A.V.C College(Autonomous) Mannampandal, Mayiladuthurai

Department of Microbiology

B.Sc Microbiology

For the students admitted from 2018-2019 onwards

Semester	Courses	Hours	Credits	Total credits
I	LC- I	6	3	20
	ELC-I	6	3	
	CC I - Fundamentals of Microbiology	5	5	
	CC II- Practical I	2	2	
	AC-I Theory	7	4	
	AC II- Practical	2	1	
	VBC- Human values based course	2	2	
II	LC- II	6	3	20
	ELC-II	6	3	
	CC III - Microbial diversity	5	5	
	CC IV- Practical II	2	2	
	AC-III Theory	7	4	
	AC IV- Practical	2	1	
	ES- Environmental studies	2	2	
III	LC- III	6	3	20
	ELC-III	6	3	
	CC V- Microbial Physiology	5	5	
	CC VI- Practical III	2	2	
	AC V Theory	7	4	
	AC VI- Practical	2	1	
	SBC I- Mushroom technology and value added products	2	2	
IV	LC- IV	6	3	20
	ELC-IV	6	3	
	CC VII- Immunology	6	6	
	CC VIII- Practical II	2	2	
	AC VII Theory	7	4	
	AC VIII- Practical	2	1	

	EA I- Gender studies	1	1	
V	CC- IX Medical Microbiology	5	5	30
	CC- X Molecular biology and Microbial genetics	5	5	
	CCXI Principles of Microbiological methods	4	4	
	CC XII Practical V	5	5	
	EC I Food and Nutrition	5	5	
	NMEC I Food Microbiology	2	2	
	SBC II Medical laboratory technology	2	2	
	SSD- Soft skill Development	2	2	
VI	CC- XIII Soil and Env.MB	4	4	29
	CC- XIV Food and Industrial MB	4	4	
	CCXV Microbial Biotechnology	4	4	
	CC XVI Practical VI	6	5	
	EC II Bio ethics and IPR	4	4	
	EC III Cell biology	4	4	
	NMEC II Medical Microbiology	2	2	
	SBC III Bio inoculants	2	2	
	EA-2		1	1
Total				140

A.V.C College(Autonomous) Mannampandal, Mayiladuthurai

Department of Microbiology

M.Sc Microbiology

For the students admitted from 2018-2019 onwards

Semester	Courses	Hours	Credits
I	CC- I Microbial diversity	5	4
	CC-II Microbial metabolism	5	4
	CCC III - Virology	5	4
	CC IV- Bio chemistry	5	4
	CC-V Practical I	6	3
	EC I- Microbial Nanotechnology and IPR	4	4
II	CC- VI – Environmental Microbiology	4	4
	CC-VII- Soil and Agricultural Microbiology	4	4
	CCV III - Food and industrial Microbiology	4	4
	CC IX- Research methodology, Biostatistics and computer applications	4	4
	CC-X Practical II	6	3
	EC II Marine Microbiology	4	3
	EDC I- Microbes in human welfare	4	2
III	CC- XI – Molecular biology and microbial genetics	4	4
	CC-XII Medical Microbiology	4	4
	CCXIII - Immunology and Immunotechnology	4	4
	CC XI – Microbial Biotechnology and Genetic Engineering	4	4
	CC XV – Practical III	6	3
	EDC II- Microbial disease and management	4	2
	EC III - Biological techniques.	4	4
IV	Project		17
Total			90

CCI- FUNDAMENTALS OF MICROBIOLOGY

SEMESTER: I **CODE: 18 MB 101**

Unit-I

Historical development of Microbiology- Scope & Discovery of Microorganisms -Spontaneous generation conflict - 20th century Microbiology-Louis Pasteur, Leewen Hoek, Joseph Lister, Robert Koch, Edward Jenner, Alexander Fleming, Metchnihoff -Structural organisation of bacteria- size, shape, arrangement of bacterial cells- Cellwall structure, cell membrane, ribosomes, nucleoid, capsule, flagella, fimbriae, mesosomes, cytoplasmic inclusions.

Unit – II

Microscopy -Principles and applications of Simple, Bright field, Dark-field, Phase-contrast, Fluorescent, Electron Microscopes – Transmission Electron Microscope(TEM)- Scanning Electron Microscope(SEM).-Staining methods – Simple-Differential staining- Gram's staining-Endospore staining- Acid fast staining-Negative staining - Motility by hanging drop method.

Unit – III

Classification – Haeckel's three kingdom concept, Whittaker's six kingdom concept-Carl Woese three domain classification. Taxonomical ranks, Binomial Nomenclature - Characteristics used in Taxonomy – Outline of bacterial classification according to Bergey's manual of systemic bacteriology(8^{th} edition).

Unit – IV

Sterilization - Physical agents -moist, dry heat, filtration,(membrane and HEPA), Radiation, Chemical agents - Phenols and phenolic compounds, Alcohols, Halogens, Heavy metals and their compounds, Aldehydes, Gaseous agents.

Unit -V

Pure culture techniques- serial dilution-Pour plate, spread plate, streak plate. Anaerobic culture method - Types of media-Media preparation-Preservation and storage of microbial cultures.

Text Books

• Michael J. Pelzar. Jr., E.C.S. Chan, Noel R. Krieg, Microbiology, 1993 (Fifth edition), Tata McCraw Hill, New Delhi.

• Prescott, L. M., J. P. Harely and D. A. Klain, Microbiology, 2003 (5 th Edition) McGraw Hill, New York.

Reference Books

• Talaro K. P. and A. Talaro, Foundations in Microbiology, 1999, (3 rd Edition), WCB McGraw Hill.

• Atlas R. A. Principles of Microbiology (2 nd Edition), 1997. Wm. C. Brown Publishers, Iowa.

• Salle A. J., Fundamental Principles of Bacteriology, 1974 (TMH Edition), Tata McGraw Hill Publishing Company, New Delhi.

SYLLABUS –B.Sc.,
CCII- Practical I

Code: 18 MBP 102

Semester I

a. Rules and regulations in Microbiology Laboratory
b. Cleaning and sterilization of glass wares.
c. Principles and operations – Autoclave, Hot air oven, Laminar air flow chamber, Incubator, centrifuge.
d. Media preparation- Broth, solid (slant and deep), semi solid media.
e. Pure Culture techniques:

i) Spread Plate
ii) Pour Plate
iii) Streak Plate

f. Microscope and its operation
g. Staining-Simple Staining-Differential Staining-Gram's staining and Negative staining- Endospore staining.
h. Measurement of size of microbes-Micrometry
i. Motility determination by hanging drop technique

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL
B.Sc., BIOTECHNOLOGY
SEMESTER – I
ACI- GENERAL MICROBIOLOGY
CODE: 18 AMB 101

UNIT - I: **History of Microbiology, Characteristics of Prokaryotes and Eukaryotes. Microscopy: Bright field, Dark field, Phase contrast, Fluorescent Microscope Electron microscope-TEM and SEM.**

UNIT- II: Structural organisation of bacteria- size, shape, arrangement of bacterial cells-Cellwall structure, cell membrane, ribosomes, nucleoid, capsule, flagella, fimbriae, mesosomes, cytoplasmic inclusions. General characteristics of virus, fungi algae and protozoa.

UNIT –III: Sterilization: physical-Dry heat, Moist heat sterilization -chemical methods,Types of culture media, Pure culture of techniques -Pour plate, spread plate and streak plate technique, Maintenance and Preservation of Culture.

UNIT – IV: Microbial metabolism: Nutritional requirements - macro and micro nutrients - Nutritional groups-Nutrient Transport: Active, passive and facilitated-Microbial Growth-Growth curve - Factors affecting growth (temperature, acidity, alkalinity, water availability and oxygen requirement) -measurement of growth,-Bacterial growth kinetics-Batch, continuous culture and synchronous growth.

UNIT – V: Carbohydrate metabolism- Glycolysis, Pentose Phosphate Pathway, TCA Cycle. Photosynthesis in microorganisms; Oxygenic and Anoxygenic-Calvin cycle. Phototrophic prokarykotes- purple photosynthetic bacteria- Green sulfur bacteria-cyanobacteria and chloroplast.

Text book

1. Microbiology, M.J.Pelczar, Jr., E.C.S.Chang and N.R.Krieg. McGraw Hill Company, New York (1986).
2. Microbiology,L.M.Prescott,P.Hareley D.A.KleinWm.c.Brownublishers.DutiqueJawa, Melbourne (1993).

Reference book

- Microbiology Concepts and Applications, M.J. Pelczar, Jr., E.C.S Chang and N.R. Krieg, McGraw Hill Company, New Delhi (1993).
- Modern microbiology, Wayne, W. Umbreit, W.H, Freeman and company, San Francisco. (1962).
- Basic and Practical Microbiology, Ronald M. Atlas, MacMilleen Company New York (1986).
- Brock Biology of Microorganisms, Madigan, M.T., Martinko, J.M. and Parker, J. Prentice –Hall, New Delhi
- General Microbiology, Stainer, R.Y., Ingraham, J.L., Wheelis, M.L. and Painter

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL

B.Sc., BIOTECHNOLOGY

SEMESTER – I

AC- II: PRACTICAL- I **Code: 18 AMBP 102**

- Culture media preparation-liquid and solid medium
- Selective and differential media
- Pure culture techniques –i)Pour plate ii)spread plate iii) Streak plate method
- Enumeration of bacteria in water and soil
- Colony morphology on nutrient agar slants, nutrient broth
- Staining technique:i) simple staining ii) negative staining iii) Gram's staining.
- Bio chemical characterization of microorganisms
  i) Indole test
  ii) Methyl red test
  iii Voges Proskauer test
  iv) Citrate utilization test

8. Antibiotic sensitivity test

A.V.C COLLEGE (AUTONOMOUS),
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY

SEMESTER – II

CCII- MICROBIAL DIVERSITY

CODE: 18 MB 203

UNIT I

Distribution of algae- Classification (Fritsch's System of classification)-Ultra structure of algae-algal nutrition-structure of algal thallus- algal reproduction- Characteristic features of the following division- Chlorophyta- Charaphyta- Xanthophyta- Bacillario phyta-Pheophyta-Rhodophyta.

UNIT II

Fungi – Distribution- Classification(Alexopolus)Importance- Structure – Nutrition and metabolism- Reproduction- Characteristics of fungal divisions- Zygomycota-Ascomycota-basidiomycota-Deuteromycota- Type study species: *Aspergillus niger- Penicillium notatum-Rhizopus stolonifer-Mucor moniliformis-Saccharomyces cerevisiae*

UNIT III

Early development of Virology- Classification(ICTV)General properties of viruses- Structure of Viruses-Viral replication- Cultivation of plant,animal and bacterial viruses.

UNIT IV

Protozoa- General characteristics-classification(Society of Protozoologists-1985)-Morphology- Nutrition- Locomotion- Reproduction. Parasites-*Amoeba*, worms- *Taenia*

UNIT V

General characteristics of important groups of bacteria – Cyanobacteria- Mycoplasma-Rickettsiae- Chlamydiae- Spirochaetes- Actinomycetes- Archaebacteria,Methanogenic bacteria, Sulfate utilizing bacteria.

Text book

• Michael J. Pelzar. Jr., E.C.S. Chan, Noel R. Krieg, Microbiology, 1993 (Fifth edition), Tata McCraw Hill, New Delhi.
• Prescott, L. M., J. P. Harely and D. A. Klain, Microbiology, 2003 (5 th Edition) McGraw Hill, New York.

References:

- B.R .Vashista 1990. Algae. 8th Edn. S.Chand and Company publishing.
- O.P Sharma. Text Book of Algae. 4th Edn. TATA McGraw Hill Publishers.

A.V.C COLLEGE (AUTONOMOUS),
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY

CCIV-PRACTICAL-II **CODE: 18MBP204**

Semester II

1. Cultural characteristics of microorganisms
2. Enumeration of bacteria from soil
3. Enumeration of fungi from soil
4. Enumeration of actinomycetes from soil
5. Identification of fungi by Lactophenol cotton blue staining
6. Slide culture techniques
7. Isolation of alage from pond water
8. Isolation of coliphage from sewage sample
9. Permanent slides- Algae, Cyanobacteria, Fungi, Protozoa

A.V.C.COLLEGE (AUTONOMOUS), MANNAMPANDAL.
B.Sc., BIOTECHNOLOGY
SEMESTER II
ACIII- IMMUNOLOGY AND IMMUNOTECHNOLOGY
CODE: 18 AMB 203

UNIT: I

History and Scope of immunology. Haematopoiesis-Cells of the immune system, Organs of the immune system-Primary Lymphoid organ-Bone Marrow and Thymus-Secondary Lymphoid organ-Lymph node, spleen, MALT and GALT.

UNIT: II

Immunity-Types of immunity-Innate and acquired immunity-active and passive-Humoral Immunity-Cell mediated Immunity-Complement-Properties-Biological functions of complement-Classical and alternative pathway.

UNIT: III

Imunoglobulin-Structure-Types-Functions of Immunoglobulins-Antigen-Types-Haptens-Adjuvants-Auto immune diseases-Organ specific-Good Pasteur syndrome. Grave's disease-systemic-SLE, Rheumatoid Arthritis.

UNIT: IV

Structure and function of Major Histocompatability complex. Antigen recognition. Processing and Presentation. Hypersensitivity-type and mechanism. Introduction to tumor immunology. Transplantation immunology.

UNIT: V

Immunotechniques- Antigen-Antibody reaction. Precipitation, Agglutination, Immuno electrophoresis, Immunofluorescence and immuno diffusion, ELISA, RIA.

