A.V.C.COLLEGE (AUTONOMOUS),
MANNAMPANDAL, MAYILADUTHURAI
DEPARTMENT OF MICROBIOLOGY
2015 -2016 UG -MICROBIOLOGY

SEMESTER	COURSES	TITLE OF THE PAPER	HOURS	CREDITS	TOTAL CREDITS
I	LC I	Kavithai illakkiyamum,Urainadai illakkiyamum	6	3	20
	ELC I	English for communication I	6	3	
	CC I	Fundamentals of microbiology	5	5	
	CC II	Practical I	2	-	
	AC I	Biochemistry I	7	4	
	AC II	Biochemistry practical I	2	-	
	SBC I	Mushroom technology and value added product	2	2	
II	LC II	Part I Mozhithiranum Mozhipeyarppum	6	3	20
	ELC II	Part II English for communication	6	3	
	CC III	Principles of microbiological methods	5	5	
	CC IV	Practical II	2	4	
	AC III	Biochemistry II	7	4	
	AC II	Biochemistry practical I	2	2	
	SBC II	Bioinoculants	2	2	
III	LC III	Part I Podhutamil paper III	6	3	20
	ELC III	Part II English through literature text –II	6	3	
	CC V	Microbial diversity	5	5	
	CC VI	Practical III	2	2	
	AC IV	Biostatistics	9	4	
	AC V	Practical II	2	1	
	SBC III	Herbal drug and microbes	2	2	
IV	LC IV	Part I Podhu tamil paper IV	6	3	20
	ELC IV	Part II English through literary text -II	6	3	
	CC VII	Bacteriology	5	5	
	CC V III	Practical IV	2	2	
	AC VI	Introduction to computer application	9	6	
	AC V	Practical II	2	1	
	NMEC I	Biotechnology	2	2	
V	CC VII	Microbial physiology	5	5	32
	CC IX	Immunology	5	5	
	CC X	Microbial genetics and genetic Engineering	5	4	
	CCXI	Practical V	6	4	

	EC I	Food and Nutrition	4	5	
	EC II	Bioethics	2	3	
	NMEC II	Medical microbiology	2	2	
	SSD I	Soft skill development	2	2	
	EA I	Gender studies	1	1	
VI	CCX II	Agricultural and environmental microbiology	5	5	28
	CCX III	Medical microbiology	5	5	
	CCX IV	Food and Industrial microbiology	5	5	
	CCXV	Practical VI	6	4	
	EC III	Applied Phycology	5	5	
	VBC	Human value and ehics	2	2	
	ES	Environmental studies	2	2	
	ES II		-	1	1
				TOTAL	142

A.V.C.COLLEGE (AUTONOMOUS),
MANNAMPANDAL,MAYILADUTHURAI
2015 -2016 ONWARDS
PG -MICROBIOLOGY

Semester		Title of the paper	Hours	Credit
I	CCI	Microbial Diversity	5	5
	CCII	microbial metabolism	5	5
	CCIII	Virology	5	5
	CCIV	Biochemistry	5	5
	CCV	Practical I	6	5
	EC I'	Microbial biotechnology and Nanotechnology	4	4
			30	28
II	CC VI	Environmental Microbiology	7	5
	CCVII	Soil and Agricultural Microbiology	7	5
	CC VIII	Food and industrial Microbiology	6	5
	CC IX	Practical II	6	5
	EDC I	EDC-Microbes in Human Welfare	4	2
			30	21
III	CC X	Molecular biology and microbial genetics	5	5
	CC XI	medical Microbiology	5	5
	CC XII	Immunology and Immunotechnology	5	5
	CC XIII	Practical III	6	3
	EDC II	EDC - Microbial Disease and management	4	2
	EC II	EC II – Intellectual property rights	5	4
			30	25
IV	CC XIV	Research methodology,Biostatistics and computer application	6	5
	EC III	EC III -Marine Microbiology	6	4
		Project	18	6
			30	15

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

SEMESTER: **I**
CODE:**15MB101**

UNIT I

History –Introduction of Microbiology, Scope & Discovery of Microorganisms -Spontaneous generation conflict -Recognition of the Microbial role in disease ... -Discovery of Microbial effects on organic and inorganic matter -20th century Microbiology-Louis Pasteur, Leewen Hoek, Lozaro Spallanzani, John Tyndal, Joseph Lister, Robert Koch, Edward Jenner, Stanley, Alexander Fleming, Meitchnichoff, Fransisco Redi -Composition of the Microbial world-Prokaryotes, Eukaryotes

UNIT II

NUTRITION AND CULTURE – Cornmon Nutritional requirements -Nutritional types – Uptake of nutrients-ion. Active transport. **CULTURE MEDIA:** TYPES OF MEDIA - culture technique-.colony morphology and growth.

UNIT III

MICROBIAL TAXONOMOY:

Classification of microorganisms-general principles and nomenclature - Haeckel's three kingdom concept, Whittaker's five kingdom concept - Characterization of Microorganisms (Morphological, Biochemical, Metabolical, Ecological) . Genetic analysis-Molecular analysis DNA analysis-comparison of proteins.

UNIT IV

General characteristics and nature of Archaebacteria, Eubacteria, Cyanobacteria, Mycloplasmas, Rickettsiae, Chlamydias, Spirochaetes, Actinomycetes, Protozoa, Algae, Fungi and Viruses.

UNIT V

PROTOZOA - General characteristics, classificatio - Morphology, nutrition, locomotion &Reproduction.

References

1. Fundamentals of Microbiology by I.Edward fifth Edition
2. Foundations of Microbiology by Karthleen Talaro
   Arthur Talaro Second Edition W.M.C Brown publishers Microbiology by pelczar , E.C.S chan Tata Mc.Graw Hill publishers
3. Textbook of Medical Microbioloy by Chackraborty

Skill Based Major I

SBC I – MUSHROOM TECHNOLOGY AND VALUE ADDED PRODUCTS

SEMESTER: I

CODE:**11SMB101**

Unit :I

Introduction – history – scope of edible mushroom cultivation – types of edible mushroom available in India – *Calacybe indica, Valvariella volvaceae, Pleurotus sp.,, Agaricus bisporous.*

Unit II

Pure culture – preparation of media (PDA and Oat meal agar media), sterilization – preparation of test tube slants to store mother culture – culturing of *Pleurotus* mycelium on Petri plates – preparation of mother spawn in saline bottle and poly propylene bags and their multiplication.

Unit III

Cultivation technology: Infra structure, substrates (locally available) polythene bags, vessels, inoculation hood, inoculation loop, low cost stove – sieves – cultural rack mushroom unit (Thatched hous) – mushroom bed preparation – paddy straw, banana leaves.

Unit IV

Storage and nutrition: short term storage – long term storage (canning, drying and storage in salt Solutions) - Nutrition: Proteins, amino acids, mineral elements. Nutrition – carbohydrates, crude fiber content, vitamins.

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. Cost benefit ratio marketing in India and abroad- export value.

