impact of microbes on foods
- To acquire knowledge of preservation methods
- To acquire knowledge on the fermented foods produced from milk and milk product.
- To acquire knowledge on the fermented foods produced from cereals
- To acquire knowledge on the fermented foods produced from fruits
- To acquire knowledge on the food borne illness

UNIT I

Food as a substrate for growth of microbes Role of microbes (mold yeast, bacteria) in food General characteristic & importance principles of food preservation - Asepsis – Removal of microorganism , aerobic condition High temperature – Low temperature - Drying – Food additives

UNIT II

Contamination and spoilage – cereal , Vegetables , sugar product, fruits, meat and meat, fish & their product – poultry , spoilage of canned foods.

UNIT III

Milk & milk product - pasteurization.-role of microbes in milk and milk products – quality testing- MBRT, SPC- spoilage of organism - preservation method.

UNIT IV

Food borne infection and intoxication- bacterial, non – bacterial – Food borne disease-outbreaks - Laboratory testing - preventing measures. Food sanitation – plant sanitation – quality control

UNIT V

Food fermentation - yoghurt, cheese, pickle, bread, vinegar, wine, beer-spoilage and prevention

REFERENCE:

- 1.Adams MR & Moss MO;, 1995,'Food Microbiology, New Age International P. Ltd.Publications.
- 2.Frazier WC and Westhoff DC, 1988, Food Microbiology, 4th Edition, McGraw| Hill-New York.
- 3.Hobbs B.C. and Roberts D, 1993, Food poisoning and Food hygiene, Edwards] Arnold, London.
- 4.Stanbury, PF., Whitaker," A and Hall, SJ., 1995, Principles of Fermentation Ecology, 2nd Edition, Pergamon Press.
- 5.Boyd, R.F., General Microbiology, 2nd Edition, Times Mirror Mosby college Publishing, St. Louis, 1988.

PAPER-12

INDUSTRIAL MICROBIOLOGY II

Semester : VI

Sub. Code:

Hours /week : 4

Credit : 4

OBJECTIVES:

- To emphasize the importance of industrial microbiology in the aspects of producing economically favorable microbial products.
- To give the knowledge of various concepts of technology handled in the industries.
- To acquire knowledge on the importance of antibiotics
- To acquire knowledge on the production of organic acids using microorganisms

UNIT I

Microbial growth kinetics: Batch culture, continuous culture, feedback system, comparison of bacterial continuous culture in Industrial process – fed batch culture

UNIT II

Antibiotics – Classification – production and purification- Penicillin –Tetracycline and Griseofulvin.Organic acids- citric acids – production and purification-Lactic acid,- Acetic acid. Solvents – Acetone, butane, 2, 3 – Butanediol.

UNIT III

Principle and function of chromatography –Paper chromatography, TLC, Column chromatography, HPLC, centrifugation – Principles – functions and types. UV– VIS Spectrophotometry.

UNIT IV

Recovery and purification of fermentation products: Removal of microbial cells – Physical and mechanical methods: filtration –Chemical methods: extraction — Drying – precipitation - crystallization.

UNIT V

Vitamins Production- Vitamin B12, B2, C- single cell proteins: Bacterial proteins, , yeast proteins, fungal proteins, algal proteins.

REFERENCE:

1. Stanbury PR Whittaker A 1984 Principles of fermentation technology Pergamon Press Oxford
2. Reviere, J 1996. Industrial application of microbiology. Surrey University press.
3. Demain, AL & Solman, NA Manual of industrial microbiology. American society of microbiology, Washinton
4. Abhilasha S.Mathuriya 2009 Industrial biotechnology First edition Ane Books Pvt Ltd
5. Wulf crueger and Anneliese Crueger Biotechnology A textbook of Industrial Microbiology second edition Panima publishing Corporation New Delhi

PAPER-13

MEDICAL LABORATORY TECHNIQUES

Semester - VI

Hours /week :4

Sub. Code:

Credit :4

OBJECTIVES:

- To obtain knowledge on the principles of Laboratory works
- The main objective of the work is to make a brief knowledge about tissue processing and preservation for future studies
- To make a fundamental clinical and laboratory knowledge regarding pathogens
- To make a fundamental clinical and laboratory knowledge regarding hematology of human beings.
- To Acquire a fundamental knowledge on the collection .preservation and testing of urinary samples

UNIT I

Principles of Laboratory work, Essential Principles used in the laboratory – Personal Cleanliness & Care with Regard to infected materials, Glass wares, Flammable materials & Chemical burns- Principle Construction, Maintenance, Use and Care of Equipments & Instruments in Lab, SI Units, Collection & Dispatch of Specimens

UNIT II

Haematology– Determination of hemoglobin concentration, Tallquist Method, Sahlis acid hemoglobin method- Cyan met hemoglobin Method, Enumeration of Blood cells, Total RBC, WBC, Platelet – Indirect Method & Simple Method, Erythrocyte Sedimentation Rate(E.S.R), Westergren’s Method, Wintrobe’s Method, RBC Indices, Mean Corpuscular Hemoglobin (MCH),Color Index (CI), Differential Leucocytes Count- Arnith Count- Schilling Count, Anemia- Types of Anemia, leukemia,

UNIT III

Preparation of Reagents for Urine Examination- physical – chemical –microscopical- microbiological analysis of Urine, pregnancy test stool, sputum and CSF

UNIT IV

Basic steps for tissue processing-Fixation, Routine fixative-formalin-normal saline. Secondary fixative- Cornoy’s fluid, normal alcohol fixative- Zenker’s fluid, Helly’s fluid.

UNIT V

Decalcification, Dehydration, Clearing, Waxing, Embedding, Blocking, Section cutting, Microtome-types-Staining-Routine Haemotoxylin and Eosin Staining, Perl’s stain for Iron, Vonkossa silver nitrate procedure for calcium.

REFERENCE:

1. KanaiL Mukherjee Medical Laboatory technology A procedure Manual for Routine Diagnostic tests Voume I,VolumeII Volume III Reprint 2008 Publisher Tata Mcgraw-Hill Publishing Company Limited New Delhi
2. Satish Gupta The short textbook of Medical microbiology 2006 Ninth edition.Pub:Jaypee brothers medical publishers(P) Ltd,New Delhi.
3. T.J.J Inghish Microbiology and Infection A clinically –oriented core text with self assessment First edition 1996 Publisher Churchill Livingstone NewYork
4. S.Rajan Medical microbiology first edition 2007 publisher [Mjp](#) publishers

PRACTICAL-VII

Lab In FOOD AND DAIRY, AGRICULTURE & ENVIRONMENTAL MICROBIOLOGY

Semester: VI

Hrs/ week : 4

Sub. Code :

Credit : 4

1. Isolation of microbes from milk, pickles, Ice creams & soft drinks.
2. Detection of milk quality by Methylene blue reduction test.
- 3 Water quality analysis by MPN method
4. Isolation of *Xanthomonas* from cotton leaves
- 5 Mushroom cultivation
- 6 Isolation of *Rhizobium* from root nodules of leguminous plants
7. Isolation of *Azotobacter* from the soil
- 8 Observation of VAM from plant root
9. Isolation of microbes from air sample technique- settle plate method
10. Isolation and counting of faecal bacteria from sewage water
11. Isolation and enumeration of soil microorganism

REFERENCE:

- 1.A.P.Gunasekaran 1996 Laboratory Manual in Microbiology New age international publisher ISBN . 81-224-0783-8 ed.2.
2. Sathish Gupta Practical Microbiology Second edition 1998 Jaypee brother medical Pub:pvt ltd New Delhi ISBN -81-7179-579-9..
3. Gand R.S and Gupta G.D1998 Practical Microbiology First edition Pub Nirali Prakashan.
- 4.Jane Roskams and Linda Rodgers Lab Ref A Handbok of Recipes,Reagents and Other Reference Tools for Use at the Bench Indian reprint 2004 Publisher I K International PVT Limited New Delhi

PRACTICAL-VIII

LAB IN MEDICAL LAB TECHNIQUES, MICROBIAL BIOTECHNOLOGY & INDUSTRIAL MICROBIOLOGY

Semester: VI

Hrs/ week :3

Sub. Code:

Credit ;1

1. Preparation of permanent slides for blood smears
2. Estimation of Erythrocyte sedimentation Rate by Westergren's method
- 3 Estimation of total sugar in urine sample
- 4 Estimation of total sugars in blood samples
- 5 Estimation of blood cholesterol in human blood
6. Determination of blood clotting time
7. Alcohol production using sugarcane molasses and yeast
8. Lipase production
9. Isolation of plasmid DNA from the given bacterial culture
10. Agarose gel electrophoresis

REFERENCE:

- 1.A.P.Gunasekaran 1996 Laboratory Manual in Microbiology New age international publisher ISBN . 81-224-0783-8 ed.2.
2. Sathish Gupta Practical microbiology Second edition 1998 Jaypee brother Medical Pub:pvt ltd New Delhi ISBN -81-7179-579-9..
3. Gand R.S and Gupta G.D Practical microbiology First edition Pub Nirali Prakashan.
4. Jane Roskams and Linda Rodgers Lab Ref A Handbok of Recipes,Reagents and Other Reference Tools for Use at the Bench Indian reprint 2004 Publisher I K International PVT Limited New Delhi

SELF STUDY PAPER

PLANT TISSUE CULTURE

Semester III
Subject Code

Credits : 3

Objective

- To acquire knowledge on the techniques used in plant tissue culture
- To achieve knowledge on the role of metabolites in plant tissue culture
- To acquire knowledge on the plant genome
- To acquire knowledge on the development of new traits

UNIT-1

Introduction of plant tissue culture and cell suspension culture, physical-chemical conditions for propagation of plant cells and tissues, composition of media, nutrient and hormone requirement, continuous culture, techniques for immobilization of plant cells, continuous product recovery system using immobilized plant cell system

UNIT II

Plant tissue culture-product and recovery: primary and secondary metabolic products (photochemical) of plant cells, Biosynthesis of secondary metabolites of biotechnological importance biotransformation for product development and selection of cell culture process technology with salient features for specific products.

UNIT III

Plant tissue culture-genetic engineering- (a): structure and organization of plant genome, regulation of plant genome expression, transcriptional, translational and post transcriptional regulation in plant genome.-transposons, chloroplast and mitochondrial genome.

UNIT IV

Plant tissue culture-genetic engineering (b) Transfer of nucleic acid to plant cells –direct transformation by electroporation and particle gun bombardment.-Agrobacterium,Ti plasmid vector.

UNIT V

Theory and techniques for the development of new genetic traits, conferring resistance to herbicide, pesticide, plant pathogens, plant engineering towards development of enriched to products, plant growth regulators.

REFERENCE:

- 1.S.S Lele Jyothi Kishen Kumar Algal bioprocess technology 1 st Edition 2008 New Age International Publishers
- 2.Rev Fr Dr S Ignacimuthu Methods in Biotechnology 1st Edition 2003 Phoneix Publishing House Pvt Limited
- 3.H.E.Street. Tissue culture and plant science. Ed 1974 Academic press. London
- 4.M.K.Sateesh 2003 Biotechnology Edition 2003 New age Int Publishers
- 5.D.Balasubramnian,Brycee,Dharmalingam,Green,Jayaraman 1996 Concepts in Biotechnology Univ.press.
- 6.Colin Ratledge and Bjorn Kristiansen Basic Biotechnology 2nd edition Cambridge university Press
- 7.Hiva Aithal and Nikhilesh Kulkarni Glossary in Biotechnology and Genetic engineering and Bogaphs of related scientists Hand book 1st edition Hilmalaya Publishing House New Delhi
- 8.S.Chand Genetic Engineering 1st edition S.Chand and Company New Delhi

SELF STUDY PAPER

PROTEOMICS AND PROTEIN ENGINEERING

Semester : IV
Subject Code :

Credit : 3

Objective

- To acquire knowledge on the structure of protein
- To acquire knowledge on techniques for the separation of protein
- To acquire knowledge on the role of protein –genome relation
- To acquire knowledge on the protein synthesis

UNIT I

Primary and secondary and tertiary structure of proteins, enzymes as a class of protein, active site and protein folding