References:

Text Book:

1.Kuby J. Immunology. 5th edition.

Reference Book:

Roitt I M and Delvis P J. 2001. Essential Immunology. 10th edition. Blackwell Publishing company.

2.Playfair J. H. L. 2001. Immunology at a Glance. 7th edition. Blackwell Publishing company.

3.Janeway's Immunobiology 8th edition

4.Atlas of Immunology, 2nd edition.

5.Introduction to Medical immunology by Gabrial Virellce, Marcel Dekker.1993 .

AC-IV PRACTICAL

SEMESTER II Code: 18AMBP204

1. Blood Grouping

   (i) ABO blood grouping

   (ii) Rh Typing

` 2. WIDAL (SLIDE TEST)

3. Rapid plasma Reagain test

4. ASO latex test (Latex agglutination test)

5. Precipitation test- Single radial immune diffusion test

6. Double immuno diffusion test

7. Blood Counting (i) WBC Counting, (ii) RBC Counting, (iii) Differential counting

A.V.C COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY
SYLLABUS –B.Sc.,
CC III -MICROBIAL PHYSIOLOGY

Sub.Code :18MB305

Semester III

Objectives

To provide the basic knowledge of microbial growth, enzymology and physiological process of microorganisms.

UNIT I: Nutrition: Nutritional requirements of microorganisms-Nutritional classification (Autotrophs, Heterotrophs, Photoautotrophs, Chemoautotrophs, Copiotrophs, Oligotrophs)-Endospore structure and sporogenesis in *Bacillus*.

UNIT II: Different phases of growth- growth curve-generation time-factors influencing microbial growth-temperature, pH, pressure, salt concentration-synchronous growth and continuous culture, Diauxic growth.

UNIT III: Carbohydrate metabolism-Embden Mayerhoff Parnas pathway-Hexose mono phosphate pathway-Entner Doudoroff pathway-Tricarboxylic acid cycle-Electron transport chain- Oxidative and substrate level phosphorylation-Secondary metabolites.

UNIT IV: Anaerobic Respiration-Sulphur nitrate and CO_2 as final electron acceptor-Fermentation-Alcoholic, lactic acid, propionic and mixed acid fermentation.

UNIT V: Photosynthesis-photosynthetic pigments-oxygenic and anoxygenic- CO_2 fixation. Biosynthesis of bacterial cell wall, nucleic acid biosynthesis, biosynthesis of amino acid (Glutamic acid family)-Bioluminescence– definition and application of Quorum sensing.

Text Book

j. Prescott, L.M., J.P. Harley and C.A. Klein, 1995. Microbiology 2nd edition WMC.Brown publishers.
k. Moat, A.G. J.W. Foster, 1988. Microbial physiology. 2nd edition, springer-Verlage.

References:

- Tortora, Funke and Case. Microbiology, 8th edition.
- Doelle. H.W. 1975. Bacterial Metabolism. 2nd edition. Academic Press.
- Caldwell, D.R. 1995. Microbial physiology and Metabolism. Wm. C. Brown publishers, England.

A.V.C COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY
SYLLABUS –B.Sc.,

SBC I- MUSHROOM TECHNOLOGY AND VALUE ADDED PRODUCTS

SEMESTER: III
Sub.Code : 18SMB 301

Objectives

To enable the students to get skill on Mushroom cultivation techniques, nutritional properties and health benefits.

Unit I Mushroom morphology: Different parts of a typical mushroom & variations in mushroom morphology. Edible-Poisonous mushrooms. Biology of Mushrooms: Button, Straw& Oyster- General morphology, distinguishing characteristics, spore germination and life cycle.

Unit II Spawn & Spawning: Facilities required for spawn preparation, Preparation of spawn substrate, preparation of pure culture, PDA and SDA agar media, culture maintenance, and storage of spawn.

Unit III Mushroom Cultivation technology: Cultivation of Button, Oyster and Straw Mushrooms: Infra structure, Collection of raw materials, polythene bags – cultural rack mushroom unit – mushroom bed preparation – cropping and crop management, picking and packing. Visit to relevant Labs/Field Visits.

Unit IV Nutrient Profile and Health benefits of Mushroom: Protein, aminoacids, calorific values, carbohydrates, fats, vitamins & minerals. Antiviral value, antibacterial effect, antifungal effect, anti-tumour effect, haematological value, cardiovascular and renal effect. Therapeutic diets-adolescence, aged persons and diabetes mellitus.

Unit V Food preparation, Types of foods prepared from mushroom- soup, cutlet, omelets, papads samosa, pickles and curry. Research centre – National level and regional level. Entrepreneurship opportunities in mushroom cultivation and marketing.

Text Book:

1. Mushroom Cultivation, Tripathi, D.P. (2005) Oxford & IBH Publishing Co. PVT.LTD, New Delhi.

Reference Books:

1. Mushroom Production and Processing Technology, Pathak Yadav Gour (2010) Published by Agrobios (India).

2. A hand book of edible mushroom, S.Kannaiyan and K.Ramasamy (1980). Today and Tomorrows printers & publishers, New Delhi.

3. Handbook on Mushrooms, Nita Bahl, oxford & IBH Publishing Co.

A.V.C COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY
SYLLABUS –B.Sc.,
CC VI- PRACTICAL III

SEMESTER: III
Sub.Code : 18PMB 306

3. Effect of pH on the growth of microbes.
4. Effect of temperature on the growth of microbes
5. Effect of salt on the growth of microbes.
6. Determination of growth curve.
7. Microbial cell count by Direct plate count and by haemocytometer
8. Biochemical tests:

- Indole test
- MR-VP test
- Citrate utilization test
- Carbohydrate fermentation test
- Triple sugar Iron test
- Catalase test
- Oxidase test
- Urease test
- Nitrate test
- Starch hydrolysis

A.V.C COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY
SYLLABUS –B..Sc.,
CC VII - IMMUNOLOGY

SEMESTER: IV
Sub.Code : 18MB 407

Objectives

This course is designed to provide knowledge to the students about the immunity and the major parts of the immune system.

UNIT: I

History and Scope of immunology. Haematopoiesis-Cells of the immune system, Organs of the immune system-Primary Lymphoid organ-Bone Marrow and Thymus-Secondary Lymphoid organ-Lymph node, spleen, MALT and GALT.

UNIT: II

Immunity-Types of immunity-Innate and acquired immunity-active and passive-Humoral Immunity-Cell mediated Immunity-Complement-Properties-Biological functions of complement-Classical and alternative pathway.

UNIT: III

Imunoglobulin-Structure-Types-Functions of Immunoglobulins-Antigen-Types-Haptens-Adjuvants-Immune regulation and tolerance-Auto immune diseases-Organ specific-Good Pasteur syndrome. Grave's disease-systemic-SLE, Rheumatoid Arthritis-Vaccine-types-immunization schedule.

UNIT: IV

Structure and function of Major Histocompatability complex. Antigen recognition. Processing and Presentation. Hypersensitivity-type-Immediate, Delayed and mechanism. Transplantation immunology-Graft-Types of graft-Graft rejection-GVH, HVG-Prevention of graft rejection.

UNIT: V

Immunotechniques- Antigen-Antibody reaction. Precipitation, Agglutination, Complement fixation-Immuno electrophoresis, Immunofluorescence and immunodiffusion-Single immunodiffusion, Double immunodiffusion-ELISA, RIA.

References:

Text Book:

Kuby J. Immunology. 5th edition.

Reference Book:

Roitt I M and Delvis P J. 2001. Essential Immunology. 10th edition. Blackwell Publishing company.

Playfair J. H. L. 2001. Immunology at a Glance. 7th edition. Blackwell Publishing company.

Janeway's Immunobiology 8th edition

Atlas of Immunology, 2nd edition.

Introduction to Medical immunology by Gabrial Virellce, Marcel Dekker.1993 .

A.V.C COLLEGE (AUTONOMOUS)

MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY
SYLLABUS –B.Sc.,
CC -VIII Practical IV

SEMESTER: IV
Sub.Code : 18 MBP 408

i) Blood grouping

1. ABO Blood grouping
2. Rh Typing.

ii) WIDAL (Slide test), Tube agglutination test.

iii) Rapid Plasma Reagain test (RPR)

iv) ASO latex test (Latex agglutination test)

v) Precipitation test- single radial immune diffusion test

vi) Double immuno diffusion test

vii) Blood counting (i) WBC Counting (ii) RBC Counting (iii) Differential Counting

viii) Hemoglobin estimation-Sahli's method

ix) Separation and preservation of serum from blood sample

A.V.C COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI
DEPARTMENT OF MICROBIOLOGY
B.Sc MICROBIOLOGY
CC IX- MEDICAL MICROBIOLOGY

Semester :V Hours:5
Credits:5 Code: 18MB509

Learning objectives:

The main objective of this paper is to study about the causative agent, pathogenesis, laboratory diagnosis and treatment clinical infections.

Course outcomes:

On completion of this paper, the students would be able to
CO1: Understand the basic principles of specimen collection, handling and transport.
CO2: Learn about the sources and transmission of infections.
CO3: Discuss the characteristics, pathogenesis and lab diagnosis of bacterial infections.
CO4: Describe the characteristics, pathogenesis and lab diagnosis of fungal infections.
CO5: Understand the pathogenesis and control measures of viral infections.

Unit- I: History of medical microbiology-Safety precaution in microbiology laboratory – Specimen collection – Handling and Transport (Blood, Pus, Throat, Swab, Stool, Urine). Definition of Pathogen, Parasites, commensal, Saprophytes, carrier types and Normal flora of the human body.

Unit- II: Infection- Types of infections – sources of infection-Methods of transmission of infections- Definition-epidemics, endemics, pandemics diseases- Epidemiology of infectious disease-infectious disease cycle-control of epidemics. Nosocomial infection

Unit- III: Bacterial infection: Morphology, pathogenesis, laboratory diagnosis, prevention and treatment of Gram positive bacteria: *Staphylococcus aureus*, *Streptococcus pyogens, Clostridium tetani,Bacillus anthracis* and *Mycobaterium tuberculosis.* Gram negative bacteria: *Escherichia coli, Salmonella typhi, Shigella dysentriae* and *Vibrio cholerae*- Spirochaetes: *Treponema pallidum*- Gram negative cocci- *Neisseria gonnorhoeae*

Unit- IV: Fungal infection- Superficial mycosis-Dermatophytes- *Trichophyton* - *Epidermophyton* and *Microsporum.* Opportunistic fungi-*Aspergillus flavus, Candida albicans.* Systemic fungi *: Histoplasma capsulatum.* Parasitology: *Plasmodium falciparum, Entamoeba histolytica, Giardia lamblia* and *Leishmania donavani*.

Unit- V: Viral infections: Morphology, pathogenesis, laboratory diagnosis, prevention and treatment of Hepatitis B, Rabies, Influenza, Mumps, Measles, Rubella, Herpes simplex virus, Epstein barr virus, HIV, Swine flu, Avian flu, Corona virus- SARS-CoV-2.

Text book

1. Ananthanarayan N.R.and C.K. Jayaraman paniker 1994. Text book of Microbiology-orient Longman.
2. Praful B Godkar and Bijal Dave, 2017. Text book of Medical Microbiology and Parasitology - 1st Edition, Bhalani Publisher, New Delhi.

References

1. Jawetz Melnick and Adelberg Medical Microbiology, 27th edition
2. Mackie and Mccartney – 1995 Medical microbiology. Vol I & VolII, Churchill Livingston 14th edition
3. David Green wood-Medical microbiology, Kannan66@usa.net.in
4. Subash Chandhra Parija. Test book of medical parasitology. 4th edition

5. Fenner White's. Medical virology. 5th edition
6. Prescott LM, Harley JP and Helin DA, Microbiology, fifth edition, McGraw Hill, NewDelhi. 2002.
7. Apurba S Sastry and Sandhya Bhat, 2018. Essentials of Medical Microbiology 2nd Edition. Jaypee Medical Publisher, New Delhi.
8. Kenneth Ryan, Nafees Ahmad, J. Andrew Alspaugh, W Lawrence Drew, 2018. Sherris Medical Microbiology, 7th Edition, MGH publications, New Delhi.

A.V.C COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI
DEPARTMENT OF MICROBIOLOGY
B.Sc., MICROBIOLOGY

CC X – MOLECULAR BIOLOGY AND MICROBIAL GENETICS

Semester: V Hours:5

Credits:5 Code: 18MB510

Learning objectives:

To make the students to equip with the fundamental principles and concepts of prokaryotic genes and genomes, their molecular organization, replication and functioning.

Course outcomes:
On completion of this paper, the students would be able to
CO1: Learn the basic knowledge molecular biology, structure and types of genome
CO2: Understand the DNA replication methods in prokaryotic organism
CO3: Describe the mechanisms and gene expression in prokaryotic organisms
CO4: Learn about how the mechanism involved in gene exchange of microbes
CO5: Understand the molecular basis of mutation and its types.

Unit- 1 : Genome organization

Milestones in history – Definition of nucleic acids - Experimental proofs of DNA as the genetic material (Griffith and Hershey Chase) - Chemistry and molecular structure of DNA double helix - Discovery of DNA structure –Types and forms of DNA and RNA .

Unit- 2 : DNA replication and plasmid

DNA Replication in prokaryotes: Modes of replication-Meselson and Stahl experiment – Mechanism, enzymes involved in replication – types of replication(Theta, rolling circle and bi directional replication)- Plasmids: properties, structure and types.

