MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

UG COURSES – AFFILIATED COLLEGES

B.SC. MICROBIOLOGY

(Choice Based Credit System)

(with effect from the academic year 2017-2018 onwards)

Sem	Pt.	Subject Status	Subject Title
III	I	Language	Tamil/Other language
	II	Language	English
	III	Core – V	Microbial Genetics
	III	Major practical-III	Microbial Genetics
	III	Allied– III	Plant pathology Biofertilizer and Biopesticides
	III	Allied practical– III	Plant pathology Biofertilizer and Bio pesticides
	III	Skilled based core	A.Medical Lab Technology or B.Enzymology
	IV	Non major Elective	A.General Microbiology Or B.Applied Food Microbiology
		Common	Yoga

IV	I	Language	Tamil/Other Language
	II	Language	English
	III	Core – VI	Fundamentals of Immunology
	III	Major practical –IV	Fundamentals of Immunology
	III	Allied-IV	Genetic Engineering
	III	Allied practical-IV	Genetic Engineering
	III	Skillbasedcore	A.Diagnostic Microbiology Or B.Entrepreneurial Microbiology
	IV	Non major Elective	A.Microbes and Infections or B.Basics of biotechnology
	IV	Common	Computer for digital era
	V	Extension Activity	NCC,NSS,YRC,YWF

V	III	Core-VII	Environmental and Agricultural Microbiology
	III	Core-VIII	Industrial Microbiology
	III	Elective	Bioinformatics
	III	Elective	Dairy Microbiology
	III	Major Practical– V	Environmental and Agricultural Microbiology
	III	Major practical-VI	Industrial Microbiology
	III	Major Practical– VII	Dairy Microbiology
	IV	Skill Based, Common	Personality Development/ Effective Communication/ Youth Leader ship

VI	III	Core-IX	Food Microbiology
	III	Core-X	Clinical Microbiology
	III	Core –XI	Microbial Biotechnology
	III	Major practical-VIII	Food Microbiology
	III	Major Practical – IX	Clinical Microbiology
	III	Major practical-X	Microbial Biotechnology
	III	Project	Project

MSU/2017-18/UG-Colleges/Part-III(B.Sc.,Microbiology)/Semester -III

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-III/Part-III/Core-5

MICROBIAL GENETICS

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Preamble: Molding the student's society with interest in research in the area of life science by teaching with essentials of microbial genetics.

Unit – I Basic tools

Genetics - Historical introduction - Experiments of Hershey, chase and Griffith - DNA Structure - circular and super helical - RNA as the genetic material - Genetic code and table - organization and functioning of prokaryotic genetic material (Viral and E-coli) - Replication of RNA - Reverse transcriptase.[12L]

Unit – II Plasmids and application

Bacterial plasmids - structure, types and properties of plasmids - plasmid replication - Transposons and its elements - structure, types and properties.[12L]

Unit – III: Phages and its proliferation

Bacteriophage (T_4) - Lytic cycle and lysogenic cycle, operon systems - lac and Trp[10L]

Unit –IV : Types of mutation and its application

Mutations - Spontaneous, induced, base pair changes, frame shift, deletion, insertion, tendem, duplications, transversions - Genotyphic and phenotypic mutants - Reversion and suppression - Ames test [11L]

Unit –V : Gene transfer

Gene transfer mechanisms - Conjugation (cell transmissible plasmids, F factor and Hfr strains) - Transformation (Natural transformation, competence, DNA uptake, role of natural transformation artificially induced competence and electroporation) - Genetic recombination (Requirements molecular basis and genetic analysis of recombination in bacteria) - Generalized and specialized transduction [15 L] [Total: 60 L]

Text book Recommended

- Watson JD., Hopkins N.H., Roberts J.W., Steitz JA and weiner A.A.M (1987) Molecular biology of the Gene. The Benjamin Cumming Publishing Company
- Lewin B. (2007) Genes IX Oxford University Press UK
- Maloy S.R. Croman JR. J.E and Freifelder D (1994) Microbial Genetics, Jones and Barlett Publishers.
- Freifelder D (1991) Molecular Biology, Nanosa Publishing ttouse
- Jeyanthi, G.P. (2008) Molecular biology, MJP Publisher Chennai.