Reference:

1. Marimuthu et al (1991). Oyster mushrooms, Dept of plant pathology, TNA, Coimbatore.
2. Nita Bahl (1998) Hand book of mushrooms , 2nd edition. Vol I ?& II

Practical syllabus-(I B.Sc) – Semester – I

Code:15MBP 101

1. Laboratory precautions
2. Preparations of cleaning solutions
3. Principles of aseptic techniques
4. Culture media preparation
5. Selective and Differential media
6. Enumeration of bacteria from soil
7. Enumeration of fungi from soil
8. Enumeration of actinonycetes from soil
9. Pure culture techniques- Pour plate, Spread plate, Streak plate
10. Cultural characteristics of microorganisms- Colony Morphology on nutrient agar slants and nutrient broth

CC IV - MICROBIAL DIVERSITY

SEMESTER – III
CODE: 15MB305

UNIT I

Distribution of algae – classification of algae – Ultrastructure of algal cell – algal Nutrition – Structure of the algal thallus (vegetative form) – algal reproduction – Characteristics of the algal divisions – Chlorophyta (Green algae) Chlorophyta (Stone worts/ Brittle worts) – Euglenophyta (Euglenoids) Chrysophyta (Golden and yellow) – Green algae, Diatoms – Phaeophyta (Brown algae) Rhodhophyta (Red algae) – Pyrrhophyta (Dinoflagellates)

UNIT II

Fungi – Distribution – Importance – Structure – Nutrition and Metabolism – Reproduction. Characteristics of fungal divisions – Zygomycota, Ascomycota, Basidiomycota and Deuteromycota. Type study species – *Aspergillus niger, Penicillium notatum, Rhizopus.*

UNIT III

Early development of Virology – General properties of Viruses – Structure of Viruses – Replication of animal viruses – Cyanophages and Mycophages.

UNIT IV

Structure, Replication and Growth of the following: Animal -plant and Bacterial Viruses- Hepadna virus, Retro virus, Paramyxovirus,Orthomyxovirus,TMV,CaMv,T4- phage, lamda phage- lytic and lysogenic phage

UNIT V

Cultivation of Viruses – Animal, plant Bacterial Viruses. Purification and Assays- Characterization of virus- Direct assay(Microscopy)- Indirect assay (Cultivation)- Embryonated assay –chick embryo fibroblast method- Plague assay.

REFERENCE

Presscot, et al (2002)., Microbiology Mc Graw Hill publication 5th edition.
C.J.Alexopoulous et al (1983) Introduction to Mycology Wiley eastern Linuted., Third edition.
B.R.Vashishta (1999) fungi, Chand and company Limited 9th revised Edition
R.N.Verma et al (1992) physiology of fungi Vikas publishing house private Limited. Second Revised Edition.O.P.Sharma., (1992) Text book of Algae. Tata Mc Graw Hill publishing Company limited. Fourth edition.

SBC III-HERBAL DRUGS

SEMESTER: III
CODE :15SMB303

Unit I

Herbs – Medicine – Medical botany – Herbal medicine-Indian system of medicine (Ayurveda, Siddha, Unani, Homeopathi)- Natural sources of drugs – classification of crude drugs – classification of plant tissue.

Unit II

Traditional knowledge and utility of some medicinal plants in Tamil nadu – *Solanum trilobactum, Cardiospermum halicacabum, Vitex negundo, Adathoda vasica, Azadiracta indica, Gloriosa superba, Eclipta alba, Aristolochia indica, Phyllanthus fraternus and Boerhaavia diffusa*

Unit III

Plants in day today life – *Ocimum sanctum , Centella asiatica, Solanum trilobactum, Cassia auriculata, Aloe vera*,. Nutritive and medicinal value of some fruits (Guava, sapota, Orange, Mango, Banana, Lemon, Pomegranate) and vegetables – greens (*Moringa olifera, Solanum nigrum*)-Cabbage.

Unit IV

Drug acting on brain and nervous system-Rheumatic arthritis-Psychoactive drugs-Depressants, stimulants, hallucinogens-sources, effects, basic mechanism of action. Drugs for urogenital disorders-roots of *Withania somnifer* – memory stimulants – *Centalla asiatica* - Drug for dissolving kidney stones.

Unit V:

Drugs for cardio vascular disease , Cardiac drugs of plant origins- alkaloids, Analytical pharmacognosy – cross anatomy of plant (Senna, Datura, Cinchona, clove), systematic examination of powdered drugs.

Reference:

Pharmacognosy, A.Roseline, MJP publishers.
Introduction to pharmocognosy R.Kumar

Subject: Practical-III **Semester : III**

Paper code:15MBP306

1. Isolation of fungi by using media.
2. Slide culture technique
3. Lactophenol cotton blue staining.
4. Identification of fungi
   a. *Aspergillus*
   b. *Mucor*
   c. *Penicillium*
   d. *Candida albicans*
   e. *Saccharomyces cerevisiae*
5. Wet mount preparation for the assessment of algae from aquatic ecosystem.
6. Isolation of Coliphage.
7. Cultivation of viruses in chick embryo –demonstration.
8. Cultivation of anaerobic microorganisms by Wright's tube method.

CCIX - MICROBIAL PHYSIOLOGY
SEMESTER V

CODE- 15MB509

UNIT I

Nutrition : Nutritional requirement, autotrophs, heterotrophs ,photoautotrophs chemoautotrophs, chemolithotrophs ,oligotrophs , transport of nutrients:Active transport, passive transport, Group translocation, facilitated transport.

UNIT II

Growth - growth curve, phases of growth, factors affecting growth – synchronous growth and continuous growth, measurement of growth.

UNIT III

Metabolism: Pathways of carbon dissimilation, HMP, EMP, ED -Krebs's cycle - Oxidative phosphorylation-substrate level phosphorylation-Generation of ATP. Secondary metabolites and their products.

UNIT IV

Enzyme: Introduction, Structure, Classification and mechanisms. Amino acid Biosynthesis: Glutamate family-Glutamine and proline, Serine family – Serine and Glycine, Aspartate family – Asparagine and Lysin, Pyruvate family – Valine. Fatty acid metabolism - β oxidation, Nucleotide biosynthesis.

UNIT V

Bacterial photosynthesis: oxygenic and anoxygenic photosynthesis, Photophosphorylation: Light and dark reaction, CO_2 assimilation, Microbial assimilation of nutrients: iron and sulphur bacteria. Bioluminescence.

Reference

Caldwell ,D.R 1995 Microbial physiology and Metabolism Wn.C. Brown publishers, England

Doelle, H.W.1975 Bacteriological metabolism, Academic press, New york.

Moat, A.G and Foester, J.W 1998 Microbial physiology Hohn Wiky sons New york

Physiology and Biochemistry of prokaryotes – David White D. 1995 Indian University , New york , Oxford University press.

CC X - IMMUNOLOGY

SEMESTER VI

CODE:15MB510

UNIT I

History of immunology – Haematopoiesis - Cells of the immune system: T cell- B cell – Granulocytic cells. Organs of the immune system: Primary lymphoid organs: Thymus & Bone marrow; Secondary lymphoid organs: Spleen, Lymph node, Mucosal Associated Lymphoid Tissue & Cutaneous Associated Lymphoid Tissue.

UNIT II

Immunity: Innate immunity (Non-specific immunity) - Acquired immunity (Specific immunity). Complement: Properties & biological functions of complement - Classical pathway- Alternate pathway.

UNIT III

Antigen: types – properties – Hapten - Adjuvant. Immunoglobulin: structure & types. Ag-Ab interactions – Agglutination: Heamagglutination, Bacterial agglutination, agglutination inhibition, Precipitation: Precipitation in gels. Immunofluorescence - ELISA – RIA.

UNIT IV

Hypersensitivity: Type I Anaphylaxis - Type II Antibody dependent cell mediated cytotoxicity - Type III Immune complex mediated - Type IV Hypersensitivity reaction – Auto immune diseases: Organ specific – Good Pasteur Syndrome, Grave's disease, Myasthania Gravis; Systemic – SLE, Rheumatoid Arthritis, Multiple Sclerosis.