Unit-3 : Transcription, translation and gene regulation

DNA Transcription: Definition – Brief account on transcriptional machinery and mechanism of transcription – Genetic code – Translation: Definition – Brief account on translational machinery and mechanisms of translation. Regulation of gene expression in prokaryotes – Operon concept – lac and trp operons.

Unit-4: Mechanisms of Genetic Exchange

Mechanisms of Genetic Exchange- Transformation - Discovery, mechanism of natural competence - Conjugation - Discovery, mechanism, Hfr and F' strains - Transduction - Generalized transduction, specialized transduction.

Unit-5: Mutation and DNA repair mechanism

Mutations and mutagenesis: Definition and types of Mutations; Physical and chemical mutagens; Molecular basis of mutations: Spontaneous and induced mutation. DNA repair mechanisms-Direct repair – photo reactivation, excision repair –base excision and nucleotide excision, mismatch repair, recombination repair and SOS repair.

Text Book

1. Verma P.S. and Agarwal V.K.2010. Molecular Biology. S. Chand and Company Pvt. Ltd., New Delhi.
2. Powar, C.B. and Daginawala,H.F.(2008),General MicrobiologyPublisher:Himalaya publishing house
3. David Freifelder. Molecular Biology, Narosa publishing house, New Delhi. 2nd edition. 2008.

References:

1. Gardner, E. J,Simmons, M J& D P Snustard ,1991 , Principles of Genetics, 8th edition. John Wiley & Sons.NY.
2. Stanly R Maloy, John E Cronan Jr. and David Freifelder. Microbial Genetics, 2nd edition, Narosa publishing house, New Delhi. 2006
3. Old RS and Primrose SB. Principles of Gene Manipulation, 4th edition, Blackwell Scientific Publications, London. 1989.
4. Watson JD, Baker TA, Bell SP et al. (2008) Molecular Biology of the Gene, 6th Ed., Benjamin Cummings
5. Lewin.B, 1990. Genes, 6th edition, Oxford University Press.
6. James D. Watson , A. Baker Tania , P. Bell Stephen, Gann Alexander, Levine Michael, Losick Richard, 2017. Molecular Biology of the Gene. Pearson Education.

A.V.C COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI
DEPARTMENT OF MICROBIOLOGY
B.Sc MICROBIOLOGY

CCXI-PRINCIPLES OF MICROBIOLOGICAL METHODS

Semester :V Hours:4

Credits:4 Code: 18MB511

Learning objectives:

To enrich the knowledge of the students to understand the basic principles of instrumentation in Microbiology and various biological techniques.

Course outcomes:
On completion of this paper, the students would be able

CO1: To understand the basic principles and techniques of microscope.

CO2: To learn the working principle and function of spectrophotometry.

CO3: To know the separation techniques and types of centrifugation

CO4: To understand the principles and application of various electrophoretic techniques.

CO5: To explain the principle, types and application of PCR.

Unit- I: Microscopic techniques-Components of microscopes - Basic principles and methods of Bright field, Dark field, Phase contrast, Fluorescence, Polarization and confocal microscopes. Electron Microscopy – Principle, Techniques and applications of Transmission Electron microscope (TEM), Scanning Electron Microscope (SEM)and Atomic Force Microscope (AFM).

Unit – II: Electrodes: Introduction-Acid and bases-Buffer-pH meter-Analysis of biomolecules using UV and visible range-Colorimetry-Spectrophotometry – Principles-Beers and Lamberts Law–-light, Radiation – interference – diffraction – electromagnetic spectrum.

Unit – III: Separating techniques: Introduction- Principles, working procedures and applications of Paper chromatography, Rf value, TLC, HPLC, Ion exchange, column Chromatography- Centrifugation types of centrifuges and rotors. Preparative ultracentrifugation - differential and density gradient.

Unit- IV: Electrophoresis- Introduction-Principles, working procedures and applications of Agarose Gel Electrophoresis-SDS PAGE-Applications of Agarose and Pulse field gel electrophoresis, counter current and rocket immuno electrophoresis.

Unit – V: Polymerase chain reaction – Principle, working procedures and applications of PCR types(RT PCR, inverse PCR, nested PCR) -Blotting Techniques (Southern, Northern and Western)-DNA Finger Printing- -RFLP and RAPD.

Text Book

1. CP Baveja, 2018. Textbook of Microbiology 6th Edition, ARYA MEDICAL (APC)
2. Ananta Swargiary, 2017. Biological Tools & Techniques, Kalyani Publishers, New Delhi.

References:

1. William claus.G.W.1989, Understanding Microbes – A laboratory text book for microbiology, W.H.Freeman and Co., New york
2. Wildon K. and Goulding K.H., 1986. Biologists Guide to principles and techniques of practical Biochemistry ELBS, London.
3. Benson. J.H.m1994 Microbiological application- A laboratory manual in General Microbiology W.W.C.Brown publication,Iowa, U.S.A.
4. Cappucino J.G and Sherman.N.1996 Microbiology – A laboratory manual Benjamin Cummings publication company California.
5. Kannan. N.1995 laboratory Manual in General Microbiology Palani paramount publication , Palani.
6. Joanne Willey, Linda Sherwood, Christopher J. Woolverton , 2017. Prescott's Microbiology, McGraw-Hill Education.

A.V.C COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI
DEPARTMENT OF MICROBIOLOGY
B.Sc MICROBIOLOGY
CCXII- PRACTICAL V

SEMESTER: V | Hours: V
Credits: 5 | Code: 18MBP512

1. Identification of bacterial pathogens from the clinical sample

i) Throat swab ii) pus iii) urine iv) sputum v) Blood

2. KOH/Lactophenol cotton blue preparation for skin scrapings for fungi.

3. Biochemical identification of *E.coli, Staphylococcus, Streptococcus* and *Klebsiella*

4. Germ tube technique

5. Antibiotic sensitivity test -MIC

6. Isolation of bacterial Chromosomal DNA

7. Isolation of plasmid DNA

8. Replica plating Technique

9. Antibiotic resistant bacteria

10. Mutagenesis by UV

11. Bacterial conjugation

12. Bacterial Transformation

13. Thin Layer Chromatography

14. Buffer Preparation

15. Agarose Gel Electrophoresis

16. Instrumentation-pH Meter, Spectrophotometer, Cooling Centrifuge, UV Trans illuminator

A.V.C COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI

DEPARTMENT OF MICROBIOLOGY

B.Sc MICROBIOLOGY

EC I FOOD AND NUTRITION

Semester: V Hours:5

Credits:5 Code:18MBE501

Learning objectives:

To familiarize students with fundamentals of food and nutrition, functions of nutrients nutritional requirement and to identify common adulterants in various foods.

Course outcomes:

At the end of the course the students will be able to

CO1: Importance of nutrients and their functions in the body.
CO2: Plan diets for various age groups
CO3: Illustrate about nutritionally deficiency disorders.
CO4: Discuss the adulterants in various food items
CO5: Describe the therapeutic values of fermented foods

UNIT- 1: Basic concepts in food and nutrition

Definition for food, nutrition and Health– Functions, dietary sources and clinical manifestations of the following nutrients: Carbohydrates, lipids and proteins- Fat soluble vitamins - Water soluble vitamins -Minerals – calcium, iron and iodine

UNIT- II: Nutrition for different age groups:

Physiological changes, RDA, nutritional guidelines, nutritional concerns and healthy food

Choices: children-Adolescents-Pregnant Woman-Elderly

UNIT- III: Nutritional deficiency disorders:

Causes, symptoms, treatment, prevention of the following:- Protein Energy Malnutrition (PEM)-Vitamin A Deficiency (VAD)-Iron Deficiency Anemia (IDA)-Iodine Deficiency Disorders (IDD)-Sodium,Potassium, calcium and Zinc deficiency disorders.

UNIT- IV: Food Adulteration:

Definition of food adulteration- Adulterants in commonly consumed food items- Prevention of Food Adulteration (PFA) Act-Brief account on AGMARK, Bureau of Indian Standards (BIS), ISO-9001:2005-FSSAI.

UNIT -V:

Value added fermented foods and their therapeutic uses: Butter milk, acidophilus milk, Kefir and koumiss, Cheese, Yoghurt and Sauerkraut.

Text Book

9. Begum R M, 2008. A Textbook of Foods, Nutrition & Dietetics, Sterling Publishers Pvt. Ltd.
10. Swaminathan, 2018. Handbook of Food and Nutrition, Bappco.

References:

1. Srilakshmi B. Dietetics; Fourth Ed; 2002; New Age International (P) Ltd.
2. Srilakshmi B. Food Science; Fourth Ed; 2010; New Age International (P) Ltd.
3. Swaminathan M. Handbook of Foods and Nutrition; Fifth Ed; 1986; BAPPCO.
4. The Food Safety and Standards Act along with Rules and Regulations. Delhi:Commercial Law Publishers (India) Pvt Ltd, 2011.
5. George C. Davis , Elena L. Serrano, 2016. Food and Nutrition Economics: Fundamentals for Health Sciences (Food and Public Health) 1st Edition, Oxford University Press; 1st Edition.

A.V.C COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI
DEPARTMENT OF MICROBIOLOGY
B.Sc MICROBIOLOGY
NMEC I - FOOD MICROBIOLOGY
III B.Sc BIOTECHNOLOGY

Semester: V Hours:2

Credits: 2 Code: 18NMMB501

Learning Objectives:

To study about the food microflora, food fermentations, food preservation, food spoilage, food poisoning and food quality control.

Course outcomes:
On completion of this paper, the students would be able to
CO1: Learn about important and factors affecting the growth of microbes in food
CO2: Explain the how preserved food by various preservation methods
CO3:Understand the process of spoilage and contamination
CO4: Learn about the importance of fermented food products
CO5: To knowledge about the food borne infection by microorganisms

UNIT- I: Introduction: History and Scope of Food Microbiology – Microorganisms present in food - Molds, yeasts and bacteria – General characteristics and importance – factors affecting the growth of microorganisms in food(Intrinsic and Extrinsic factors).

UNIT-II: Principles of food preservation: Asepsis – Removal of microorganisms, anaerobic conditions – Canning- High temperature – Low temperature – Drying – Food additives.

UNIT- III: Food Spoilage and Causes: Contamination and Spoilage – Vegetables and fruit meat and meat products, milk and milk products- Fish, sea foods and poultry.

UNIT- IV: Food fermentation: Bread, Vinegar, fermented vegetables-Sauerkraut. Fermented dairy products-Cheese and Yoghurt – Oriental ferment foods (Tempeh, soy sauce) and fermented beverage- Beer,Wine.

UNIT-V: Food borne infections and intoxication: Bacterial- *Salmonella typhimurium* , *Staphylococcus aureus, Clostridium botulinum*, Non bacterial-Aflatoxin, Amoebiasis, Algal intoxication– food borne diseases out break – laboratory testing – preventing measures. Food sanitation –HACCP–quality control in food processing.

Text Book:

1. Ramanathan, N. 2009. Food Microbiology, Om Sakthi Publication.
2. Sivakumar PK, Joe MM and Sukesh K. An introduction to Industrial Microbiology. First edition, S. Chand and Company Ltd, New Delhi. 2010.

References:

1. Adams MR and Moss MO. Food microbiology, New Age international (P) Ltd., New Delhi.2006.
2. Stanbury , P.M.A.Whitaker and S.J.Hall – Principles of Fermentation Technology 2nd edition

3. Fraziar, W.C and Westho , D.C.C 1988 – Food Microbiology – 4th edition. Mc Graw Hill, Newyork.
4. Casida, J.M.1987 Modern Food Microbiology, CHS publishers and Distributors. New Delhi.
5. Foster W M, 2016. Food Microbiology, CBS Publishers and Distributors

A.V.C COLLEGE (AUTONOMOUS),MANNAMPANDAL, MAYILADUTHURAI
DEPARTMENT OF MICROBIOLOGY

B.Sc MICROBIOLOGY
SBC II -MEDICAL LABORATORY TECHNOLOGY

Semester:V Hours:2

Credits:2 Code: 18SMB502

Learning Objectives :

To enrich the knowledge of the students with the potential basic techniques of laboratory hazards and efficient to investigate for clinical pathology, haematology and serology for detection of various diseases.

Course outcomes:
On completion of this paper, the students would be able
CO1: To learn about the basic knowledge about laboratory hazard and safety
CO2: To analysis the urine sample and identified the clinical pathogen
CO3: To collect and examine the blood sample.
CO4: To get adequate knowledge about serum tests
CO5: To isolate and identification of pathogenic organisms from clinical specimens.

Unit-I

Introduction and scope of Medical Lab Technology- Rules and regulations followed in Lab – maintenance of Records-Specimen collection and processing of blood and urine- separation of serum and plasma, deproteinization of sample, Handling of specimens for testing, preservation of specimen, transport of specimen, factors affecting the clinical results, effect of storage on sample.

Unit-II

Physical, chemical and microscopic examination of urine-Bence Jones Proteinuria and its clinical significance, qualitative test of urine-reducing sugars, protein, ketone bodies, bile Salt, bile pigments, urobilinogen, occult blood, uric acid, urea and Creatinine-Quantitative estimation of 24 hrs urine for protein and their clinical significance-Microbiological Examination of Urine.

Unit-III

Collection of blood (Venous and Capillary) Preservation of blood – Importance of blood bank, anticoagulants used in blood bank - ABO Blood grouping Rh typing - Blood transfusion-Total RBC count – Total leucocytes count - Differential count – Haemoglobin estimation, ESR, PCV - Bleeding and clotting time and Platelet count.