MSU/2017-18/UG-Colleges/Part-III(B.Sc.,Microbiology)/Semester -III

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-III/Core practical-III

Preamble: Exposing students exhibiting passion over teaching, research and jobs in industries to basics and routine experiments carried out in diverse areas pertaining to their theory background so as to improve their experimental skills, reliability and effectiveness needed for effective research and employment.

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Major Practical-III

MICROBIAL GENETICS

1. Isolation of spontaneous mutants
2. UV-mutagenesis - survival studies
3. Chemical mutagenesis - NTG
4. Conjugation in bacteria (Interrupted & Uninterrupted) – (Demo)
5. Transformation in *E.coli*
6. Transduction of *E.coli* (Demo)
7. Isolation of Plasmid DNA by Agarose gel electrophoresis.
8. Quantification of DNA by Diphenylamine method
9. Demonstration of antibiotic resistant mutant
10. Quantification of Protein by Bradford method.

References:

- J.G. Cappuccino and N.Sherman 1996 Microbiology - A laboratory manual - Benjamin Cummins, New York
- M. Kannan 1996, Laboratory Manual in General Microbiology

- P. Gunasekaran - Laboratory Manual in Microbiology
- Dr.S.Rajan and Mrs.R.Selvi Christy - Experimental procedures in Life Sciences - Ajantha book house, chennai
- Dr.S.M.Reddy and Dr.S.Ram Reddy - Microbiology A laboratory manual - BSC Publishers and Distributors - Hyderabad

MSU/2017-18/UG-Colleges/Part-III(B.Sc.,Microbiology)/Semester -III

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-III/Allied-3

L T PC

PLANT PATHOLOGY, BIOFERTILIZERS AND BIOPESTICIDES 3 0 0 3

Preamble: Introducing the students about the menace and mercy of microbes in plant world.

Unit –I :Plant Diseases and its Control

Concept of plant disease - definitions of disease cycle and pathogenicity, Symptoms associated with microbial plant diseases. Stages in development of a disease - infection - invasion, colonization - dissemination of pathogens and perennation. [8 L]

Unit –II:Histopathology of plant

Concepts of constitutive defence mechanisms in plants - inducible structural defenses (histological - cork layer, abscission layer, tyloses, gums) inducible biochemical defences (Hypersensitive response (HR), Systemic acquired resistance (SAR) - Phytoalexins - pathogens related (PR) Proteins, Plantibodies, Phenolics, Quinones, Oxidative bursts) [12 L]

Unit – III: **Plant Bacterial Diseases**

White rust of crucifers *(Albugo candida)* - Late blight of potato *(Phytophthora infestans)* Ergot of rye *(Claviceps purpurea)* Black stem rust of wheat – *Puccinia graminis tritici* [9 L]

Unit – IV: **Biofertilizers**

Bacterial biofertilizers - isolation, purification - commercial application of Azotobacter, Azospirillum, Rhizobium, Phosphobacteria, cyanobacteria, Anabena, Nostoc- Mycorrhizae (Endo and ecto) - VAM - Siderophore activity [9 L]

Unit – V: **Biopesticides**

Biopesticides - *Bacillus thuringiensis, Agrobacterium tumifaciens*, Fungi *Trichoderma viridae, Beauvaria,Phytophthora palmivora*, virus - Nuclear Polyhedrosis Virus.[7 L]

[Total: 45 L]

Text book Recommended

- Prescott LM Harley JP and klein DA (2013) Microbiology Mccrawttill, New york
- Salle A.J (1996) Fundamental Principles of Bacteriology
- R.C Dubey and Mahewari – 2014 A Text Book of Microbiology – chand and Co New Delhi

MSU/2017-18/UG-Colleges/Part-III(B.Sc.,Microbiology)/Semester -III

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-III/Part-III

ALLIED PRACTICAL – III

PLANT PATHOLOGY, BIOFERTILIZERS, BIOPESTICIDES

Preamble: **Exposing students exhibiting passion over teaching, research and jobs in industries to basics and routine experiments carried out in diverse areas pertaining to their theory background so as to improve their experimental skills, reliability and effectiveness needed for effective research and employment.**

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- Isolation of Phosphate solublizing microorganisms
- Isolation of *Rhizobium* from root nodules
- Isolation of *Agrobacterium tumifaciens*
- Isolation of *Azospirillum* from paddy fueld
- Isolation of *Azotobacter* from soil
- Identification of Cyanobacteria from paddy fields (*Anabena* and *Nostoc*)-Microscopic observation
- Staining of VAM
- Isolation of Cyanobacteria