UNIT II

Introduction to proteomics and protein engineering- protein pre fractionation and sample preparation- two dimensional electrophoresis (2-D PAGE) - protein identification – post translational modification

UNIT III

Functional and genomics- proteomics and drug delivery –reverse genetics – transcription and replication of negative strand viruses

UNIT IV

Protein engineering and transfer RNA world-Essential requirements for protein synthesis- Role of messenger RNA-SNIJRPS and introns- translation

UNIT V

Protein folding-Hierarchic protein folding-defective protein folding-molecular chaperones-the HSP 70 Chaperone system. Proteasomes, prions, polyketides and nonribosomal peptides-combinational manipulation of polyketides and nonribosomal peptides

REFERENCE:

1. H.D.Kumar Molecular biology 2nd edition Vikas Publishing House Pvt Ltd
2. B.Alberts,D.Bray,J.Lewis etal. Molecular cell of the cell Edition1983 Garland pub. New York
3. D.Balasubramanian ,Bryce,Dharmalingam,Greenand Jeyaraman Concepts in Biotechnology Edition1996 Univ.press.
4. S.N.Mukhopadhyay Advanced process biotechnology Edition 2008 Publishers Viva books New Delhi
5. Nandan Hazare Protein Biotechnology edition 2010 Publisher Wisdom press New Delhi
6. K.G.Ramawat and Shaily Goyal Comprehensive Biotechnology 4th edition 2009 S Chand and Company Private Limited New Delhi
7. S V S Rana Biotechniques Theory and Practice first edition 2005 Rastogi publications Meerut
8. CM Brown I Campbell and F G Priest Introduction to Biotechnology 2nd edition Panima publishing corporation New Delhi
9. ColienRatledge and Bjorn Kristiansen Basic biotechnology 2nd edition Cambridge University Press
10. Abhilasha S Mathuriya Industrial Biotechnology 1st edition Ane Books Pvt Ltd New Delhi

**SELF STUDY PAPER
GENETIC ENGINEERING**

Semester V
Subject Code:

Hours/week:
Credit : 3

OBJECTIVE

- To acquire knowledge on recent trend in genetic studies
- To acquire knowledge on the proteomics
- To acquire knowledge on the vectors used in genetic engineering
- To give ideas about making cells and doing jobs

UNIT I

Basic principles of gene cloning- basic principles of modern biotechnology protein engineering, and gene cloning, scope of genetic engineering.

UNIT II

Gene cloning vectors-plasmids, bacteriophage vectors for E.coli,cosmids.vectors for plant cells, vectors for animal cells, shuttle vectors,YAC vectors,BAC vectors, expression, Vectors,genecartridges,synthetic regulator sequences.

UNIT III

Enzymes in genetic engineering-restriction endonucleases, types of restriction enzymes, naming and target sites of endonuclease, host controlled and restriction and modification, uses of restriction enzymes in genetic engineering. Ligase enzyme-activity and application. Uses of alkaline phosphatase, phosphonucleotidide kinase,terminal deoxynucleotidyl transferase,holoenzyme,T4 DNA polymerase, TAQ DNA polymerase, TAQ DNA polymerase, Ribonuclease H,Reverse transcriptase,poly –A polymerase, deoxyribose nuclease-I, and exonuclease.

UNIT IV

Tools of genetic engineering.-isolation and use of restriction enzymes, ,southern blotting,northern blotting.western blotting,Vectors ,transformation and molecular cloning.isolation of ribosomal RNA genes in Xenopus,. Sequencing of genes- sanger's dideoxynucleotide synthetic method ,Maxam and gilbert's chemical degradation method,Direct DNA sequencing using PCR.Synthesis of gene,restriction maps and RFLPS

UNIT V

Gene transfer in plants-*Agrobacterium tumefaciens*,direct gene transfer.expression of foreign DNA in eukaryotic cells.transgenic animals,genetics and ethics..genetic engineering in service of mankind.