Unit-IV

Estimation of blood sugar, Glucose tolerance tests (GTT), Glycosilated haemoglobin (HbA1C). Lipid determination of serum lipids – cholesterol, TGL, HDL, LDL, VLDL-Liver function tests: Estimation of Total Protein, Albumin & A/G ratio, Estimation of Bilirubin – total and conjugated. Renal function test: Estimation of NPN substances a) Blood Urea, b) Serum Creatinine. c) Serum Uric acid.

Unit-V

Histopathology and its applications in Mycology-Introduction – Fixatives - Microtechnique – Tissue processing, Fixation – Dehydration – Embedding, sectioning, staining and mounting - Cancer staining - Pap's stain - Biopsy.

Text book:

1. Medical Laboratory Technology, Procedure manual for routine diagnostic tests by Kani L Mukherjee and Swarajit Ghosh. 2nd Edition (Volume I - III) Mc Graw Hill Pub. (2010).

2. Sood.R., 2006. Textbook of Medical Laboratory Technology, Jaypee, New Delhi.

3. Darshan P. Godkar, Praful B. Godkar, 2014.Textbook of Medical Laboratory Technology (Set of 2 Volumes) - Clinical Laboratory Science and Molecular Diagnosis 3rd Edition, Bhalani Publishing House.

4. Sant M. 2020. Textbook of Medical Laboratory Technology, CBS publications.

5. Godkar P.B. 2020. Textbook of Medical Laboratory Technology Vol 1 & 2, Bhalani Publishing House.

Reference Books:

1. Gradwohl, Clinical Laboratory-methods and diagnosis, Vol 1.

2. Sabitri sanyal, Clinical pathology, B.I.Churchill Livingstone (P) Ltd, New Delhi, 2000.

3. Gurumani N, (2008). Research Methodology for Biological Sciences, MJP Publishers.

4. Kanai and L Mukherjee and A K Chakravarthy, 2017. Medical Laboratory Technology Volume 1, McGraw Hill Publishers.

A.V.C COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI
DEPARTMENT OF MICROBIOLOGY
B.Sc MICROBIOLOGY

CC XIII- SOIL AND ENVIRONMENTAL MICROBIOLOGY

Semester : VI Hours:4

Credits:4 Code: 18MB613

Learning objectives:

To provide the fundamental knowledge about the various scope on soil and Environmental microbiology and role of microorganisms in various ecosystem.

The main goal is to know and understand the role of microbes in biogeochemical processes in different ecosystems.

Course outcomes:
On completion of this paper, the students would be able to
Learning outcomes: On completing the course, the students would be able to
CO1: Discuss the importance of soil microbes
CO2: Describe about Microbial interactions
CO3: Bring out importance of microbes in bio geo cycling of nutrients.
CO4: Enumerate the microbes in air
CO5: Describe about the water borne diseases.

Unit- I: Introduction to soil microbiology-Soil types and its properties. Soil profile. Microbial flora of soil- Bacteria, Actinomycetes, Fungi, Algae, Viruses, Protozoan and nematodes. Factors affecting the growth of microbes in soil.

Unit- II: Microbe-Microbe Interactions Mutualism, Commensalism, Synergism, Parasitism, Amensalism, Competition - Plant-Microbes interactions: Rhizosphere, Phyllosphere, Siderophores and Mycorrhizae-Endo and Ecto Mycorrhizae-VAM.

Unit- III: Biogeochemical cycles. – Carbon, Sulfur, Phosphorus. Nitrogen Cycle –N_2 fixation-symbiotic and non-symbiotic-mechanism of nitrogen fixation- nif gene- Biopesticides-*Bacillus thuringiensis.*

Unit-IV: Microbiology of air – Sources of microorganisms in air – Assessment of air quality – air sampling techniques – Enumeration of air borne organisms – air borne diseases – air sanitation.

Unit- V: Types of aquatic ecosystems: fresh water – ponds, lakes, streams- estuaries. Marine habitats –, mangroves, deep sea. Zonations -eutrophication – food chain. Potability of water – microbial assessment of water quality – brief account of water borne diseases.

Text Book:

i) Alexander. (1997). Introduction to soil Microbiology. John Wiley and Sons. N.Y.
ii) Subba Rao, N.S. (1995). Soil Microorganisms and plant growth, Oxford and IBH publishing Co. Pvt. Ltd.
iii) Atlas, R. M. and Bartha. R. (1992). Microbial Ecology: Fundamentals and Applications. 3 rd Edition. Benjamin Cummings. Redwood City. CA.
iv) K Vijaya Ramesh, 2019. Environmental Microbiology, MJP Publisher

Reference Books:

10. Michell, R. (1974). Introduction to Environmental Microbiology. Prentice- Hall. Inc. Englewood Clilffs – New Jersy.
11. Paul, E.A. and Clark. F.E. (1989). Soil Microbiology and Biochemistry. Academic pres New York.
12. Subba Rao, N.S. (1995). Biofertilizers in Agriculture and Forestry. 3rd Edition. Oxford and IBH publication Co. Pvt. Ltd., New Delhi.
13. Rao N. S. Subba, 2017. Soil Microbiology 4th Edition, Oxford & IBH Publishing Co Pvt.Ltd.

A.V.C COLLEGE (AUTONOMOUS)MANNAMPANDAL, MAYILADUTHURAI
DEPARTMENT OF MICROBIOLOGY
B.Sc MICROBIOLOGY
CC XIV- FOOD AND INDUSTRIAL MICROBIOLOGY

Semester: VI Hours:4
Credits:4 Code: 18MB614

Learning objectives:

The aim is to study about the food microflora, food fermentations, food preservation, food spoilage, food poisoning and food quality control.
To learn the screening of industrial strains, fermenters, media, fermentation process and downstream process.

Course outcomes:
On completion of this paper, the students would be able to
CO1: Discuss the factors affecting the growth of microbes in food
CO2: Understand the process of spoilage and contamination
CO3: Learn about the importance of fermented food products
CO4: Describe the process of screening of microbes and strain improvement
CO5: Explain the process of down stream process.

Unit- I: Food and microorganisms – Importance and types of microorganisms in food (Bacteria, Mould and Yeasts) - Sources of contamination- Factors influencing microbial growth in food – pH, moisture, Oxidation-reduction potential, nutrient contents and inhibitory substances. Food preservations: principles- methods of preservations-Asepsis, anaerobic condition –high and low temperature-drying- chemical preservatives.

Unit -II: Contamination and spoilage of cereal products-vegetables-milk and milk products and meat and meat products. Spoilage of canned food. Food intoxication and food borne diseases – *Staphylococcus, Clostridium botulinum, Vibrio parahaemolyticus*, Salmonellosis-Hepatitis A, Amoebiosis. Algal intoxication and Mycotoxins(Aflatoxin).

Unit- III: fermented foods: – Microorganisms important in fermentation. Fermented dairy products (yoghurt and Cheese) - plant products- Bread, Sauerkraut and Pickles - Fermented beverages- Beer and wine. Food sanitation and control.

Unit- IV: Industrially important microorganisms- Primary and secondary screening and preservation of industrially important strains. Strain improvement. Fermenter - Design, types and basic functions (continuous stirred tank , bubble column, airlift fermenter, tower fermenter). Types of fermentation.

Unit- V: Downstream processing - recovery and purification of fermentations products (intracellular and extracellular), cell disruption, precipitation, filtration, centrifugation and drying. Industrial production of alcohol, vinegar, amylase, penicillin, vitamin $B_{12.}$.

Text Book:

6. Ramanathan, N. 2009. Food Microbiology, Om Sakthi Publication.
7. Sivakumar PK, Joe MM and Sukesh K. An introduction to Industrial Microbiology. First edition, S. Chand and Company Ltd, New Delhi. 2010.

Reference Books:

1. Adams MR and Moss MO. Food microbiology, New Age international (P) Ltd., New Delhi.2006.
2. Chris Bell, Paul Neaves, Anthony P. Williams. Food Microbiology and Laboratory Practicals 2nd edition, Blackwell Scientific Publishers, UK. 2006.
3. Frazier WC and Westhoff DC. Food Microbiology, Sixth edition, Tata McGraw-Hill Publishing Ltd., New Delhi. 2005.
4. Casida LE Jr. Industrial Microbiology, 5th edition, Wiley Eastern Ltd., New Delhi. 1993.
5. Crueger W and Crueger A. Biotechnology: A Test Book of Industrial Microbiology, 2nd edition. Panima Publishing corporation, New Delhi. 2000.
6. Glazer NA and Nikaido H. Microbial Biotechnology: Fundamentals of Applied Microbiology 2nd edition, Cambridge University Press. 2007.
7. Patel AH. Industrial microbiology. Published by Mac Millan India Ltd., Chennai. 2005.
8. Prescott LM, Harley JP and Helin DA, Microbiology, fifth edition, McGraw Hill, NewDelhi. 2002.
9. Purohit SS, Saluja AK, Kakrani HN, Pharmaceutical Microbiology. First edition, Agrobios India. 2004.
10. Stanbury PF, Whitaker A and Hall SJ. Principles of Fermentation Technology, second edition, Aditya Book (p) Ltd., New Delhi. 1999.
11. Foster W M, 2016. Food Microbiology, CBS Publishers and Distributors.

A.V.C COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI

DEPARTMENT OF MICROBIOLOGY

B.Sc., MICROBIOLOGY

CCXV-MICROBIAL BIOTECHNOLOGY

Semester :VI Hours:4

Credits:4 Code: 18MB615

Learning objectives:

To understand the various applications of microbial biotechnology in medicine, industry, and applications of rDNA technology in plants and animal.

Course outcomes:

On completion of this paper, the students would be able to

CO1: Critically evaluate the role of micro-organisms in specific biotechnological processes

CO2: Learn about the recombinant DNA technology and cloning vector

CO3: Describe the production of enzyme and fuel by microorganisms

CO4: Understand the process of development of genetically modified plants

CO5: Discuss about the human gene therapy and diagnostic of genetic diseases.

Unit- I: Biotechnology: Definition – Milestones in History - Scope of microbial biotechnology and its applications - Microbial production of pharmaceuticals – antibiotics, hormones (insulin), enzymes (streptokinase), recombinant vaccines (Hepatitis B vaccine) – Edible vaccine, Single cell Protein(Spirulina).

Unit- II: Genetic Engineering; . Cloning vector-plasmids, bacteriophage, Cosmids- restriction enzymes-types, recognition site and specificity, ligases and their uses. Principles and applications of rDNA technology. Cloning strategies-Gene library-cDNA Cloning.

Unit- III: Enzyme technology : Production, Microbes and applications-enzyme immobilization-methods and substrate, application and advantages-Biosensors-Microalgal biotechnology; Biotechnological potential of microalgae as food, feed and fuel production.

Unit- IV: Genetic engineering in plants: Ti plasmid derived vector systems - Development of insect, virus and herbicide resistant plants, stress and senescence tolerant plants, modification of flower nutritional content, sweetening by genetic engineering.

Unit- V: Transgenic animals: Introduction-History-methods of creating transgenic mice, cattle and sheep. Human gene therapy – in vivo and ex vivo gene therapy. Molecular diagnostics for genetic diseases.

Text Book:

3. Sathyanarayana, U 2005. Text book of Biotechnology, Book and Allied (P) Ltd, Kolkata.
4. Patnaik,2012. Textbook of Biotechnology. McGraw Hill Publications.
5. N. Arumugam, A. Thangamani, L.M. Narayanan, V. Kumaresan, 2017. Microbial Biotechnology, Saras Publication.

Reference Books:

1. Glazer, A.N. and H. Nikaido. Microbial Biotechnology: Fundamentals of Applied Microbiology, 2 nd edition. Cambridge University Press. 2007.
2. Old RW and Primrose SB. 1995. Principles of gene manipulation- An introduction to Genetic Engineering 5th Ed. Blackwell Scientific Publications, London.
3. Glick BR and Pasternak JJ. 2003. Molecular Biotechnology-Principles and applications of Recombinant DNA. ASM Press, Washington DC.
4. Alexander N. Glazer, Hiroshi Nikaido, 2007. Microbial Biotechnology: Fundamentals of Applied Microbiology, Cambridge University Press.
5. Crommelin, J.A.D. R. D. Sindelar, and B. Meibohm. 2013. Pharmaceutical Biotechnology: Fundamentals and Applications, 4th Edition. Springer.

A.V.C COLLEGE (AUTONOMOUS),

MANNAMPANDAL, MAYILADUTHURAI-609 305

DEPARTMENT OF MICROBIOLOGY

B.Sc., Microbiology

CC-XVI-PRACTICAL VI

Semester: VI Hours:6

Credits:5 Code: 18MBP616

- Isolation of bacteria, fungi and Actinomycetes from soil.
- Isolation of VAM fungi from roots.
- Enumeration of microorganisms from air by open plate method
- Air sampling technique by Reuters Centrifugal air sampler
- Water quality analysis by MPN technique
- Isolation of microorganisms from spoiled foods.
- Milk quality testing by Methylene blue reduction test.
- Yoghurt Production
- Sauerkraut Production
- Wine production
- Amylase production
- Cultivation of spirulina
- Enzyme immobilization.
- Enzyme purification by ammonium salt precipitation.