- Observation of bacterial, fungal and virally infected plant parts (Blight of paddy, citrus canker, Late blight of potato and stem rust of wheat), Tobacco mosaic - Cucumber mosaic virus infection
- Isolation of *Bacillus thuringiensis* and *Trichoderma viridae* from soil (Demonstration)

References:

- J.G. Cappuccino and N.Sherman 1996 Microbiology - A laboratory manual - Benjamin Cummins, New York
- M. Kannan 1996, Laboratory Manual in General Microbiology
- P. Gunasekaran - Laboratory Manual in Microbiology
- Dr.S.Rajan and Mrs.R.Selvi Christy - Experimental procedures in Life Sciences - Ajantha book house, Chennai
- Dr.S.M.Reddy and Dr.S.Ram Reddy - Microbiology A laboratory manual - BSC Publishers and Distributors - Hyderabad

MSU/2017-18/UG-Colleges/Part-III (B.Sc.,Microbiology)/Semester -III

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-III/Part-III

Skill based Subjects

L T P C

Paper - 1 A: MEDICAL LAB TECHNOLOGY **2 2 0 4**

Preamble: Exposing the students about principle and applications of commonly employed techniques in medical lab technology to make them employable.

Unit – I: Clinical measurement

Organization of the clinical laboratory - Role of medical lab technician - Safety regulation - first aid - clinical lab records - units of measurements- laboratory calculations - Quality control of lab findings.[12 L]

Unit –II:Haematology

Haematology - Specimen collection - Routine haematological tests - Haemoglobin - Haematocrit - RBC - MCV - MCH - MCHC - Differential counts, Reticulocyte count - ESR - Eosinophil count {12 L)

Unit –III:**Serology**

Blood clotting mechanisms - Bleeding time - Clotting time determination - Blood grouping, Principles of immunologic reactions - Specimen collection - Preservation - Serological test for Syphilis and Typhoid (10 L)

Unit –IV :**Diagnostic Kit Assay**

Agglutination tests - C reactive protein (CRP) test - RA test - Serodiagnosis of *Streptococcal* infections - Pregnancy test, Enzyme assays - Phosphatase - Transaminases - Creatine kinase - Lactic dehydrogenase - Blood gases and bicarbonate(11 L)

Unit – V: **Clinical Pathology**

Clinical pathology - Urine analysis - routine examination of urine - rapid chemical test of urine - CSF - Semen analysis - routine biochemical tests - Glucose, Protein, urea, Creatine in and Bilirubin(15 L) [Total: 60 L]

MSU/2017-18/UG-Colleges/Part-III (B.Sc.,Microbiology)/Semester -III

Text book Recommended

1. Ananthanaryanan R and Panikar J (200) Text book of Microbiology, Orient Longmans
2. Rajan (2007) Medical Microbiology MJP Publisher, Chennai
3. Kani L Mukherjee, Medical Lab technology Hill Publishing Co., Ltd., New Delhi Vol I-III

MSU/2017-18/UG-Colleges/Part-III(B.Sc.,Microbiology)/Semester -III

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-III/Part-III/

Skill based subject **L T P C**

2 2 0 4

Paper - 1 B : ENZYMOLOGY

Preamble: Make the students to understand the basics, types, mechanism and factors affecting enzymes to have better understanding about physiology and metabolism.

Unit – I: Analysis of Enzymes

Enzyme techniques - Activity of enzymes - properties - Handling modes - Enzymatic analysis - isolation (12 L)

Unit –II : Enzyme activity

Enzyme kinetics - velocity of a reaction - order - progress curve - influenzing factors – Michaelis Menton kinetics (12 L)

Unit –III : Co- enzymes

Co enzymes: introduction cofactors - substrate enzyme relationship - classification – characteristics (10 L)

Unit – IV: Enzyme action

Mechanism of enzyme action : Enzymes specificity - active sites - Mechanism of action - pathway of enzyme - catalytic reaction - Mapping of active site. (11 L)

Unit –V : Enzyme technology

Enzyme technology : Role of enzymes in industries and health care - Enzyme production - extraction - purification and Stabilization - Abzymes - Biosensors – Ribozymes (15 L) [Total: 60 L]