UNIT V

MHC – Structure & types – Transplantation – Types of Graft- Graft rejection -GVH – HVG. Cancer Immunology: Types of Cancer- Malignant and Benign Tumors – Immune response to cancer.

Reference:

1. Immunology , Janis Kuby, Barbara A. Osborne, Seventh edition , Arihant Publications.

2. Immunology & Immunotechnology , M. Rajasekara Pandian, Senthil Kumar B, Panima publishing corporation, New delhi.

CCX I- MICROBIAL GENETICS AND GENETIC ENGINEERING

SEMESTER V

CODE: 15MB511

UNIT I

Historical development – Mendel, Morgan, Griffith, Avery and Hershey – Structure, types and functions of DNA and RNA - DNA replication.

UNIT II

Gene transfer mechanism – transformation – DNA uptake and competence, transduction: generalized and specialized - conjugation – Hfr and F plasmid. Genetic code.

UNIT III

Transcription – Translation – Gene regulation in Prokaryotes – Lac and trp operon Concept, Gene Mutation – Spontaneous and induced mutation – DNA Repair Mechanism

UNIT IV

Tools of genetic engineering: Restriction enzymes - Nomenclature, Properties. Vectors – plasmid –pBR 322, pUC 19, Ri plasmid, Ti Plasmid, cosmid, bacteriophage.

UNIT V

Blotting techniques – Sourthern, Northern and Western blotting-Polymerase Chain Reaction-Construction of genomic library and cDNA library.

REFERENCES:

1. Robert H. Tamarin 1996, principles of Genetics, V.Edition Wm.C.Brown publishers, Dubuquie Boston

2. Old, R.W.and primrose, S.B 1989 principle and Gene manipulations Blackwell scientific publications

3. Freifelder, D. 1990 Microbial Genetics. Norose publishing house

4. Click, B.R and pastemak J.J 1994 – molecular Biotechnology, principles And application of recombinant DNA-ASM press Washington DC

5. Brown T.A 1996 Genecloning 3rd edition – chapman and hall publications

CCX- PRACTICAL III

MICROBIAL PHYSIOLOGY, IMMUNOLOGY & MICROBIAL GENETICS AND GENETIC ENGINEERING

SEMESTER: V
CODE: 14MBP512

MICROBIAL PHYSIOLOGY

Learning objectives:

Learning outcome

1 Effect of Environmental factors on Microbial growth-pH, Temperature and Salt.

2 Physiological characteristics of bacteria

i) Indole test
ii) Merthyl red test
iii) Voges-Proskauer test
iv) Citrate utilization test,
v) Carbohydrate fermentation test
vi) TSI test,
vii) Catalase test,
viii)Urease test

IMMUNOLOGY

3. Blood grouping

i) A.B.O blood grouping

ii) Rh typing

4 Serological Diagnosis

f. Entero test (widal) Slide test
g. Entero test (Widal) tube tst
iii) Rapid plasma Reagin test

h. ASO latex test (Latex agglutination test)
i. Pregnancy test

6. Precipitation test – Single radial Immunodiffusion test. Double diffusion test

7 Blood counting

Study of Haemocytometer

i) WBC counting
ii) RBC counting
iii) Differential counting

8. Genetics:

iv) Mutagenesis by UV
v) Isolation of auxotrophic mutants
vi) Isolation of Coliphage from sewage

EC I - FOOD AND NUTRITION

SEMESTER V

CODE:15MBE501

Unit: I

Introduction – Nutrients present in (different) foods – Importance of vitamins and minerals - Nutritive value of foods – Food groups and their nutritional value

Unit: II

Nutrition and food requirements during adolescence , aged – food habits , balanced diet – Nutritional problem and disorder.

Unit: III

Therapeutic nutrition and Diets- General conmsiderations-Diet schedule during certain diseases – Diabetes mellitus – Peptic ulcer – Coronary heart disease – blood pressure and Immunodeficiency disorder

Unit: IV

Food Allergy – food allergens symptoms- diagnosis and treatment – Dietary advice / counselling

Unit: V

Nutritious and value added fermented foods and their Therapeutic uses – Buttermilk, Acidophilus milk , Kefir , kumiss

References:

Dr.M.Swaminathan - A text book on human nutrition and Diet – The Bangalore printing and publishing Co.Ltd Bangalore

B.Srilakshmi – Text book on food service – New age International publishers

B.Srilakshmi – Text book of Dietetics – New age International publishers

BIOETHICS & INTELLECTUAL PROPERTY RIGHTS

SEMESTER : V

CODE: 15MBE502

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 animal 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, affect 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- Patent- Copy right- Trade Mark- Design- Geographical Indications

Unit V

Types of patents in biology- Patenting laws in India- Conservation of Bio diversity- Trade Related Intellectual Property Rights(TRIPS) - General Agreement On Trade and Tariff(GATT).

Reference:

Nancy, S. Jecker, Albert R. Johnson, Fobert A. Pearlman, Bioethics: An introduction to history, methods and practice (1997), Sudbury M.A. Jones and Barlett publishers.

Syllabus B.Sc(EDC)

MEDICAL MICROBIOLOGY

SEMESTER : V

CODE:11NMMB502

UNIT: I:

Introduction – History of medical microbiology.Infection- source of infection-types of infection-methods of transmission of infection-prevention and treatment of common infectious diseases-Indian immunization schedule.

UNIT:II

Gram positive bacterial diseases: Causative organism-epidemiology-pathogenesis-prevention and control of the following diseases- Tuberculosis, Leprosy, Diptheria, Tetanus, Anthrax.

UNIT:III

Gram negative bacterial diseases: Causative organism-epidemiology-pathogenesis-prevention and control of the following diseases -Cholera, Typhoid, Bacillary dysentery, Syphilis and Gonnorrhea.

UNIT:IV:

Viral diseases: Causative organism-epidemiology-pathogenesis-prevention and control of the following diseases- Mumps, Measles, Dengu, Chikungunya and , Swine flu.

UNIT:V

Fungal & Protozoan diseases : Causative organism-epidemiology-pathogenesis-prevention and control of the following diseases –Aspergillosis, Candiadis, Amoebiasis, Malaria, Ascariasis

References:

Ananthanarayan N.R. &C.K> Jayaraman PAnikar 1994 Text book of Microbiology-Orient longman publications

Text book of medical parasitolofy CK Jayaram Panicker 1993.Laypee brothers-3rd edition

.

CC II - PRINCIPLES OF MICROBIOLOGICAL METHODS

SEMESTER II
CODE: 15MB203

UNIT I

Sterilization and Disinfection: Principles – physical – Dry heat , moist heat sterilization, tyntallization, pasterurization, radition.chemical – phenol coefficient – sterility testing, culture techniques, media preparation, preservation of culture – aerobic and anaerobic.

UNIT II

Microscopy: simple – compound – light microscopy – phase contrast – Electron microscopy transmission scanning fluorescent microscopy

UNIT III

Morphology : Wet mount , hanging drop , staining techniques simple and differential staining – Micrometry.

UNIT IV

Electrodes: Acid and bases – pH – Spectrophotometry – Principles – light, Radiation – interference – diffraction – electromagnetic spectrum.

UNIT V

Separating techniques: paper chromatography, TLC,HPLC,Ion exchange, column Chromatography – GLC.Centrifugation:low – high – Ultra – density gradient – calculation of 'g' value.