A.V.C COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI-609 305

DEPARTMENT OF MICROBIOLOGY

B.Sc Microbiology

EC II-BIOETHICS & INTELLECTUAL PROPERTY RIGHTS

Semester :VI Hours:4

Credits:4 Code: 18MBE602

Learning objectives:

To introduce fundamental aspects of Intellectual property Rights, patents, registration aspects of patents, copyrights and its related rights.

Course outcomes:

On completion of this paper, the students would be able to
CO1: Learn about the general ethical concerns of science
CO2: Understand the animal rights and learn about the human gene therapy
CO3: Discuss about the human embryonic development
CO4: Learn in detail about the Intellectual property rights
CO5: Describe the types of patents in biology.

Unit-I: General ethical concerns: the use of nature, different views of nature, dynamic nature, interfering with nature, integrity of species, Reducing genetic diversity: biological warfare, public perception of science.

Unit-II: Animal rights: making new strains of animal ethical limits of use. Religious views of animal status, philosophical views of animal status and regulations. Human gene therapy, ethics of somatic cell gene therapy, efficiency of treatment, safety of transferred genes, protecting human life, effect on family life, economic factors, application of gene therapy.

Unit-III: Status of human embryo: Human embryonic development, ethics through embryo development-Scientific Research on Human embryos. Experimental goals of human embryo Research. Human Development, quantum of Embryo experimentation in ethical.

Unit-IV: Intellectual Property Rights (IPRs): History and evaluation of IPR – like patent design and copyright. Various forms of IP – patents, industrial designs, trade secrets, geographical indications. copyright: fair use, protection of indigenous intellectual property.

Unit- V: Basic, principles and general requirements of patent and patent law. Patenting of living organisms, procedure involved in patenting, patent infringement, patent filing and international patent law. Types of patents in biology-Patenting laws in India-Conservation of Biodiversity-Trade Related Intellectual Property Rights (TRIPS)-General Agreement on Trade and Tariff (GATT) WTO and WIPO.

Text Book:

1. Deepa Goel and Shomini Parashar, 2013. IPR, Biosafety and Bioethics, Pearson India.
2. Na. Vikram,2020. Best Textbook of Bioethics Biosafety and IPR. Independently Published.

Reference Books:

Naney, S. Jecker, Albert R.Johnson, Fobert A. Pearlman. Bioethics: An introduction to history. Methods and Practice (1997). Sudbury M.A. Jones and Barlett Publishers.

Mittal,D.P (1999). Indian patents Law. Jaxmann Allied Services (P) Ltd.

Matthew Rimmer. "Intellectual Property and Biotechnology: Biological Inventions" Edward Elgar. (2008).

Neeraj, P., & Khusdeep, D. (2014). *Intellectual Property Rights*. India, IN: PHI learning Private Limited.

Ahuja, V K. (2017). *Law relating to Intellectual Property Rights*. India, IN: Lexis Nexis.

Nithyananda, K V. (2019). *Intellectual Property Rights: Protection and Management*. India, IN: Cengage Learning India Private Limited.

Sibi G. 2020. Intellectual Property Rights, Bioethics, Biosafety and Entrepreneurship in Biotechnology. I K International Publishing House Pvt. Ltd.

A.V.C COLLEGE OF (AUTONOMOUS),
MANNAMPANDAL, MAYILADUDHURAI-609 305
DEPARTMENT OF MICROBIOLOGY
B.Sc MICROBIOLOGY
EC III-CELL BIOLOGY

Semester : VI Hours:4
Credits:4 Code: 18MBE603

Learning objectives:
To understand the structure and functions of prokaryotic and eukaryotic cells
Course outcomes:
On completion of this paper, the students would be able to
CO1: Learn the basic knowledge about the prokaryotic and eukaryotic cells
CO2: Describe about the prokaryotic cell structure
CO3: Understand the cell structure and functions of eukaryotic organism
CO4: Learn about the morphology of chromosome
CO5: Discuss about the cell division and phases of cell cycle

UNIT- I: Introduction - History and scope of cell biology-cell theory-protoplasm theory-germ plasm theory-organismal theory- General structure of prokaryotes and Eukaryotes-Difference between prokaryotes and Eukaryotes.

UNIT - II: Prokaryotic cell structure: Cell wall(Gram positive and Gram negative)- Flagella and its ultra-structure-fimbriae- capsules- mesosomes- ribosomes- nucleoids- Inclusion bodies - Endospores.

UNIT - III: Eukaryotic cell structure and functions: Plasma membrane /cell membrane-Different models of Plasma membrane – cell wall – protoplasm- cytoskeleton – nucleus – Ribosomes – Mitochondria – Endoplasmic reticulum– Golgi complex – Plastids – lysosomes and peroxisome – centrosome.

UNIT - IV: **C**hromosome: Definition –History of chromosome discovery –Morphology : number ,size and shape of chromosomes – chromatid – chromomeres, centromeres – telomeres-nucleosomes.

UNIT - V: Cell division and cell cycle: mitosis – Definition – phases of mitosis – prophase, Metaphase, Anaphase, Telophase and Cytokinesis. Meiosis – Definition – phases of meiosis – Prophase-I, Metaphase-I, Anaphase I and Telophase I.

Text Book:

- N. Arumugam,2010. Cell Biology, Saras Publication
- Sadava D. E, 2009. Cell Biology, CBS Publishers.
- P.S. Verma & V.K. Agarwal (2009) Cell Biology, S. Chand & Co., New Delhi.

Reference Books:

1. Verma P.S. and Agarwal V.K. (2016) Cell Biology (Cytology, Biomolecules, Molecular Biology), Paperback, S. Chand and Company Ltd.
2. Hardin J. and Bertoni G. (2017) Becker's World of the Cell, 9th Edn (Global Edition). Pearson Education Ltd.
3. KumarP. and Mina U. (2014) Life Sciences: Fundamentals and Practice, Part-I, 4thEdn. Pathfinder Publication. p.582.

A.V.C COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI
DEPARTMENT OF MICROBIOLOGY
NMEC II-MEDICAL MICROBIOLOGY

III B.Sc., Biotechnology

Semester : VI Hours:2

Credits:2 Code: 18NMMB602

Learning Objectives:

To impart knowledge of the basic principles of bacteriology, virology, mycology, including the nature of pathogenic microorganisms, pathogenesis, laboratory diagnosis, transmission, prevention and control of diseases

Course outcomes:

On completion of this paper, the students would be able to

CO1: Learn about the basic principles of medical microbiology and infectious disease

CO2: To knowledge about the laboratory hazard and safety

CO3: Understanding the characteristics of bacteria, mechanism of pathogenesis.

CO4: Describe the structure and multiplication of medically important viruses

CO5: To knowledge about human mycotic infection caused by various pathogenic fungi.

Unit-I: Basics in Medical microbiology - Infectious diseases overview. Microbial diseases - sources, route of transmission. Pathogenesis - adhesion, invasion, host cell damage, release of pathogens. Microbial virulence and virulence factors. Nosocomial infections.

Unit-II: Diagnosis of microbial diseases - Laboratory hazards and safety- Collection, transport and preliminary processing of the following clinical samples; Blood, Sputum, Pus and Urine.

Unit-III: Bacteriology - Characteristics, classification, pathogenesis, diagnosis, treatment, prevention and control of diseases caused by *Staphylococcus aureus*, *Clostridium botulinum*, *Salmonella typhi*, *Vibrio cholerae*, *Mycobacterium tuberculosis*.

Unit-IV: Virology - Structure, multiplication, pathogenesis, diagnosis, treatment, DNA viruses – Pox- small poxvirus,Herpes virus - Herpes Simplex Virus , Hepatitis virus - Hepatitis-B; RNA viruses – Picorna virus– Polio virus, Orthomyxo virus-influenza virus, Rhabdo virus – Rabies virus. Viral vaccines and antiviral agents.

Unit-V: Mycology - Human mycotic infections caused by Dermatophytes, *Candida albicans, Histoplasma capsulatum*-Parasitology - Medical importance of *Entamoeba histolytica*, *Giardia lamblia*, *Plasmodium falciparam*.

Text Book:

1. Ananthanarayan N.R.and C.K. Jayaraman Paniker 1994 Text book of Microbiology-orient Longman
2. Sathyanarayana, U 2005. Text book of Biotechnology, Book and Allied (P) Ltd, Kolkata.
3. Patnaik,2012. Textbook of Biotechnology. McGraw Hill Publications.
4. N. Arumugam, A. Thangamani, L.M. Narayanan, V. Kumaresan, 2017. Microbial Biotechnology, Saras Publication.

Reference Books:

l. David Greenwood, Richard CD, Slack, John Forrest Peutherer. (1992) Medical Microbiology. 14th edition. ELBS with Churchill Livingstone.

m. Topley & Wilsons's. (1990) Principles of Bacteriology, Virology and Immunity, VIII edition, Vol. III Bacterial Diseases, Edward Arnold, London.

n. Topley & Wilson's Microbiology and Microbial infections. 10th edition. Volumes 1- 6: 2008 Arnold, London.

o. Kwon-Chung K.J and Bennett JE. 1992. Medical Mycology. Lea and Febiger, Philadelphia, USA.

p. Bailey and Scott's Diagnostic Microbiology- 11th edition: Eds: Forbes BA, Sahm DF, Weissfeld AS. 2002, Mosby, St. Louis, USA.

q. Prescott LM, Harley JP and Helin DA, Microbiology, fifth edition, McGraw Hill, NewDelhi. 2002.

6. Glick BR and Pasternak JJ. 2003. Molecular Biotechnology-Principles and applications of Recombinant DNA. ASM Press, Washington DC.

7. Alexander N. Glazer, Hiroshi Nikaido, 2007. Microbial Biotechnology: Fundamentals of Applied Microbiology, Cambridge University Press.

8. Crommelin, J.A.D. R. D. Sindelar, and B. Meibohm. 2013. Pharmaceutical Biotechnology: Fundamentals and Applications, 4th Edition. Springer.

A.V.C COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI
DEPARTMENT OF MICROBIOLOGY
B.Sc MICROBIOLOGY
SBC III BIO INOCULANTS

Semester: VI Hours:2
Credits:2 Code: 18SMB603

Learning objectives:
The aim of the course is to make the student to learn the importance of biofertilizers in agriculture and to know about field application and production technologies.

Course outcomes:
On completion of this paper, the students would be able to
CO1: Discuss the microbes used as biofertilizers
CO2: Learn about the role of symbiotic N_2 and their applications
CO3: Understand the role of cyanobacteria in rice cultivation
CO4: Describe the isolation and mass multiplication of phosphate solubilizers
CO5: Discuss the mycorrhizal bioinoculants and their applications

Unit- I: General account of the microbes used as biofertilizers for crop plants and their advantages. Symbiotic N_2 fixers: *Rhizobium* - Isolation, identification, Classification, inoculum production and field application. *Frankia* - Isolation, characterization - actinorrhizal nodules - non-leguminous crop symbiosis.

Unit-II: Non - Symbiotic N_2 fixers - *Azospirillum* - Free living - *Azotobacter* - free isolation, characterization, mass inoculum production and field application.

Unit-III: Algal bio fertilizers: Cyanobacteria, Azolla - Isolation, mass multiplication - Role in rice cultivation - Crop response – field application .

Unit-IV: Phosphate solubilizers - Phosphate solubilizing microbes - Isolation, mass inoculum production, field application - Phosphate solubilization mechanism.

Unit-V: Mycorrhizal bioinoculants - classification - Isolation of VA mycorrhizae - Mass inoculum production of VAM - field applications of Ectomycorrhizae and VAM. National and Regional Biofertilizers Production and Development centers.

Text Book:

x) Kannaiyan, S. (2003). Biotechnology of Biofertilizers, CHIPS, Texas.
xi) R M Khobragade; P P Dixit, 2007. Handbook of biofertilizers and biopesticides, Jaipur, India : Oxford Book Co.,

Reference Books:

1. Mahendra K. Rai (2005). Hand book of Microbial biofertilizers, The Haworth Press, Inc. New York.
2. Reddy, S.M. *et. al.* (2002). Bioinoculants for sustainable agriculture and forestry, Scientific Publishers.
3. Subba Rao N.S (1995) Soil microorganisms and plant growth Oxford and IBH publishing co. Pvt. Ltd. NewDelhi.
4. Subba Rao N.S. (1988) Biofertilizers in Agriculture and forestry Oxford and IBH Publishing Co., Ltd., New Delhi. B.Sc. Microbiology: Syllabus (CBCS) 40 ELE
5. Rao BNS, 2019. Biofertilizers In Agriculture And Forestry 3rd Edition. Oxford & Ibh Publishing.

A.V.C COLLEGE (AUTONOMOUS),
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc.,

CCI –GENERAL MICROBIOLOGY AND MICROBIAL DIVERSITY

SEMESTER: I **CODE: 18 PMB 101**

UNIT I

History and development of Microbiology-Bacteria: Morphological types; cell wall – cell walls of Gram negative, Gram positive, halophiles. L-forms and Archaebacteria, Cell wall synthesis, cell membrane, capsule type's composition and function. Structure and function of flagella, fimbriae and pili, gas vesicles, chlorosomes, carboxysomes, magnetosomes and phycobilisomes. Reserve food materials - polyhydroxybutyrate, polyphosphates, cyanophycin and sulphur inclusions. Nuclear material - bacterial chromosomes and bacterial plasmids.

UNIT II

Microscopy-Bright Field, Dark Field-Fluorescence-Phase Contrast-Electron microscope-SEM, TEM-staining methods-simple, differential-grams, capsular, endospore, acid fast, flagella staining-Motility determination-Sterilization-Heat, Physical and chemical- Culture media, pure culture technique-Anaerobic culture methods-preservation of microbial cultures.