REFERENCE:

1. S.Verma and V.K.Agarwal Genetic engineering.. Ed:2009 Pub:S.Chand and Company Ltd. New Delhi
2. J.M Walker and R.Rapley Molecular biology and biotechnology Ed 2006 Pub.Panima publishing corporation, Bangalore.
- 3.P.K.Gupta Molecular Biology and Genetic Engineering Ed 2005 Pub.Rastogi .Meerut.
- 4.H.D.Kumar Molecular biology 2nd Edition, Vikas Pblishing House Pvt Ltd
- 5.D.Balasubrmainian ,Bryce,Dharmalingam, Green and Jeyaraman Concepts in Biotechnology Ed 1996 . Univ.press.
- 6.S.N.Mukhopadhyay Advanced process biotechnology Edition 2008 Publishers Viva books New Delhi
- 7.Nandan Hazare Protein biotechnology edition 2010 Publisher Wisdom press New Delhi
- 8.K.G.Ramawat and Shaily Goyal Comprehensive biotechnology 4th edition 2009 S Chand and Company Private Limited New Delhi
- 9.S V S Rana Biotechniques theory and practice first edition 2005 Rastogi publications Meerut
10. C M Brown I Campbell and F G Priest Introduction to Biotechnology 2nd edtion Panima publishing corporaqtion New Delhi
- 11.ColienRatledge and Bjorn Kristiansen Basic biotechnology 2nd edition Cambridge University Press
- 12.Abhilasha S Mathuriya Industrial Biotechnology 1st edition Ane Books Pvt Ltd New Delhi

SELF STUDY PAPER

AQUACULTURE

Semester: VI
Subject Code :

Hours/week:
Credit : 3

OBJECTIVE

- To gain knowledge on the role of blue revolution in our economy
- To acquire knowledge in constructing fish ponds
- To acquire knowledge on the type of fish culture
- To acquire knowledge on the disease and prevention methods of fish diseases
- To acquire knowledge on the fish spoilage and its preservation methods

UNIT I

Scope of aquaculture, aquaculture in India, aquaculture in world, culture organisms

UNIT II

Requirements of fresh water fish farm, fish seed farm, barrage pond, diversion pond, brackish water fish farm, paddy fields, and coastal lagoons. Types of ponds-nursery, rearing, stocking, seasonal and perennial

UNIT III

Culture of organisms- monoculture, polyculture. Culture of Indian major corps, freshwater prawn, marine prawn, edible oyster, pearl oyster and seaweed culture.

UNIT IV

Common fish diseases and their control. Behavioral changes and suspected causes of fish disease. External appearance related to fish disease. Fungal disease- gill rot, bacterial disease- abdominal dropsy, fin and tail rot, eye disease, Viral disease - SVC, protozoan diseases - costiasis, myxosporodiosis, ichthyophthiriasis, knot disease ,parasites-worm disease, crustaceans diseases.

UNIT V

Contamination, preservation and spoilage of fish and fishery products. Preservation-use of low temperature, chilling, freezing, irradiation, drying, use of preservatives. Factors influencing spoilage, bacteria causing spoilage.

REFERENCE:

- 1.G.N.Vankhede and S.V.Deshmukh. Fresh water fish culture development and management. Ed 2002 Pub: Sarup and sons, New Delhi.
- 2.G.Santhakumar and A.M Selvaraj Concepts of Aquaculture Ed. 2005 Pub: Lekshmi papers Nagercoil
- 3.Frazier WC and Westcoff DC Food Microbiology 4th Ed Mc grow Hill New York.
- 4.N Shakuntala and M Shadaksharaswamy Foods Facts and Principles 3rd revised edition Publishers New Age International (P) limited New Delhi
- 5.Keshav Trehan Biotechnology 3rd reprint 1996 New Age International (P) Limited publishers New Delhi
- 6.S.K Kulshrestha Food preservation Edition 1996 Vikas Publishing PVT Ltd New Delhi
- 7.SN Tripathy Food biotechnology dition 2006 Dominant publishers and Distributors New Delhi
- 8.Yeshajahu Pomeranz and Clifton E Meloan Food analysis Theory and Practice 3rd edition CBS Pulishers and Distributors New Delhi

**NON MAJOR ELECTIVE
MUSHROOM CULTIVATION
PAPER IV**

Semester: III
Subject code:

Hours/Week : 2
Credit : 2

UNIT I

History of Mycology ,Mycology in Twentieth Century, Fungi general
Characteristics:nutrition,thallus,cellwall,Karyons,life cycle:asexual and sexual reproduction.