Reference:

Willaim claus.G.W.1989,Understanding Microbes – A laboratory text book for microbiology, W.H.Freeman and Co., New york

Wildon K. and Goulding K.H., 1986. Biologists Guide to principles and techniques of practical Biochemistry ELBS, London.

Benson. J.H.m1994 Microbiological application- A laboratory manual in General Microbiology W.W.C.Brown publication,Iowa, U.S.A.

Cappucino J.G and Sherman.N.1996 Microbiology – A laboratory manual Benjamin Cummings publication company California.

Kannan. N.1995 laboratory Manual in General Microbiology Palani paramount publication , Palani.

SBC II - BIOINOCULANTS

SEMESTER II

CODE:15SMB202

UNIT I

General account about the microbes used as bio – fertilizer –Rhizobium – taxonomy – Physiology – host –Rhizobium interaction – isolation , identification, mass multiplication, carrier based inoculants & serology, Actinorrhizal symbiosis.

UNIT II

Azospirillum – rhizosphere competence and host plant specificity , taxonomy, physiology-isolation and mass multiplication – carrier based inoculums, associative effect of different microorganisms.

Azatobacter – classification, characteristics , ecology, physiology – crop response to Azotobacter, inoculum maintenance and mass application.

UNIT III

Cyanobacteria (BGA) , Azolla and anabena, azolla- anabena association, nitrogen fixation, factors affecting growth, BGA and azolla in rice cultivation.

UNIT IV

V.A.Mycorrhizal association , types of mycorrhizal association,taxonomy, occurrence and distribution , phosphorous nutrition, growth and yield – colonization of VAM – isolation and inoculum production of VAM and its influence on growth and yield of crop plants.

UNIT V

Production and identification of different nitrogen fixing microbes,Assesment of nitrogen fixing ability of different strains under controlled and field conditions, culture production(fermentor), storage culture, carrier, packing, quality control, ISI standards,marketing and storage, methods of application.

References:

1.Alexander,M.1977 Introduction to Soil microbiology, John wiley And sons. New york
2. Subba rao N.S 1995 Soil Micro organisms and plant growth Oxford and IBH New York
3.Malhotra R.S. 1981 Plant pathology Tata Mc Graw Hall New Delhi

Subject: Practical-II

Semester : II

Paper code:14MBP204

1. Antiseptics and Disinfectants
2. Methods of sterilization and testing of sterility
3. Maintenance and preservation of cultures
4. Microscope
5. Simple staining
6. Negative staining
7. Gram's staining
8. Motility test by Hanging drop method
9. Motility test by soft agar inoculation
10. Paper chromatography
11. Centrifuge

CELL BIOLOGY

Semester: III
CODE:15MB407

UNIT I: Introduction - History and scope of cell biology-cell theory-protoplasm theory- germ plasm theory-organisational theory- cell biology in the 20th century- cell – types of cell – size of cell – shape of cell – protoplasm – cytoplasm.

UNIT II: Prokaryotic cell structure: flagella and its ultra structure-fimbriae- capsules- cell wall-mesosomes- ribosomes- nucleoids- Inclusion bodies - Endospores.

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

UNIT IV: chromosome: Definition – short history of chromosome discovery – number ,size and shape of chromosomes – structure – chromatid – chromomers ,centromeres – telomeres – nucleosomes – special chromosome – giant chromosome.

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 - Genetic significance of meiosis

REFERENCE

1. Cell biology – S.C.Rastogi – New age international Publishers –III.edition.
2. Text book of cell biology – Aminul Islam Book and allied (P) Ltd –I edition.

II UG Practical Syllabus

Title: Practical IV

Semester: IV

Code: 15MBP408

1. Endospore staining.
2. Capsular staining.
3. Staining of giant chromosome from chironomous larva.
4. Assessment of cell division in onion root tip.
5. Assessment of squamous epithelial cell.
6. Microscopic observation of phloem from plant tissues.
7. Microscopic observation of xylem from plant tissues.

CC XIII - SOIL AND ENVIRONMENTAL MICROBIOLOGY

SEMESTER VI
CODE:15MB613

UNIT I

Distribution of microorganism in Soil-Factors influencing microbial densities in soil-Microbial interaction: Symbiosis, Commensalism, Amensalism, Parasitism and Predation, Plant root-Rhizosphere-Mycorrhizae-Types of AM fungi.

UNIT II

Role of microbes in biogeo chemical cycling- Carbon, Nitrogen, Phosphorus and Sulphur. Nitrogen Fixation: Symbiotic-*Rhizobium*- Free living-*Azotobacter, Azospirillum, Cyanobacteria*- Phosphate solubilization.

UNIT III

Distribution of microorganism in water- Freshwater Environments- Marine Environments - Factors influencing the distribution of microorganisms in water- Waterborne transmission of diseases.

UNIT IV

Microbiology of air– organisms in air, distribution and sources. Droplet nuclei, aerosol, assessment of air quality- air borne transmission of harmful microbes. Air sanitation- Physical and chemical methods.

UNIT V

Characterization of solid and liquid wastes. Solid waste treatment –saccharification– gasification– composting. Liquid waste treatment. Treatment methods -primary– secondary (anaerobic– methanogenesis; aerobic-tricking activated sludge– oxidation pond–tertiary treatment.

REFERENCES:

1.Alexander,M.1977 Introduction to Soil microbiology, John wiley And sons. New york
2. Subba rao N.S 1995 Soil Micro organisms and plant growth Oxford and IBH New York
3.Malhotra R.S. 1981 Plant pathology Tata Mc Graw Hall New Delhi
4.Atlas and Bartha 1992 Microbial ecology fundamentals and Applications

CC XIV - MEDICAL MICROBIOLOGY

SEMESTER VI
CODE: 15MB614

UNIT I

Safety precautions in microbiology laboratory, Specimen collections –Handling, transport – Blood, Pus, Throat swab, Stool, Urine- Definition of pathogens, Saprophytes, Commensal and Carrier types.

UNIT II

Infections – Sources of Infections – types of Infections – Methods of Transmission of infections – Definitions – Epidemic, Endemic, Pandemic Diseases- Epidemiology of infectious diseases – Infectious diseases cycle –control of epidemics.

UNIT III

Morphology, pathogenicity and laboratory diagnosis – *Staphylococcus aureus, Streptococcus pyogens, Clostridium tetani and Mycobacterium tuberculosis. G-ve organisms – E.coli, Salmonella typhi, Shigella dysentriae and vibrio cholerae.*

UNIT IV

Mycology: Superficial mycoses – Dermatophytes-*Trychophyton*, *Epidermophyton*, *Microsporum*- Opportunistic fungi – *Candidia*, Systemic fungi – *Histoplasma.*

Protozoology: *Plasmodium, E. histolytica, Giardia*, *Leishmania*

UNIT V

Viral infections – Pathogenicity and diagnosis of Hepatitis B, Rabies, Influenza, Mumps Measles, Rubella, Herpes simplex virus, Epstein Bar virus, AIDS, Swine flu and Avian flu.

Reference:

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

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

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

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

CC XV - FOOD AND INDUSTRIAL MICROBIOLOGY

SEMESTER VI

CODE: 15MB615

UNIT I

Foods as a substrate for microorganisms – Microorganisms important in food Microbiology: Molds, yeasts and bacteria – General characteristics - Classification and importance. Principles of food preservation – Asepsis – Removal of microorganisms, anaerobic conditions – High temperature – Low temperature – Drying – Food additives.