UNIT III

Microbial systematic - Microbial evolution and Phylogeny - Molecular chronometers Evolutionary distance - Taxonomy and classification - Classical approach - Numerical taxonomy - Molecular based classification - Phylogeny of microbial Diversity -phylogenetic groups of prokaryote and eukaryotes

UNIT-IV

Bacterial diversity -Gram positive rod and cocci-Gram negative- rods and cocci- Aerobic, Anaerobic, facultative, Microaerophilic- Rickettsias and Chlamydia-Spirochetes-Mycoplasma-Actinomycetes. Archael Diversity: Cell structure. Ecology of Archaea - Taxonomic functional groups of Archaea Methanogens, Archaeal sulfur reducers, Extreme halophilic, Cell wall less archaea.

UNIT V

Biodiversity of eukaryotic microorganisms: Algae, fungi and protozoa. Algae- Morphological diversity and reproductive strategies. Fungi - Filamentous fungi - Morphological diversity - Growth and reproduction - Protozoa -Morphological diversity and reproductive strategies.

Text book

• Michael J. Pelzar. Jr., E.C.S. Chan, Noel R. Krieg, Microbiology, 1993 (Fifth edition), Tata McCraw Hill, New Delhi.

• Prescott, L. M., J. P. Harely and D. A. Klain, Microbiology, 2003 (5 th Edition) McGraw Hill, New York.

References

4. Atlas, R.M. 1997. Principles of Microbiology. WCB Mc Graw Hill.
5. Balows, A., H.G. Truper, M. Dcvorkin. W.lIardcr. K.H. Schleifer. 1992.
6. Prokuryotes Springer vcrlog, New York.

A.V.C COLLEGE (AUTONOMOUS),
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc.

CCII - MICROBIAL METABOLISM

SEMESTER: **CODE: 18 PMB 102**

UNIT I

Growth and regulation: Nutritional requirements - macro and micro nutrients - Vitamins Coenzymes. Transport of nutrients across the membrane - diffusion, active, passive transport and osmoregulation. Nutritional groups. Growth curve - factors affecting growth - Growth determination - bacterial growth kinetics - batch, continuous and synchronous culture.

UNIT II

Cell differentiation : Cell differentiation in C*aulobacter crescentus* - development of dormant and resting structures in Cyanobacteria –Heterocysts, Akinates, Hormogones. Endospores- Sporulation in *Bacillus*, *Streptomyces* - Germination and regulation.

UNIT III

Carbohydrates Metabolism - Glycolytic pathways - Embden Mayer Hoff Pathway, The Pentose Phosphate Pathway, The Entner Doudoroff pathway, The tricarboxylic acid cycle, Glyoxalate cycle. Aerobic respiration - Chemoorganotrophic bacteria. Substrate level phosphorylation, Oxidative phosphorylation, Anaerobic respiration - Sulfur compounds - nitrate and carbon dioxide as electron acceptors. . Fermentation - alcoholic, propionic, lactic and mixed acid. Fermentation by *Ruminococcus albus*.

UNIT IV

Biosynthesis of molecules. Synthesis of fatty acids, phospholipids and archaeal lipids. Biosynthesis of nucleotides - Purines, pyrimidines. Biosynthesis of amino acids and bacterial cell wall of gram positive and negative cell.

UNIT V

Photosynthesis: Classification of photosynthetic bacteria- Anoxygenic photosynthetic bacteria-Purple photosynthetic bacteria-Green sulfur bacteria- Oxygenic photosynthetic bacteria-Cyanobacteria. Photosynthetic pigments- Bacteriochlorophyll- carotenoids, Bacteriorhodopsin- phycolibins- Mechanisms of photosynthesis-Cyclic and non cyclic photophosphorylation -Calvin benson cycle.

Text book

7. Moat, A.G. and J.W. Forster, 1995. Microbial physiology, 3rd Edition, Wiley-Liss,New York.

References

Doelle, H.W. 1975. Bacterial metabolism, 2nd Edition, Academic press.

Gottschalk, G. 1986. Bacterial metabolism 2nd edition. Springer - Verlag. New York

3. Prescott, L. M., J. P. Harely and D. A. Klain, Microbiology, 2003 (5 th Edition) McGraw Hill, New York.

A.V.C COLLEGE (AUTONOMOUS),
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc.,

CCIII - VIROLOGY

SEMESTER: I **CODE: 18 PMB 103**

UNIT I

History and development of virology-General properties of viruses-General classification virus ICTV -bacteriophage-Life cycle - Single stranded DNA viruses ϕ *XI74*, M13, Filamentous phages - Double stranded DNA phages - Structure and biology ofT4 phage.

UNIT II

Plant viruses - structure, and mode of transmission and control of RNA viruses- TMV, Cow Pea mosaic viruses, Brome mosaic viruses. Double stranded DNA Virus- Cauliflower mosaic virus, Single stranded DNA Viruses - structure and replication of Gemini virus, Sub viral pathogens, viroids, satellite viruses.

UNIT III

Animal viruses - Structure and replication, Pathogenesis of RNA viruses. Picarno virus - Polio, Rhabdo virus-Rabies and Myxoviruse-Influenza, Arbo virus - Dengue. Structure and replication, Pathogenesis and lab diagnosis of DNA viruses: Adeno-HIV, Herpes-HSV, Hepatitis-B, tumour viruses (SV) and Prions.

UNIT IV

Emerging viruses- H1N7, Ebola, chikungunya. Cultivation of plant and animal viruses. Tissue culture - Cell lines and cell culture Characterization of viral particles. Recovery of viral proteins and nucleic acids. Detection and quantification of virus assay.

UNIT V

Applied virology: viral vaccines, antiviral approaches - interferon. The role of Animal viruses, plant viruses and bacteriophages in biotechnology.

Text Book

1. S.Rajan and Prof.V.Kumaresan. 2010. Virology.2nd Edition. Saras Publication.

References

1. Dimmock DJ. and Primrose S.B. 1994. Introduction to modern virology, 4th edition. Blackwell science Ltd.

2. Levy. lA., Fraenkel H.C. and Owens R.A. 1994. Virology, 3rd edition, Prentice

3. Hall, Englewood cliffs, New Jersey 07632. " '

4. Cornnt & Kilbull. An Introduction to Virology.

A.V.C COLLEGE (AUTONOMOUS),
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc.,

CC IV - CLINICAL BIOCHEMISTRY

SEMESTER: I

CODE: 18 PMB 104

UNIT-I

Carbohydrates: Introduction, Sources, Structure and functions of sugars- Isomerism of carbohydrates-Classification- mono, di, oligo and polysaccharides-Disorders of carbohydrate metabolism- Diabetes Mellitus.

UNIT-II

Proteins and Lipids: Protein classification - primary, secondary, tertiary, quaternary and three dimensional structure of protein. Lipids and fatty acids – properties- oxidation - biosynthesis of cholesterol - Disorders of lipid metabolism.

UNIT III

Enzymes as biocatalyst, enzyme classification, specificity, active site, unit activity, isozymes. Enzyme kinetics: michaelis - Menton equation for simple enzymes. Enzyme inhibition.

UNIT-IV

Biochemistry of Blood-Constituents of Blood, types of blood cells, components of plasma, types of plasma proteins and functions. Mechanism of blood clotting (Extrinsic and Intrinsic pathway). Structure of hemoglobin.-Types of hemoglobin, sickle cell anemia.

UNIT-V

Blood and their various pathological conditions-urea, uric acid, creatinine, glucose, bilirubin, total protein, albumin/globulin ratio. Lipid profile-cholesterol, Triglycerides, lipoproteins-HDL and LDL-Liver function tests-Alkaline phosphatase, SGOT and SGPT.

Reference

1. Christopher K.Mathews and Van Holde,K.E.(1996) Biochemistry (2nd edition).The Benjamin/Cumming publication Company.Inc

2. David Metzler. And Curol M.Metzler (2000). Biochemistry - The chemical reaction of living cells - Vol 11&12 (2nd edition) Horcourt/academic press - New York.

3. Freilfelder D (1996) molecular biology II edition Narosa publishing house. New Delhi.

4. Geofforey,L. And Zubay (1998). Biochemistry 4th edition. Brown publication.

5. Lubert Styer (1995) Biochemistry (11th edition) W.H.Freman and company New York.

A.V.C COLLEGE (AUTONOMOUS),
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc.,

CC V - PRACTICAL I
GENERAL MICROBIOLOGY AND MICROBIAL DIVERSITY, MICROBIAL METABOLISM, VIROLOGY& CLINICAL BIOCHEMISTY

SEMESTER: I

CODE: 18 PMBP 105

1. Staining technique - Gram's, Acid fast, Endospore & Negative staining.

2. Enumeration of bacteria, fungi & actinomycetes by serial dilution from soil.

3. Motility-Hanging drop technique

4. Measurement of cell and growth of bacteria-a. Micrometry b. Cell mass-turbidometry,

c. Determination of generation time and specific growth rate

5. Anaerobic culture technique a. RCM, b. Wright's tube method

6. IMViC test

7. Oxidase, Catalase & Urease test

8. Hydrolysis of a. Starch, b. Gelatin, c. Casein

9. Carbohydrate fermentation, TSI and H2S Production test

10. Slide culture technique for studying morphology of fungi

11. Preparation of permanent slides '

12. Isolation of bacteriophage from natural resources

13. Demonstration of virus cultivation by embryonated egg.

14. Buffer prepartion (Tris,Phosphate and acetate)

15. Urine-Sugar, Albumin, Creatinine

16. Separation of serum and plasma from Blood

17. Sugar test in blood.

A.V.C COLLEGE (AUTONOMOUS),
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.sc.,

EC-I Introduction to Nanotechnology & IPR

SEMESTER: I

CODE: 18 PMBE 101

Unit I

Nanotechnology : Definition - History of nanotechnology – Richard Feymann- Eric Drexler- Nano particles- Characteristics of nanoparticles – properties of nano particles – Biological synthesis of nanoparticles using microbes.

Unit II

Biomimicry -need of nanotechnology today – carbon nano tubes, quantum dots, nano wires, Bukcy balls-Nano robots-application of nanotechnology - nanotechnology in medicine, tissue engineering, Environment.

Unit III

Introduction – History. Biological Invention and creativity – Intellectual property (IP) types and Importance – patent – copyrights and related rights – Trademarks, Geographical Indications and rights arising from trade mark registration - Protection of IPR

Unit IV

Patents and Types of patent-patenting of transgenic animals and its institution – patenting of plants variety and its institutions – patenting of biotechnological invention and its use – patenting of food products – patenting of microbes. Bar coding – conflicts in patenting.

Unit V

Establishment and significance of WIPO - History - mission and activities – General Agreement on trade and tariff (GATT), Indian position in patenting, WTO strategies – Indian IPR – other countries IPR – legislations.

References:

v) Mittal, D.P (1999). Indian patents law. Jaxmann Allied services (P) Ltd.Subbaram N.R & 47; Handbook of Indian patent law and practice & 147;S.Viswanathan (Printers and publishers) Pvt. Ltd.

vi) Eli Whitney, United states patent Number: 72X, cotton Gin, March 14, 1794

vii) Intellectual Property today: Volume 8, No.5, May 2001, (www.iptoday.com)

A.V.C COLLEGE (AUTONOMOUS),
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc.,

CCVI – ENVIRONMENTAL MICROBIOLOGY

SEMESTER: II

CODE: 18 PMB 206

UNIT I

Environmental Microbiology: Characteristic features of environmental microflora: Important uses and harmful effects of bacteria, fungi, actinomycetes ,algae, virus, protozoa, and nematodes. Microorganisms and their environment: Temperature, oxygen, desiccation, extreme cold, ionic effect, electricity, osmotic pressures, radiant energy, hydrostatic pressures, mechanical Impact, vibration, and surface forces.

UNIT II

Aeromicrobiology: Distribution-Sources-Droplet, Droplet nuclei, aerosols: air borne transmission of microbes and diseases: assessment of air quality-Settling under gravity-Centrifugation, filtration, impingement in solids and liquids-Electrostatic precipitation-Significance of air microflora.

UNIT III

Aquatic microbiology: aquatic habitats: fresh water, marine habitats- estuaries, hydrothermal vents, salt pans, coral reefs, mangroves and their microbial communities - role of microorganisms in the productivity of ecosystem - food chain.

UNIT IV

Waste water treatment - aerobic, anaerobic and activated sludge - BOD- COD. Eutrophication, solid waste disposal, water quality assessment (Portability of water).

UNIT V

Biodeterioration of leather, paper, fuel and lubricants- biodegradation of hydrocarbon ,Pesticides (Mode of degradation, enzymes involved and significance) -Microbial enhanced oil recovery-Bioleaching. Indicator microorganisms-Bacteria, Algae, Lichens.

References

1. Atlas R.M and Bartha, Microbial Ecology, Fundamentals and applications, John Wiley Publicaitons
2. Grant W.D and Long, P.E Environmental Microbiology
3. Mark Coney – Soil Microbiology
4. Mitchell – Environmental Microbiology

A.V.C COLLEGE (AUTONOMOUS),
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc.,

CCVII – SOIL AND AGRICULTURAL MICROBIOLOGY
SEMESTER: II

CODE: 18 PMB 207

UNIT I

Soil profile. Effect of soil factors on microorganisms, Microbial flora of soil- Bacteria, Actinomycetes, Fungi, Algae, Viruses, Protozoan and nematodes. Soil Sterlization.