UNIT II

Taxonomy, nomenclature and classification of fungi upto class levels,natural and artificial classification. Mastigomycotina –eg:Physoderma maydis,Zygomycotina –eg Mucor,Scomycotina Eg:Sacharomyces Cerevisae, Basidiomycotina eg-Agaricus Camposteces,Deuteromycotina eg:Candida albicans.

UNIT III

Cultivation of Edible Mushroom –Agaricus bispores,Pleurotus ostereolatus,Lentimu edodes,Volvariella volvaceae,Auricularia auricular,Tremella fusciformis.

UNIT IV

Growing conditons of Mushrooms,Nutrition of fungus – nutritional requirements-Carbon source,nitrogen sources,minerals and vitamins.

UNIT V

MycotoxinsandMycotoxicases-alfotoxins,esterogenictoxins,tricothecenetoxin,alimentary toxicaeukia(ATA),Mushroomtoxin-Amantia.Toxinscyclopeptides,orellonine,gryomitritin, muscarine, psilocybin and psilocin

REFERENCE:

1. An introduction to Fungi .H.C Dubeed 1990 Vieofrey kibby,-Pkas Publishing House Pvt Ltd.Mushroom and toad stool- Geoffrey kibby –Pub::chartwelbooksINC.1977.Octobus book Limited.

Non Major Elective Catering and Food Processing

Semester: IV
Subject Code:

Hours/Week : 2
Credits : 2

UNIT I

Food as a Substrate for Microorganism, Contamination and spoilage of Vegetables, Fruits, Meat Products, Fish, and Fishery Products, Milk and Milk Products, Spoilage of Canned Foods.

UNIT II

Food quality, Reception and Preparation of Raw Materials, Cleaning, Sorting, Grading, Peeling, Heat Transfer in Food Processing-Blanching, Pasteurization, Sterilization, UHT, Cooling and Freezing.

UNIT III

Processing Based on Heat and Mass transfer Evaporation, Drying, Frying, Baking, Extrusion, Agglomeration, Process Based on Mechanical Separation, Centrifugation, Filtrations, Membrane Separations, Process Based on Electromagnetic Radiations, Microwave and Dielectric Heating, Infrared Heating, Irradiation.

UNIT IV

Food Packing, Functions of packaging, types of Packaging, active and Intelligent packaging, Safety aspects of Packing and Migrations.

UNIT V

Production of Fermented Foods, Principles of Cheese Making, Swiss cheese, Yogurt, Bakery food Methods of Bread Production. Oriental Fermented Food: Sou Sauce, Miso, Temph.

REFERENCE:

1. Frazier WC and Westcoff DC Food microbiology 4th Ed Mc grow Hill New York.
2. N Shakuntala and M Shadaksharaswamy Foods Facts and principles 3rd revised edition Publishers New Age International (P) limited New Delhi
3. S.K Kulshrestha Food preservation edition 1996 Vikas Publishing PVT ltd New Delhi
4. SN Tripathy Food biotechnology edition 2006 Dominant publishers and Distributors New Delhi
5. Yeshajahu Pomeranz and Clifton E Meloan Food analysis Theory and Practice 3rd edition CBS Publishers and Distributors New Delhi
6. Keshav Trehan Biotechnology 3rd reprint 1996 New Age International (P) limited publishers New Delhi

QUESTION PAPER PATTERN
Under graduate courses
(Both Major and Ancillary papers)

Maximum Marks – 75 Marks

Duration of Examination: 3 hrs.

PART – A.

Answer any **Ten** questions out of 15 questions

10 x 2 = 20 Marks.

PART – B.

Answer **All** questions **choosing Either or choice** pattern
(Answer not exceeding Two pages)

5 x 5 = 25 Marks.

PART – C.

Answer any **Three** out of 5 questions
(Answer not exceeding 3 pages)

3 x 10 = 30 Marks.

TOTAL

75 Marks.

The serial No. of the questions has to be continuous from 1 to 25 from Section A to Section C