UNIT II

Contamination and Spoilage – cereals, sugar products, Vegetables and fruit meat and meat products, milk and milk products- Fish and sea foods – Poultry. Spoilage of canned foods. Bacterial Food borne infections-Salmonellosis - Intoxications – Botulism-Non bacterial – Aflatoxin- Trichinosis-Algal food intoxication-food Borne diseases out break – laboratory testing – preventing measures. Food sanitation and quality control.

UNIT III

Food fermentation :Bread , cheese ,Vinegar , fermented vegetables. Fermented dairy products – oriental ferment foods.

UNIT IV

Food produced by microbes – fermented foods – microbial cells as food (SCP) – production of alcohol – fermented beverages – beer and wine. Industrial enzymes – amylases, Aminoacid production – Glutamic acid.

UNIT V

Industrial production – Fermentor – Principle types – design – mode of Operation – Instrumentation and control – product recovery and Purification. Antibiotic production – penicillin and streptomycin. Vitamins – Riboflavin.

Reference

Stanbury , P.M.A.Whitaker and S.J.Hall – Principles of Fermentation Technology 2nd edition
C.J.1989 Basic Food Microbiology – CHS publishers and Distributors
Fraziar, W.C and Westho , D.C.C 1988 – Food Microbiology – 4th edition. Mc Graw Hill, Newyork.
Casida, J.M.1987 Modern Food Microbiology, CHS publishers and Distributors. New Delhi.
Adams. M.R. and M.O.Moss 12996, Food Microbiology, New age International (P) Ltd. Publishers.

CCXVI - PRACTICAL – IV
AGRICULTURAL , ENVIRONMENTAL , MEDICAL, FOOD AND INDUSTRIAL MICROBIOLOGY

CODE:15MBP616

1 Isolation of microorganisms from Rhizosphere and Non – Rhizosphere regions.
2 Tryphan blue staining of AM fungi
3 Isolation of phosphate solubilizers
4 Composting and mushroom cultivation
5 Isolation of microorganisms from air
i) Open plate method
ii) Air sampler
6 Water quality test- MPN, presumptive, confirmed and completed test
Membrane filtration techniques

MEDICAL

7. Identification of pathogens from the clinical sample (Throat swab, pus, urine, sputum, Blood).
8. i)Coagulase test ,ii) KOH- DMSO INK MOUNT/Stain iii) Saline wet mount of stool
9 Antibiotic sensitivity test

FOOD AND INDUSTRIAL MICROBIOLOGY

11. Enzyme production test – Amylase
12 Milk quality Testing
1)Methylene blue reduction test
2) Resazurin test
13.Isolation of micro organisms from curd.
14.Litmus milk reduction test
15. Milk Breeds count
16. Microbial analysis of spoiled food –Bacteria and Fungi

APPLIED PHYCOLOGY

SEMESTER VI

CODE:15MBE 603

Learning objectives:

To provide the basic knowledge of structural organization of algae, Isolation of culture, Economic importance of algae, and bioluminescence, algae and water pollution.

UNIT I

Introduction to algae: Algal structure and composition – Distribution – Nutrition – Fine structure of algae plastids – Reproduction. Cyanobacteria – General character and structural organization.

UNIT II

Isolation of culture – Kind of culture – Culture media – Staining – Algae growth curve – Large scale Cultivation– Harvesting – Measurement of algal species: Biomass method - Chlorophyll estimation method - Algae immobilization.

UNIT III

Economic importance of Algae: Role in industry – Role in agriculture – Algae as food – SCP – Polymer from algae: Agar agar - Algae as fodder – algae in medicine – Role of algae in the origin of petroleum and fuel gas

UNIT IV

Algae showing bioluminescence: Reason for photoemission – Utility of Bioluminescene for organism. Algae and space travel. Algae uptake of radioactive substances. Diatomaceous earth- Fossil algae.

UNIT V

Algae and water pollution: Algae of domestic sewage – Algae species as indicators of industrial waste – Diatom as indicator of water pollution. Toxic algae – chemical nature and effect of algal toxin.

Reference:

1. A Text book of Botany, Dr. S.K Verma, Solver line publications
2. Botany for Degree students –Algae, B.R. Vashishta, Dr. A.K. Singa, Dr. V.P. Singh, S.Chand Publications, first edition.

CCI - MICROBIAL DIVERSITY

SEMESTER: I

CODE:15PMB101

UNIT I

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 II

Bacterial diversity: Spirochetes - Aerobic, Microaerophilic, motile Gram negative, non motile Gram negative, Gram negative microaerophilic rods and cocci - Facultative aerobic Gram negative rods - Gram negative, anaerobic straight, curved and helical bacteria Sulfate reducing bacteria - Anaerobic Gram negative cocci - Rickettsias and Chlamydia

UNIT III

Bacterial Diversity: Phototrophic bacteria, Aerobic Chemolithotrophic bacteria - Budding and Appendage bacteria, Sheathed bacteria, Bacteria with gliding motility, Gram Positive cocci - Endospore forming rods and cocci.' Asporogenous Gram positive rods Mycobacteria - Actinomycetes – Mycoplasma

UNIT IV

Archael Diversity: Physiology of Archaea - Cell structure and function metabolism Methanogenesis. 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. ProtozoaMorphological diversity and reproductive strategies. Fungi - Filamentous fungi - Growth and reproduction - Zygomycetes, Ascomycetes, Basidiomycetes, Deuteromycetes and Yeasts. Algae - Morphological diversity - Structure - Chloroplast - Structure organization - reproductive strategies-life cycles - Algal ecology

References;

1) Atlas, R.M. 1997. Principles of Microbiology. WCB Mc Graw Hill.

2) Balows, A., H.G. Truper, M. Dcvorkin. W.llardcr. K.H. Schleifer. 1992.

3) Prokuryotes Springer vcrlog, New York.

CCII - MICROBIAL METABOLISM

SEMESTER: I

CODE: 15PMB102

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 - Morphogenesis - development of dormant and resting structures. Sporulation in Bacillus. Streptomyces - Germination and regulation. Enzyme classification, structure- substrate - regulation - function - types - kinetics – factors

UNIT III

Carbohydrates Metabolism - Glycolytic pathways - Embden Mayer Hoff Pathway, The Pentose Phosphate Pathway,Proton Motive Force, The Entner Doudoroff pathway, The tricarboxylic acid cycle, Glyoxalate cycle. Aerobic respiration - Chemoorganotrophic bacteria. Substrate level phosphorylation, Oxidative phosphorylation, Lipid catabolism Beta oxidation. Anaerobic respiration - Sulfur compounds - nitrate and carbon dioxide as electron acceptors. Cl metabolism. Fermentation - alcoholic, propionic, lactic and mixed acid. Fermentation by Ruminococcus albus. Regulation of carbohydrate metabolism in facultative bacteria.

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: The phototrophic prokaryotes - purple photosynthetic bacteria - green sulfur bacteria, cyanobacteria and Chloroplasts. Photosynthetic pigments. The structure of photosynthetic membrane in bacteria – Methanogenesis

References

1. Doelle, H.W. 1975. Bacterial metabolism, 2nd Edition, Academic press.
2. Gottschalk, G. 1986. Bacterial metabolism 2nd edition. Springer - Verlag. New York
3. Moat, A.G. and J.W. Forster, 1995. Microbial physiology, 3rd Edition, Wiley-Liss,New York.
4. Rose A.H. 1976. Chemical microbiology-An introduction to Microbial Physiology.3rd edition New York Plenum
5. White, D. 1995. The Physiology and Biochemistry of Prokaryotes. Oxford University Press. New York.
6. Albert L.Lenininger, David Nelson, Michael M.Cox, 2nd edition, Principles of
7. Biochmistry, CBS Publishers & Distributors, Delhi.