UNIT II

Microbe-Microbe Interactions Mutalism, Commensalism, Synergism ,Parasitism, Amensalism, Competition - Plant-Microbes interactions: Rhizosphere, Phyllosphere, Siderophores and Mycorrhizae-Endo and Ecto Mycorrhizae,VAM.

UNIT III

Biogeochemical cycles. – Carbon, Sulfur, Phosphorus. Nitrogen Cycle –N2 fixation-symbiotic and non-symbiotic-mechanism of nitrogen fixation- nif gene.

UNIT IV

Biofertilizers – Isolation, Mass multiplication and application- Symbiotic N_2 fixers – Rhizobium and Frankia, Free living N_2 fixers – *Azospirillium* and *Azotobacter*, Associative symbionts– Azolla, Cyanobacteria. Phosphate solubilizer- *Phosphobacteria, Methylobacteria. Aspergillus*, Biopesticides: *Pseudomonas fluorescence, Bacillus thuringiensis*- *Trichoderma viridae* and Nuclear polyhedrosis virus- CPV.

UNIT V

Plant Diseases -Bacterial Diseases: Bacterial Blight of Paddy, Citrus Canker - Mycoplasma Diseases: Rice Yellow Dwarf, Fungal Diseases: Late Blight of Potato, Downy Mildew of Maize, Rust of Wheat, Wilt of Cotton, Blast disease of Rice, Tikka disease of ground nut-Viral Diseases: Leaf Curl tomato-Bunchy top of banana, Bhendi mosaic disease – Nematode Diseases: Cockle of Wheat.

References

1. Subba rao, N.S. Soil microorganisms & Plant growth.
2. Venkatraman O.S. Blue green algae and rice cultivation.
3. Mark Coney, Soil Microbiology.
4. Subba rao. N.S. Biofertilizers.
5. David M. Sylvia. Principles & Applications of soil microbiology.
6. Ramanathan N. and SM. Muthukaruppan. Environmental Microbiology,

A.V.C COLLEGE (AUTONOMOUS),
DEPARTMENT OF MICROBIOLOGY
SYLLABUS –M.Sc.,
CCVIII -FOOD & INDUSTRIAL MICROBIOLOGY

SEMESTER: II
CODE : 18 PMB 208

UNIT I

Scope of food microbiology-Significance of food microflora, Constituents of foods. Extrinsic & Intrinsic factors affecting microbial growth in food. Microbial spoilage of milk & milk products, fruits and vegetable- meat & meat products, sea foods, canned foods. Food preservation- use of temperature, canning, dehydration, lyophilization, Osmotic pressure, radiation, chemical preservatives.

UNIT II

Bacterial agents of food borne disease – *Aeromonas hydrophila, Brucella, Bacillus, Camphylobacter, Clostridium botulinum, C. perfringens, E.coli, Listeria monocytogens, Salmonella , Staphylocoocus aureus , Vibrio*. Mycotoxin – Aflatoxin. Virus-Hepatitis-Protozoa-Amoebiasis.

UNIT III

Fermented Microbial products – Alcoholic beverages (beer & wine), vinegar, vitamins: B_{12} and riboflavin – Fermented milk products (Yoghurt, Kefir, Koumiss, Butter milk & cheese) – Fermented vegetables – Oriental fermented foods.

UNIT IV

Fermentation -Fermentation system (Batch & Continuous fermentation, immobilized cell reactor, Solid state fermentation reactor)– Fermentor types (Stirrer tank, Bubble Column and Airlift Fermentor) – Upstream- media composition, strain improvement- Downstream processing of fermentation-recovery and purification.

UNIT V

Fermentation of microbial products – single cell proteins. Antibiotics – Penicillin, Streptomycin- Organic acid-Lactic acid, Citric acid- enzymes – Amylase, Protease. Amino acid-Glutamic acid. Application of computer in fermentation. Fermentation economics.

Reference:

1. Crueger, W. and Crueger, A. 1995. Biotechnology, Blackwell Scientific publications, Oxford.

2. Peppler, H.J. and D. Pearlman, 1979. Microbial Technology, Vol.I and II Academic Press, New Delhi.

3. Stanbury, P.F., Whittaker, A and Hall, S.A. 1995. Principles of fermentation Technology. Second edition. Pergaman press, Oxford.

4. Adams. N.R.and M.O.Moss. 1996. Food microbiology, New age international (P) limited Pub.

5.Frazier and Westhoff, Food Microbiology, Mc Graw Hill Pub.

A.V.C COLLEGE (AUTONOMOUS),
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc.,

CC IX - RESEARCH METHODOLOGY,BIOSTATISTICS AND COMPUTER APPLICATION

SEMESTER:II

CODE: 18 PMB 209

UNIT I

7 Research - Research Process. Selection of research topic - Literature collection, Indexing cards. Planning and designing experiments. Methods of writing a thesis: Preliminaries cover page, contents, Acknowledgement. Text - Introduction, Review of Literature, Materials and Methods, Results - Presentation of results, Discussion, Summary, References, Proof correction.

UNIT II

8 Biostatistics – sample and sampling techniques- Tabulation of data – presentation of data –Graphical - Measures of Central tendency – mean (arithmetic, harmonic & geometric) ,median and mode – Measures of dispersion – range, mean deviation, variance and standard deviation, Skewness and Kurtosis

UNIT III

Inferential statistics – Probability and distributions – Poisson, Binomial and Normal distribution Testing of hypothesis – Chi-square test – - Student's t-test – Correlation- simple and multiple - Regression – ANOVA.- one way classification and two way classification.

UNIT IV

9 Introduction to Bioinformatics – History and development – Biological database- NCBI, EMBL, DDBJ. Application of Bioinformatics. Brief outline on Genomics and Proteomics.

UNIT V

Computer applications: MS-WORD, MS-EXCEL, MS- POWER POINT. INTERNET Browsing the Internet.

References

6. Physical chemistry - David Friefelder
7. Gupta S. P. 1986. Statiscal methods
8. Zar,J. 1984. Biostatistics, Prentice Hall,London.

CC X- PRACTICAL - II
ENVIRONMENTAL, SOIL& AGRICULTURAL MICROBIOLOGY, FOOD & INDUSTRIAL MICROBIOLOGY

SEMESTER: II

CODE: 18 PMBP 201

1. Determination of Dissolved oxygen of water (DO)
2. Determination of Chemical Oxygen Demand (COD)
3. Determination of Biological Oxygen Demand (BOD)
4. Determination of chlorine in water
5. Water Analysis - MPN Technique &Membrane filter t3echnique
6. Isolation of N_2 fixers - Rhizobium, Azotobacter & Azospirillum
7. Isolation of phosphate solubilizers from soil
8. Isolation of BGA from paddy field
9. Isolation VAM from Rhizosphere soil
10. Prcparation of Mushroom spawn using sorghum's grains
11. Alcoholic fermentation – wine production, Ethanol estimation
12. Isolation of lipolytic organisms from food
13. Production of fermented milk – yoghurt, fermented vegetable – sauerkraut
14. Immobilization by using Sodium alginate and poly urethane foam
15. Dye reduction test – Methylene blue, phosphatase test
16. Microbial spoilage of food microbes associated with vegetables, fruits, meat, fish and soft drinks
17. Direct microscopic count of microorganisms in milk (Breed)
18. Isolation of antibiotic producing microbes from soil
19. Chromatography-(i) Paper chromatography (ii) Thin layer chromatography
20. Statistical analysis.

A.V.C COLLEGE (AUTONOMOUS),
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc.,
EC II Marine Microbiology
Code: 18 PMBE 202

Unit: I

Marine Microbial ecology-Marine environment – see-benthic & littoral, limnetic zone, saltpan, mangroves and estuarine-microbes, microbial loop – marine microbial community – planktons, bacteria, fungi,
protozoa.

Unit: II

Marine Extremophiles-Survival at extreme environments – starvation – adaptive mechanisms in thermophilic, alkalophilic, osmophilic and barophilic, psychrophilic microorganisms – hyperthermophiles and halophiles – importance in biotechnology.

Unit: III

Symbiotic microbes-Microbe-microbe interactions – Lichens, antagonistic interactions – amensalism, mycoparasitism – Animal-microbe interaction –*Anabaena* – sponge-sponge associated microorganisms-coral reefs and molluscs.

Unit: IV

Marine Microbial Disease-Marine food borne pathogens & Water borne pathogens – *Aeromonas, Vibrio, Salmonella, Pseudomonas, Leptospira, Corynebacterium.*

Unit: V

Marine Microbial Biotechnology-Production and applications of marine microbial products – pigments –Astaxanthin, β carotene – enzyme – antibiotics – polysaccharide – sea food preservation methods. Biolouminescence-Quorum sensing-Value added products from marine waste.

References:

Prescott, L.M., Harley J.P. Klein (1999). Microbiology, WCB, Mc Grow Hill Publications

Raina M. Maier, Ian L. Pepper, Charles, P. Gerba (2006). Environmental Micrology, Academic press.

Jamesh W. Nybakker (2001). Marine Biology, Benjamin Cummings

Shimshon Belkin and Rita R. Colwell (2005). Ocean and Health: Pathogens in the marine environment. Springer.

Scheper, T. (2005). Advances in Biochemical Engineering/Biotechnology-Marine Biotechnology I. Springer

Bhakuni, D.S. and Rawat, D.S. (2005). Bioactive marine natural products. Anamaya Publishers, New Delhi.

A.V.C COLLEGE (AUTONOMOUS), MANNAMPANDAL
DEPARTMENT OF MICROBIOLOGY
SYLLABUS
PG EDC PAPER-I MICROBES IN HUMAN WELFARE
Semester :II

Unit-I

Microorganisms-General characters-Types of Microbes-Bacteria, Fungi, Algae, Protozoa and Virus Applications of microorganisms - General.

Unit-II

Microorganisms as food and Feed: SCP, Mushroom, Yeast and Microalgae – Fermented Dairy Products and beverages - cheese, Yoghurt, Kefir, Wine and Beer.

Unit-III

Microorganisms in Agriculture: Bio fertilizer- Azolla, Rhizobium, Azospirillum, Azotobacter and VAM- Biocontrol of microbial pathogens- Bio pesticide- Bactericide and Fungicide.

Unit-IV

Microorganisms and Environment: Liquid Waste and Solid waste- Liquid waste management- Water recycling- Industrial effluent treatment-Solid waste management.

Unit-V

Microorganisms in Medicine: Antibiotics-Penicillin, Vaccine-Polio , Hormones-Insulin,Vitamins-Cyanocobalamin

REFERENCES

Adams, M.R and Moss, Food Microbiology , New international (P) Ltd Publishers

Frazier.W.C and Westhoff , Food Microbiology, McGraw Hill Ny

Alexander, Introduction to soil Microbiology, John Wiley and sons

Subba Rao.N.S,Soil Microbes and Plant growth Oxford and IBH Publishing Co Pvt.Ltd

Click and Pasteurnick, Biotechnolgy

A.V.C COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY
SYLLABUS –M.Sc.,

CC XI- MOLECULAR BIOLOGY AND MICROBIAL GENETICS

SEMESTER: III

Sub.Code : 18PMB311

Objectives

To enable the students updated the current knowledge on Microbial Genetics of prokaryotes.

It also provides the fundamental details of Molecular biology.

UNIT -1 Genetic material, DNA replication

History and scope of molecular biology – Discovery of DNA, Identification of genetic material (Griffith, Avery and Hershey and Chase experiments). Organization of genetic material, Bacteria. DNA replication – Meselson and Stahl experiment, Molecular mechanisms of DNA Replication – bidirectional and rolling circle replication. Repair mechanism-proof reading and correction. Plasmids – types structure, characteristics and replication.

UNIT – II Transcription and translation

Structure and functions of tRNA, rRNA, mRNA-Genetic code-Process of transcription – initiation, elongation – termination. RNA processing – capping and polyadenylation. Process of translation - initiation, elongation and termination. Signal sequences and protein transport.

UNIT – III Regulation of gene expression

Organization of Genes in prokaryotes, – Introduction – Operon concept, *lac*, *trp*, arabinose operons, promoters and repressors. Regulation of gene expression– Transcriptional control – promoters, terminators, attenuators and anti terminators; Induction and repression: Translational control – ribosome binding, codon usage, antisense RNA; Post – translational gene silencing – RNA.

UNIT – 4 Gene transfer and genetic recombination mechanism

Gene transfer mechanisms of Conjugation F Plasmids and Hfr strains recombination rec sites and their functions – transformation – competence and DNA uptake. Mechanism of transformation – transfection. Transduction – Specialized and generalized transduction. Gene cloning by transduction.

UNIT -5 Mutation and Transposons

Mutation and mutagenesis – mechanisms, biochemical basis, mutagens. Molecular basis of spontaneous and induced mutations. Reversion and suppression. Environmental mutagenesis and toxicity testing. Isolation of mutants**.** DNA repair mechanisms – excision, mismatch, SOS, Photoreactivation, recombination pair. Transposons – insertion sequences, Transposons types and noncomposite, Phages as transposons. Replicative, non replicative and conservative transposition.

References

Text Book

1. David Freifelder. 2008. Molecular Biology, 2nd edition, Narosa Publishing House, New Delhi.

Reference Book

1. Maloy SR, Cronan Jr. JE, Freifelder D.1994. Microbial genetics. Jones and Bartlett Publisher.

2. Ajoy Paul. 2007. Text book of Cell and Molecular Biology, Books and Allied (P) Ltd. Kolkata.

3. Gardner EJ., Simmons MJ, Snustad DP. 2008. Principles of Genetics. 8th edition. John Wiley and Sons Publisher.

A.V.C COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY
SYLLABUS –M.Sc.,
CC XII- MEDICAL MICROBIOLOGY

SEMESTER: III

Sub.Code : 18PMB312

Objectives

To introduce the basic principles and applications of clinical diseases and their control measures.