Text Books Recommended

- Stryer, L. 1995, Biochemistry, Ed. W.H.Freeman and Company, New York
- Berg JM Tymoczko JL and Stryer L (2011) Biochemistry, W.H.Freeman and Company
- Voet D and Voet J.G. (2004) Biochemistry 3rd edition John Wiley

MSU/2017-18/UG-Colleges/Part-IV(B.Sc.,Microbiology)/Semester -III

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-III/Part-IV/

Non Major Elective **L T P C**

Paper – I A : GENERAL MICROBIOLOGY **2 0 0 2**

Preamble: Introducing ambitious students about the history, scope, basics and components of microbiology to explore more about microbial world.

Unit –I :Basic concepts of Microbiology

History and scope of microbiology: Discovery of microbes - spontaneous generation - Role of microbes in disease - Industrial microbiology and microbial ecology (6 L)

Unit –II : Microscope

Microscopy - Basic types - sterilization methods - Disinfectants – Types (6 L)

Unit –III : Staining and its methods

Principles of staining procedure- simple, gram's, negative, capsule, spore (6 L)

Unit –IV : **Techniques of microbiology**

Components of growth media - General, selective and differential - pure culture techniques and preservation of cultures. (6 L)

Unit –V : **Microbial nutrition**

Cell structure - Microbial nutrition Growth curve (6 L) [Total: 30 L]

Text book Recommended

- Prescott LM Harley JP and klein DA (2013) Microbiology Mccrawttill, New yourk
- Salle A.J (1996) Fundamental Principles of Bacteriology
- R.C Dubey and Mahewari – 2014 A Text Book of Microbiology – chand and Co New Delhi

MSU/2017-18/UG-Colleges/Part-IV(B.Sc.,Microbiology)/Semester -III

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-III/Part-IV/

Non Major Elective **L T P C**

2 0 0 2

Paper - 1B: APPLIED FOOD MICROBIOLOGY

Preamble: Educating students about the relationship of foods with microbes and its positive and negative roles in food processing, production and preservation in order to keep/ produce safe foods needed for a healthy society.

Unit –I :Food fermentation

Food as a substrate for microorganisms - mold, yeast and bacteria - General characteristics and importance (6 L)

Unit –II :Preservation of food

Principles of food preserration - Asepsis - Removal of microorganisms - Anaerobic conditions (6 L)

Unit –III Spoilage of food

Food spoilage - fruits - vegetables - meat - canned food - sources - control - spoilage problems (6 L)

Unit –IV : Methods of Preservation

Preservation techniques - freezing and refrigeration - Heat - Vacuum packing - Addition of chemicals –Pasteurization (6 L)

Unit –V : Intoxications of food

Food poisoning - Bacterial, viral, fungal, protozoa and Chemical (6 L) [Total: 30 L]

Text Book Recommended

- Adams, M.R and Moss Food Microbiology
- Frazier w.c and westhoff D.C (2012) Food migobiology
- Jay. J.M (2010) Modern Food Migobiology CBS publishers
- BanwartGj (1989) Basic Food Migobiology Chapman, Hall New York
- Vijaya Ramesh K (2007 Food Migobiology MJP Publishers, Chennai

MSU/2017-18/UG-Colleges/Part-III(B.Sc.,Microbiology)/Semester -IV

2017-18/MSU/46thSCAA/Affili.Coll/UG./B.Sc.(Microbio)/Sem-IV/Part-III/Core-6

L T P C

4 0 0 4

MAJOR VI: FUNDAMENTALS OF IMMUNOLOGY

Preamble: Enriching students knowledge in the historical, basic components of immune system and their functions to understand the defense systems and contribute in the field of health improvement.