CCIII - VIROLOGY

SEMESTER: I

CODE: 15PMB103

UNIT I

Bacteriophages - Classification - Replication - Single stranded DNA containing viruses ϕ *XI74,* Ml3, Filamentous phages - Double stranded DNA Containing phages - Structure and biology ofT4.

UNIT II

Plant viruses - classification, 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 and satellite RNA

UNIT III

Animal viruses - Classification - Structure and replication, Pathogenesis and lab diagnosis of RNA containing viruses. Picarno virus - Polio, Rhabdo virus, and Myxoviruses Influenza. Structure and replication, Pathogenesis and lab diagnosis of DNA containing viruses: Vaccinia, Adeno, Herpes, Hepatitis-B, tumour viruses (SV) and Prions.

UNIT IV

Virological challenges: AIDS, T -cell leukemia - Slow viruses. Methods in virology Cultivation and assay of viruses - Tissue culture - Cell lines and cell culture Characterization of viral particles. Recovery of viral proteins and nucleic acids. Detection and quantification of virus activity.

UNIT V

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

References

1. Dimmock DJ. and Primrose S.B. 1994. Introduction to modern virology, 41h 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 & Kil11bull. An Introdllctiollto Virology.

CC IV - BIOCHEMISTRY

SEMESTER:I

CODE: 15PMB104

UNIT I

Composition of living matter. Biochemistry of Bacterial,animal and plant cell. Specialized composition of microorganisms and their structure and function.

UNIT II

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

UNIT III

Structural features and chemistry of macromolecules. Nucleic acid - properties,biosynthesis and degradation of purine and pyrimidines - protein classification - primary,secondary,tertiary,quartenery and three dimensional structure of protein.

UNIT IV

Carbohydrate - mono,di,oligo and poly saccharides - lipids and fatty acids - properties, oxidation - biosynthesis of cholesterol - catabolic principles and breakdown of carbohydrates , lipids,proteins and nucleic acid.

UNIT V

Disorder of carbohydrate metabolism - Diabetes melites ,glucose and galactose test - disorder of lipids - plasma lipoprotein,cholesterol and triglycerides in health and disease.

Reference

1.Christopher K.Mathews and Van Holde,K.E.(1996) Biochemistry (2^{nd} 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 (2^{nd} 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 4^{th} edition won c Brown publication

5.Lubert Styer (1995) Biochemistry (11^{th} edition) W.H.Freman and company New york

CCV - PRACTICAL I

MICROBIAL DIVERSITY, MICROBIAl METABOLISM, VIROLOGY& BIOCHEMISTY

SEMESTER: I

CODE:15PMBP105

1. Staining technique - Gram's, Acid fast, Endospore & Negative staining.
2. Enumeration of bacteria, fungi & actinomycetes by serial dilution technique.
3. Micrometry
4. Measurement of growth - a. Haemocytometer, 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. Polymer degradation 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. Buffer prepartion (Tris,Phosphate and acetate)
14. sugar test in blood

ELECTIVE : Microbial biotechnology and Nanotechnology

SEMESTER:I

CODE: 15PMBE101

UNIT I

Biotechnology : Definition,History and Scope - Biotechnology products obtained from microbes - concepts of biotechnology - nucleic acid hybridization- southern,northern and western blotting - sequencing of nucleic acid and proteins - polymerase chain reaction. And DNA finger printing.

UNIT II

Genetic engineering : Principles and applications of recombinant DNA technology - Restriction enzymes - types,recognition sites and specificity , ligases and their uses.

Cloning vectors:Plasmids,cosmids,Phasmids,Shuttle vectors,expression vectors - cloning strategies, gene libraries and cDNA cloning.

UNIT III

ENZYME TECHNOLOGY: Production , microbes and application enzyme immobilization - methods ,substrate,application and advantages

Micro algal technology : biotechnological potential of micro algae as feed, food and fuel production,pharmaceutically valuable compounds of microalgae.

UNIT IV

Genetic engineering in plants - Ti plasmid of Agrobacterium tumifaciens,physical methods of transferring genes to plants.transgenic plants and transgenic animal.

UNIT V

NANOTECHNOLOGY : Definition - History of nanotechnology - Characteristics of nanoparticles - need of nanotechnology today - application of nanotechnology - nanotechnology in medicine.

CCX - MOLECULAR BIOLOGY AND MICROBIAL GENETICS

SEMESTER: III
CODE :**15PMB310**

UNIT I : Nucleic acid: DNA and its forms in the microbial world (DNA,tRNA, mRNA and rRNA) organization , topology , chemistry and functions. Replication of DNA- mechanisms – enzymology – repaire mechanisms. Nucleases – various types, functions and uses –Host restriction and modification.

UNIT II: Chromosomes and plasmids – chromosomes of E.coli. Plasmids – types and functions- isolation and purification techniques – mechanism - plasmid replication and incompatibility – plasmid curing –an account of plasmids of fungi , actinomycetes and cyanobacteria.

UNIT III: Regulation of gene expression in microbes – mechanisms of transcription and translation concept of gene, genetic code and operons – Lac and Trp operons. Regulation at level of DNA - antisense DNA, RNA processing – splicing – capping and polyadenylation , ribozymes. Post translational regulation, signal sequences and protein transport.

UNIT IV: Gene transfer mechanism: 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 V: Transposable elements : IS element – transposons – mechanism of transposition and recombination- introduction , characteristic, mechanisms and regulation of transposition in Tn3 and Tn5 – transposable elements in fungi. Mutagenesis – biochemical basis of mutants – mode of action – Spontaneous and induced mutations – isolation technique of mutants – reversion and suppression of mutation – site directed mutagenesis.

References:

Microbial genetics – Friefielder

Gene manipulation technique- Primrose

Genetics – Gardner

Microbial genetics- Wiever

CCXI - MEDICAL MICROBIOLOGY

SEMESTER: III
CODE : 15PMB311

UNIT I: Medical microbiology – concepts- Normal flora of Human body. Nosocomial infection, Microbial interaction and disease (Host parasite interaction). Collection and transport of clinical samples.

UNIT II: Pathogenesis, Lab diagnosis, Prevention and treatment of diseases caused by the following gram positive bacteria –*Staphylococcus sp., Streptococcus sp., Pneumococcus sp., Corynebacterium sp., Bacillus anthracis : Mycobacterial diseases and spirochetes.*

UNIT III: Pathogenesis, Lab diagnosis, Prevention and treatment of diseases caused by the following gram positive bacteria – *Escherichia coli , Klebsiella*, *Bordettella pertuse*, *Enterobacter*, *Salmonella typhi*., *Shigella*, *Vibrio*, *Pseudomonas*, Rickettasial diseases, Chlamydial and Mycoplasmal diseases – Zoonotic infections.

UNIT IV: Mycology: Classification of medically important fungi – general approach to the identification of fungi , superficial mycoses – Dermatophytes , subcutaneous mycosis, systemic mycosis – *Histoplasum capsulatum , coocidioides immitis , Blastomyces dermatitidis* , opportunistic fungi – Candidiasis , Cryptococcosis , Aspergillosis.