UNIT I: Normal micro flora of the human body and its significance- Infectious disease cycle-Entry of pathogen into human host-portals of entry. Virulence factors and their role in breaching host defense, mechanism of microbial adhesion-Definitions of infection, invasion, primary and opportunistic pathogens, pathogenicity, virulence, toxigenicity, carriers, endemic, epidemic, pandemic diseases and epidemiology –Nosocomial infection

UNIT II: Bacteriology: Morphology, Cultural characteristics, Epidemiology-pathogenesis and Laboratory diagnosis, prevention and control of *Staphylococcus aureus, Streptococcus pyogens, Corynebacterium diptheriae, Bacillus anthracis, Mycobacterium tuberculosis, M. leprae, Escherichia coli, Klebsiella pneumoniae, Salmonella typhi, Shigella dysentriae, Vibrio cholera, Pseudomonas aeruginosa,* Rickettsial diseases *(Rickettsia rickettsii),* Spirochetes- *Treponema pallidum, Chlamydia trachomatis, Mycoplasma pneumoniae* – Zoonotic infections-*Yersinia pestis.*

UNIT III: Mycology: General approach to the identification of fungi, Superficial– Dermatophytes-*Epidermophyton flocossum*, *Microsporum canis*, *Trychophyton rubrum*-Subcutaneous- *Sporothrix schenckii*-Systemic fungi –*Histoplasma capsulatum, Coccidioides immitis, Blastomyces dermatitidis*, Opportunistic – Candida albicans, *Cryptococcus neoformans, Aspergillus fumigatus*.

UNIT IV: Protozoology: Causative agent, Morphology, Life cycle, pathogenesis and laboratory diagnosis, Treatment and control of protozoans – *Entamoeba histolytica, Giardia lamblia, Ascaris lumbricoides, Plasmodium falciparum, Leishmania donavani, Trypanosoma cruzi, Trichomonas vaginalis*.

UNIT V: Collection and Transport of clinical specimen from patients to Laboratory, microbiological examination of urine, blood, faeces, cerebrospinal fluid, Throat swabs, sputum , pus and wound exudates. Cultivation of anaerobic pathogen-Antibiogram assay and management-Chemotherapeutic agents.

References:

Text Book

1. Mackie and Mc Cartney, 1994, Medical microbiology, Vol I and Vol II. Churchill Livingston, 14th edition.

Reference book

1. Jawetz.E.Melnic, J.L and Adelberg E.A 1998, Review of medical microbiology, Lange medical publications, USA.
3. Diagnostic microbiology by Liza
4. David Greenwood-Medical microbiology, Kannan66@usa.net.in.
5. Lipence cott – Illustrated manual of medical microbiology
6. Medical microbiology by Knip

A.V.C COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY
SYLLABUS –M.Sc.,
CC XIII -IMMUNOLOGY AND IMMUNOTECHNOLOGY

SEMESTER: III

Sub.Code : 18PMB313

Objectives:

This course is designed to provide knowledge to the students about the immunity, Immune techniques and the major parts of the immune system.

UNIT I

History and scope of Immunology- types of immunity , innate , acquired , passive and active., Haematopoiesis- Immunohaematology - Blood groups- Lymphoid organs(Primary and secondary lymphoid organs)- Cells of the immune system.

UNIT II

Cell mediated and humoral mediated immune response-Antigen – types – Hapten – immunoglobulin – structure, distribution and function Origin and development and differentiation of T and B lymphocytes. Antibody diversity. Ag – Ab interactions – detection and measurement, agglutination and precipitation .

UNIT III

Complement pathways – components – classical and alternate pathways – activation – Hypersensitivity – Anaphylaxis- cytotoxic reactions- Immune complex deposition and cell mediated hypersensitivity – Auto immunity diseases(Organ specific and systemic)- Immunity to infectious diseases- Resistance to viral, bacterial, and fungal parasites.

UNIT IV

Transplantation immunology : Types of grafts- mechanism of graft rejection-. MHC types- Immunosuppression- physical, chemical and biological methods. Interleukins- types and their functions. Vaccines and their types.

UNIT V:

Principles and applications of Monoclonal antibodies - Immuno blotting- ELISA- Immuno electrophoresis- FACS- Nephlometry.

Reference :

Text Book

1. Coleman. R.M.,Lombard. M.F. and Secard R.E., 1992. Fundamental immunology,2nd edition, Dubuque, Iowa Wm C. Brown. Publishing Co.

Reference Book

1. Benjamin . E., Coico. R, Sunshine G. 2000. Immunology - a short course, 4th edition, A john Wiley and sons, INC Publication.
2.Roitt. I.M.Brostaff, I.J.and Male D.K., 1996. Immunology, 4th Edition, c.v.Mosby Company, Saint Louis

A.V.C COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY
SYLLABUS –M.Sc.,

CCXIV-MICROBIAL BIOTECHNOLOGY AND GENETIC ENGINEERING

SEMESTER: III

Sub.Code : 18PMB314

Objectives

To enrich the knowledge of the students with the potential applications of microbial biotechnology in medicine and various current industrial process and also provide advanced techniques in genetic engineering and cloning strategies.

Unit-I: Microbial production of therapeutic agents

History and scope of Biotechnology- basic concept and principle of Biotechnology-commercial products -pharmaceuticals (Interferons), Growth Hormone (HGH), Dye (Indigo), Antibiotics (Penicillin & Streptomycin). Biopolymer (Xanthan gum and PHA). Bioethanol production.

Unit-II: Enzyme Biotechnology

Screening and strain improvements-analysis- applications. Enzyme immobilization-methods –Applications. Commercial enzyme production -Amylase, Protease. Biosensor-types and their applications.

Unit-III: Tools in Genetic Engineering

Restriction endonucleases-nomenclature, classification and characteristics-DNA methylases-DNA polymerases- Ligases-Adapters, Linkers and Homopolymer tailing. Agarose gel electrophoresis, SDS-PAGE-Blotting-types of blotting-Southern, Northern and Western Blotting. Polymerase chain reaction (PCR), Restriction fragment length polymorphism (RFLP), RAPD, AFLP. Gene transfer techniques: electroporation, microinjection, protoplast fusion and microparticle bombardment.

Unit-IV: Gene cloning vectors

Cloning Vectors (genomic DNA and RNA)- properties, types– plasmids – host range and incompatibility – plasmids vectors for cloning in *E. coli* (pBR322 and derivatives, pUC vectors and pGEM3Z) - Vectors constructed based on bacteriophage (M13 and Lambda), cosmids, phasmids, phagemids and BACs - Eukaryotic vectors - Yeast vectors – animal and plant vectors -expression vectors: shuttle vectors - Expression of foreign genes in prokaryotes and Eukaryotes. Steps in gene cloning strategies.

Unit- V: Application of Genetic engineering

Transgenic plants- Restriction to Biotic stress (insect, virus and bacteria), Restriction to Abiotic stress (herbicide and drought resistant plants), modification of flower, nutritional content, sweetening by genetic engineering. Transgenic animals: methods of creating transgenic mice, cattle and sheep. Human gene therapy- *in vivo* and *ex vivo* gene therapy. Molecular diagnostics for genetic diseases. Gene transfer techniques. Limitation of genetic engineering.

References

Text Book

14. Sathyanarayana, U. 2005. Text book of Biotechnology, Book and Allied (P) Ltd. Kolkata.

Reference Book

1. GIick BR and Pasternak JJ. Molecular Biotechnology – Principles and Applications of Recombinant DNA. ASM Press, Washington DC. 2003.
15. Old RW and Primrose SB. Principles of Gene Manipulation – An Introduction to Genetic Engineering 5th Ed. Blackwell Scientific Publications, London. 1995.
16. Brown TA. Gene cloning and DNA analysis introduction. 4th Ed. Blackwell Science Ltd., London. 2001.
17. Balasubramanian D, Bryce CFA, Dharmalingam K, Green J, Jayaraman K. Concepts in Biotechnology University Press, India. 1996.
18. Glazer AN, Nikaido H. Microbial Biotechnology – Fundamentals of Applied Microbiology WH Freeman and Company, New York. 1994.

A.V.C COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY
SYLLABUS –M.Sc.,
CC XV- Practical III

SEMESTER: III

Sub.Code : 18PMBP315

10 Isolation of plasmid DNA

11 Isolation of Chromosomal DNA

12 Principles and application of PAGE, SDS PAGE

13 Mutagenesis- Isolation of drug resistant and auxotrophic mutants-replica plating technique

14 Bacterial conjugation

15 Bacterial transformation

16 Lab diagnosis of Enteric diarrhea, UTI, anaerobic infection

17 Training the students to basic knowledge regarding the collection of all body samples and their further diagnosis.

18 Antibiotic sensitivity test-Kirby Bauer Method.

19 Blood collection by vein puncture

20 Haematology-Total WBC count, Total RBC count, Differential count, Haemoglobin estimation.

21 SGOT, SGPT, Cholestrol and bilirubin test.

22 Separation and preservation of serum-short and long periods.

23 Microscopic observation of pathogenic fungi.

24 Performing diagnostics tests like WIDAL-Slide agglutination test- Tube agglutination test, RPR.

25 ELISA

26 Gel diffusion technique-Immuno diffusion in gels (Ouchterlony), Single & Double.

27 Latex agglutination test.

28 Pregnancy testing by using immunological methods.

A.V.C COLLEGE (AUTONOMOUS),
MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc

ECIII- Biological techniques

SEMESTER: III CODE: 18PMBE303

Objectives:

Students gain knowledge about principles, working mechanisms and applications of various instruments in biology.

Unit:I

Components of Microscope- Basic Principles and methods of bright field , Dark field,Phase contrast, fluorescence, polarization and confocal microscope. Electron microscopy- Principle,Techniques and application of TEM, SEM and atomic force microscope (AFM).

Unit:II

UV -Visible, atomic adsorption spectrophotometer, atomic emission spectroscopy- NMR, X-ray crystallography, FTIR. Centrifugation-Principle , types and applications. Biosensors, Principle of radioactivity, GM and LS counter.

Unit:III

Chromatography - Paper,Thin layer, Ion exchange, Affinity and Gel permeation - Principle Preparation of column, Adsorption and elution. GC, GC-MS and HPLC -Principle and their applications.

Unit:IV

Electrophoresis – Principle and application of Agarose and pulse field gel electrophoresi, Counter current and rocket immuno electrophoresis, SDS - PAGE and 2D gel elctrophoresis, MALDI-TOF.

Unit:V

Isolation and quantification of nucleic acid- DNA ,RNA and Plasmids. Amplification of DNA -Polymerase chain reaction and Real time and reverse transcriptase PCR. DNA sequencing: Primer walking, chemical method: Maxam and Gilbert method, Sanger's method: traditional (dideoxy) and automated sequencing methods .

References:

1.John G.Webster,Bioinstrumentation. University of wisconsin, John wiley and Sons, inc, US 2004.
2.Surzeki.S , Basic techniques in molecular biology,Springer,US 2000.
3.Westermeier R, Electrophoresis in practice- VCH- Federal republic of germany. 1993.
4.Wilson and Walker, Practical biochemistry principles and techniques , Cambridge University press, London 1995.
5.Alan G Marshall and Francis R. Verdun .Fourier Transforms in NMR ,Optical and Mass Spectroscopy, Elsevier.1990.

A.V.C COLLEGE (AUTONOMOUS)

MANNAMPANDAL, MAYILADUTHURAI- 609 305

DEPARTMENT OF MICROBIOLOGY

EDC II MICROBIAL DISEASES AND MANAGEMENT

Semester: III

Sub code: 18EDMB302

Objectives

Students understand the concepts of disease transmission mechanisms and its control measures.

Unit: I

Infection-Types of Infection – Sources of infection – methods of transmission of infection-Treatment and control of infection - Normal Microflora of human body- Nosocomial infections.

Unit: II

Food and water borne diseases: Causative organism, pathogenesis, symptoms, prevention and control of the following diseases- Typhoid-Bacillary dysentery- cholera – polio- Botulism

Unit: III

Air borne diseases: Causative organism, pathogenesis, symptoms, prevention and control of the following diseases- Tuberculosis-Pneumonia-Chicken pox, Histoplasmosis-Cryptococcosis.

Unit: IV

Soil borne diseases: Causative organism, pathogenesis, symptoms, prevention and control of the following diseases-Anthrax, Tetanus, Giardiasis, Amoebiasis, Dermatidis-*Blastomyces detrmatidis*

Unit: V

Vector borne diseases: Causative organism, pathogenesis, symptoms, prevention and control of the following diseases- Dengue, Malaria, Filariasis, Trypanasomiasis, Lyme disease.

References:

Text Book

viii) Mackie and Mccartney – 1995 Medical microbiology. Vol I & VolII, Churchill Livingston 14th edition

Reference Book

1. Ananthanarayan N.R.and C.K. Jayaraman paniker 1994 Text book of Microbiology-orient Longman

ix) Bailey and Scotts – 1994 Diagnostic Microbiology 9th edition Baron and fine gold, C.V.Mosby publications.

x) Text book of Medical parasitology C.K.Jayaram paniker 1993. Laypee brothers 3rd edition.