UNIT V: Parasitiology : Morphology , pathogenesis and laboratory diagnosis of protozoans – E. histolytica , plasmodium sp., Leishmania sp., Trichomonas sp., Giardia sp. Brief descriptioin on helminiths diseases caused by *Ascaris, Wuchereria* sp.

References:

Jawetz.E.Melnic, J.L and Adelberg E.A 1998, Review of medical microbiology, Lange medical publications, USA.
Mackie and Mc Cartney, 1994, medical microbiology Vol I and Vol II. Churchill Livingston, 14th edition.
Diagnostic microbiology by Liza
David Greenwood-Medical microbiology, Kannan66@usa.net.in.
Lipence cott – Illustrated manual of medical microbiology
Medical microbiology by Knip

CC XII -IMMUNOLOGY AND IMMUNOTECHNOLOGY

SEMESTER: III

CODE : 15PMB312

UNIT I

History and scope of Immunology- Haematopoiesis-Immuity- types of immunity , innate , acquired , passive and active , Immunohaematology –Blood groups - lymphoid organs – cells of immune system-CMIand HMI

UNIT II

Antigen – types – Hapten – immunoglobulin – structure distribution and function – molecular biology of Ig synthesis. Origin and development and differentiation of T and B lymphocytes. Antibody diversity. Ag – Ab interactions – detection and measurement, agglutination and precipitation – enzyme immuno assays, poly clonal and monoclonal antibodies. Immuno blotting ELISA, immuno electrophoresis.

UNIT III

Complement pathways – components – classical and alternate pathways – activation – Hypersensitivity – Anaphylaxis , cytotoxic reactions. Immune complex deposition and cell mediated hypersensitivity – Auto immunity and idiotypic network.

UNIT IV

Immunity to infectious diseases – Resistance to viral bacterial and fungal micro parasites – immunization with vaccine, methods of vaccine production – quality assessment – maximum lethal dose (MLD), maximum toxin volume (MTV) – toxicity test and potency test - Cancer and transplantation immunology and MHC types - . Immunosuppression physical, chemical and biological methods. Interleukins types and their functions.

UNIT V

Preparation and purification of antigens and antibodies. Quantification of ag – ab. Isolation of blood cells, FACS. Detection of Immune complex , Nephlometry bioassay of cytokines.

Reference :

Benjamin . E., Coico. R, Sunshine G. 2000. Immunology - a short course, 4th edition, A john Wiley and sons, INC Publication.

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

3. Roitt. I.M.Brostaff, I.J.and Male D.K., 1996. Immunology, 4th Edition, c.v.Mosby Company, Saint Louis.

CCP XIII- PRACTICAL – III

MOLECULAR BIOLOGY, MICROBIAL GENETICS, MEDICAL MICROBIOLOGY & IMMUNOLOGY & IMMUNOTECHNOLOGY

SEMESTER: III

CODE : 15PMBP313

Isolation of plasmid DNA
Isolation of chromosomal DNA
Principles and application of PAGE, SDS PAGE
Mutagenesis – isolation of drug resistant & auxotrophic mutants- replica plating technique
Bacterial conjugation
Bacterial transformation, induction of Lac operon
Diagnostic bacteriology:
Lab diagnosis of pyogenic infections - Enteric diarrhoea, UTI anaerobic infection
Isolation & identification of clinically important bacteria from the above mentioned specimens.
Training the students to obtaiun basic knowledge regarding the collection of all body samples and their further diagnosis.
Antibiotic sensitivity test – Kirby Bauer method
Blood collegection by vein puncture
haematology- Total WBC count, Total RBC count, Differential count , Haemoglobin.
SGOT, SGPT, Cholestrol and bilirubin test
Separation and preservation of serum – short and long periods.
Microscopic observation of pathogenic fungi
Preparation of antigens from bacteria and performing diagnostics tests like WIDAL, VDRL etc., and their standardization
ELISA
Performance of antigen – antibody reactions Precipitation, agglutination
Gel diffusion technique – immuno diffusion in gels (Ouchterlony)
Latex and Staphylococcal coagglutination test
Pregnancy testing by using immunological methods

EC II - INTELLECTUAL PROPERTY RIGHTS (IPR)

SEMESTER: III

CODE : 15PMBE302

Unit: I

Introduction – History. Biological Invention and creativity – Intellectual property (IP) types and Importance – Protection of IPR

Unit: II

IP – patents – copyrights and related rights – Trademarks and rights arising from trade mark registration – Indian and International patent laws – patenting, marketing.

Unit: III

Patents – 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: IV

International convention relating to Intellectual property – Establishment and significance of WIPO - History - mission and activities – General Agreement on trade and tariff (GATT)

Unit: V

Indian position in patenting, WTO strategies – Indian IPR – other countries IPR - legislations- Commitments to WTO – patent ordinance and its applications.

References: 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; 1998

3. Eli Whitney, United states patent Number: 72X, cotton Gin, March 14, 1794
4. Intellectual Property today: Volume 8, No.5, May 2001, (www.iptoday.com)
5. Using the internet for non-patent prior art searchers, Derwent IP matters, July 2000
(www.ipmatters.net/features/000707 - gibhs.ntml

EDC II MICROBIAL DISEASE & MANAGEMENT.

SEMESTER III

CODE: 15EDMB302

UNIT I

Types of Infections-Method of transmission of infections-Treatment & control of infection-Immunisation schedule followed in India.

UNIT II

Common viral infections of human:Dengue, Swineflu, Chiken pox, Small pox,Polio,Mumps,Measles,Chikengunya,AIDS.

UNIT III

Common Bacterial infections of human- Causative agent, pathogenesis, Symptoms, Prevention and treatment for the following diseases- Cholera,Gastro enteritis,Typhoid,Anthrax,Tuberculosis.

UNIT IV

Causative agent, pathogenesis, Symptoms, Prevention and treatment for the following diseases Candidiasis,Giardiasis,Amoebiasis,Filariasis,Ascariasis,Malaria.

UNIT V

Cancer-Definition-Types-Viruses causing cancer-Carcinogenesis-Cancer chemotherapy.Study on common antibiotics available in the market & its usage.

Reference

Awetz.E.Melnic, J.L and Adelberg E.A 1998, Review of medical microbiology, Lange medical publications, USA.

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

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

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

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

CCVI – ENVIRONMENTAL MICROBIOLOGY

SEMESTER: II

CODE:15PMB206

UNIT I

Aero microbiology: Droplet nuclei, aerosols: air borne transmission of microbes and diseases: assessment of air quality-aquatic microbiology: aquatic habitats: fresh water, marine habitats-esturies, hydrothermal vents, salt pans, coral reefs, mangroves and their microbial communities - role of microorganisms in the productivity of ecosystem - food chain

UNIT II

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

UNIT III

Biodetermination and biodegradation of organic molecules in soil and water. High molecular weight polymer e.g., cellulose, lignin. chitin. pectin. petrol cum products. pesticides, and other synthetic molecules. Mode of degradation, enzymes involved and significance.

UNIT IV

Use of microorganisms in oil extraction, recovery of metals, degradation of xenobiotics, and utilization of waste; food *I* (SCP, Yeast, mushroom); fuel (ethanol, methanol and methane): fertilizer (Algae); feed (algae, yeast).

UNIT V

Pollution and its hazards: sources, effect on microorganisms in various ecosystems (air and water pollution , pollution from marine drainage. radioactive leakage) chemicals, industrial water, etc., Use of microorganisms in the control of pollution and as indicator.

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

CCVII – SOIL AND AGRICULTURAL MICROBIOLOGY

SEMESTER: II

CODE:15PMB207

UNIT I

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

UNIT II

Microbial interactions - Neutral association - Positive association - negative association Microbial competition - antibiosis. Rhizosphere, Mycorrhizae

UNIT III

Biogeochemical cycles. – Carbon, Sulfur, Phosphorus, Magnesium and Iron, Nitrogen Cycle – N2 fixation – Nitrification – Denitrification

UNIT IV

Biofertilizers – Symbiotic N2 fixers – Rhizobium and Frankin, Free living N2 fixers – Azospirillium and Azotobacter, Associative – Azolla , Cyanobacteria. Phosphate solubilization , Phosphobacteria , Aspergillus, Trichoderma, Phosphate solubilization Isolation , Mass multiplication and application

UNIT V

Recent advances in Biopesticides, Bioremediation of contaminated soil - Diversity of microorganisms - definitions - criteria for bioremediation - future of bioremediation Bacterial, Fungal and viral, mass production and field application of B1. Biodegradation of Herbicides and Pesticides

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,

CCVIII -FOOD & INDUSTRIAL MICROBIOLOGY

SEMESTER: II
CODE :15PMB208

UNIT I

Scope of food microbiology- Microorganisms and food –.microorganisms and food materials. Factors affecting the growth and survival of microorganisms in food –factors affecting the Microbial growth.-spoilage of milk,cereals,meat & sea foods-principles of food preservation.

UNIT II

Bacterial agents of food borne disease – Aeromonas hydrophila, Brucells , Bacillus , Campylaobacter , Clostridium botulinum, C. perfringens, E.coli , Listeria monocytogens,, Salmonella , Staphylocoocus aureus , Vibrio , Scrombotoxic fish poisoning

UNIT III

Fermentation of Microbial products – Alcoholic beverages beer, vitamins: B_{12} and riboflavin and their biomedical importance.Fermented microbial foods. – Fermented milks – Cheese – Fermented vegetables – Fermented meat – Fermented fish – beer – vinegar – Oriental fermented foods.

UNIT IV

Types of fermentation – fermentor types – Upstream and down stream processing of fermentation. Recovery and purification of intracellular and extra cellular products – Strain improvement.

UNIT V

Fermentation of microbial products – single cell proteins. Antibiotics – Penicillin, Streptomycin-citric acid- enzymes – Amylase,Bio fuels.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.

CCP IX- PRACTICAL - II

ENVIRONMENTAL, SOIL & AGRICULTURAL MICROBIOLOGY, FOOD & INDUSTRIAL MICROBIOLOGY

SEMESTER: II

CODE:15PMBP 209

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 technique
6. Isolation ofN2 fixers - Rhizobium, Azotobacter & Azospirillum
7. Isolation of phosphate solubilizers
8. Isolation of BGA from paddy field
9. Isolation V AM from Rhizosphere soil
10. Prcparation of Mushroom spawn using sorghum's grains
11. Alcoholic fermentation – wine production , Ethanol estimation
12. Isoloation 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)

PG EDC PAPER-I MICROBES IN HUMAN WELFARE

Semester :II

Code:15EDMB201

Unit-1

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

Unit-2

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

Unit-3

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

Unit-4

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

Unit-5

Microorganisms in Medicine: Antibiotics, Vaccine, Hormones, Vitamins and Steroids.

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

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

Click and Pasteurnick,Biotechnolgy

CC XIV - RESEARCH METHODOLOGY,BIOSTATISTICS AND COMPUTER APPLICATION

SEMESTER:IV

CODE:15PMB414

UNIT I

Techniques- Microscopy -TEM, SEM, Specimen preparation of Electron microscope- Electrophoresis and Chromatography: HPLC, Ion exchange, Autoradiography, Spectrophotometry-NMR, X ray crystallography, FTIR

UNIT II

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

UNIT III

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 IV

Population, Sample and sampling methods, tabulation of data, presentation of data: Graphical (Frequency polygon and frequency' curve). Measures of central tendencies Mean, Median, Coefficient of variants, Simple and multiple correlation, regression. Testing hypothesis -'t' test, 'Chi' square test and goodness fit. ANNOVA

UNIT V

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

References

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

SEMESTER IV
CODE: 15PMBE403

Elective Course III (EC) Marine Microbiology

Unit: I Marine Microbial disserts

Marine environment – see-benthic & littoral 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, asmophilic 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 – Ectosymbiosis of Protozoa, Runinant symbiosis – Plant-microbe interaction – *Rhizobium, Mycorrhizae, Anabaena* – sponge.

Unit: IV Marine Microbial Disease

Marine food borne pathogens & Water borne pathogens – *Aeromonas, Vibrio, Salmonella, Pseudomonas, Leptospira, Cornybacter.*

Unit: V Marine Microbial Biotechnology

Production and applications of marine microbial products – pigments – Astaxanthin, β carotene – enzyme – antibiotics – polysaccharide – sea food preservation methods.

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)
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DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc - MICROBIOLOGY

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.

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DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc - MICROBIOLOGY

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

1. 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.

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DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc - MICROBIOLOGY

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.

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MANNAMPANDAL, MAYILADUTHURAI- 609 305
DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc - MICROBIOLOGY

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.

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DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc - MICROBIOLOGY

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.

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DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc - MICROBIOLOGY

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:

viii) 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.

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

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

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DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc - MICROBIOLOGY

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

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DEPARTMENT OF MICROBIOLOGY

SYLLABUS –M.Sc - MICROBIOLOGY

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 thuringiensi*s- *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 - MICROBIOLOGY
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.

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DEPARTMENT OF MICROBIOLOGY
SYLLABUS –M.Sc - MICROBIOLOGY
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

8. Physical chemistry - David Friefelder
9. Gupta S. P. 1986. Statiscal methods
10. 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.

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DEPARTMENT OF MICROBIOLOGY
SYLLABUS –M.Sc - MICROBIOLOGY
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
PG EDC PAPER-I MICROBES IN HUMAN WELFARE

Semester :II

Code: 18 EDMB

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

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DEPARTMENT OF MICROBIOLOGY
SYLLABUS –M.Sc - MICROBIOLOGY

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 - MICROBIOLOGY
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

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DEPARTMENT OF MICROBIOLOGY
SYLLABUS –M.Sc - MICROBIOLOGY
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

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DEPARTMENT OF MICROBIOLOGY
SYLLABUS –M.Sc - MICROBIOLOGY
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

3. 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.
4. Old RW and Primrose SB. Principles of Gene Manipulation – An Introduction to Genetic Engineering 5th Ed. Blackwell Scientific Publications, London. 1995.
5. Brown TA. Gene cloning and DNA analysis introduction. 4th Ed. Blackwell Science Ltd., London. 2001.
6. Balasubramanian D, Bryce CFA, Dharmalingam K, Green J, Jayaraman K. Concepts in Biotechnology University Press, India. 1996.
7. Glazer AN, Nikaido H. Microbial Biotechnology – Fundamentals of Applied Microbiology WH Freeman and Company, New York. 1994.

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DEPARTMENT OF MICROBIOLOGY
SYLLABUS –M.Sc – MICROBIOLOGY
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.

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DEPARTMENT OF MICROBIOLOGY
SYLLABUS –M.Sc - MICROBIOLOGY
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.

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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

xi) 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

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

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