UNIT – I: Basic concepts of immunology

History of immunology - Immunohaematology, structure, composition, functions of the cells in immune system - Blood groups, blood transfusion - Rh - Incompatibilities - Immunity - Types of immunity: Innate and acquired.[10 L]

UNIT –II : Immune system

Immune systems - Anatomy of lympho reticular systems - Primary lymphoid organs - Secondary lymphoid tissues - Cells of immune system - Detailed aspects of T Cells and B Cells - Receptors - Activation and functions - Humoral immune response - Cell mediated immune response - Lymphokines, cytokines. [15 L]

UNIT – III Antigen and Antibody

Antigens - Types - Properties - Haptens - Adjuvents - Vaccines - Types, toxoids, antitoxins - Immunoglobulins - Structure, types, properties and functions - Complements : Components and pathways.[12 L]

UNIT – IV Antigen and Antibody reactions

Antigen - Antibody reactions – Invitro methods :Precipitation reactions, agglutination and complement fixation - Immunofluorescence - ELISA- RIA - Invivo methods - Skin test - Immune complex in tissue demonstration. [10 L]

UNIT –V : Hypersensitivity

Hypersensitivity reactions - Antibody mediated - Type I: Anaphylaxis - Type II: Antibody - dependent cell cytotoxicity - Type III: Immune complex reactions - Respective diseases and immunological methods of diagnosis - Type IV: Hypersensitivity reaction - MHC and transplantations.[13 L]
[Total: 60 L]

Text Books Recommended:

- Donald. M. Weir and John Steward. (1993). Immunology (7^{th} Edition) ELBS, London
- Hue Davis. (1997). Introductory Immunology (1^{st} Edition) Chapman & Hall Publisher, London.
- Ivan M. Roit. (1998). Essential Immunology - Blackwell Scientific Publications, Oxford
- Paul (1998). Fundamental Immunology, (2^{nd} Edition), Raver Press, New York.
- Peter J. Delves and Ivan M. Roit (Eds) (1998) Encyclopeida of Immunology - (2^{nd} Edition) Academic Press.

MSU/2017-18/UG-Colleges/Part-III(B.Sc.,Microbiology)/Semester -IV

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-IV/Part-III/Core-Practical –IV

Preamble: Exposing students exhibiting passion over teaching, research and jobs in industries to basics and routine experiments carried out in diverse areas pertaining to their theory background so as to improve their experimental skills, reliability and effectiveness needed for effective research and employment.

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FUNDAMENTALS OF IMMUNOLOGY

1. ABO Blood grouping and Rh typing
2. Blood collection and serum separation
3. Perform total RBC and WBC count from blood sample
4. Perform Total Platelets count
5. Antigen preparation (Demonstration)
6. Polyclonal Antibody production (Demonstration)
7. Widal test
8. Single Radial Immunodiffusion test
9. Double Immunodiffusion test (Ouchterlony Double Diffusion tecst)
10. ELISA test (Demonstration)

References:

- J.G. Cappuccino and N.Sherman 1996 Microbiology - A laboratory manual - Benjamin Cummins, New York
- M. Kannan 1996, Laboratory Manual in General Microbiology
- P. Gunasekaran - Laboratory Manual in Microbiology
- Dr.S.Rajan and Mrs.R.Selvi Christy - Experimental procedures in Life Sciences - Ajantha book house, chennai
- Dr.S.M.Reddy and Dr.S.Ram Reddy - Microbiology A laboratory manual - BSC Publishers and Distributors - Hyderabad

MSU/2017-18/UG-Colleges/Part-III (B.Sc.,Microbiology)/Semester -IV

2017-18/MSU/46thSCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-IV/Part-III/Core-/Allied-4

	L T P C
GENETIC ENGINEERING	**4 0 0 4**

Preamble: Highlighting the tools and applications of genetic engineering to inculcate the desire of research in biotechnology

Unit – I:Protein synthesis:-

Transcription - Initiation, elongation, termination of transcription, post transcriptional processing - Translation - Initiation, elongation, termination of translation, post translational processing. [12 L]

Unit - II Restriction enzymes

Eco RI, Hind III, Sma, Hae III and BamHI - Types and sources - Recognition sequences and utilities - enzymes involved in genetic engineering

[8 L]

Unit - III Cloning vectors

plasmid based vectors - Natural (pSC 101, pSF 2124, pMBI), Artificial - pBR 322 and pUC construction: Phage based vectors - Lamda phage vectors and its derivatives: Hybrid vectors - phagemid, phasmid and cosmid, BAC and YAC [10 L]

Unit –IV Gene mapping

Techniques of restriction mapping - construction of chimaeric DNA - cloning in bacteria - Molecular probes - Blotting techniques (southern, Western, Northern) Techniques – C DNA library [8 L]

Unit – V Gene library

Gene amplification - Basic PCR and its modifications - Applications of PCR in biotechnology and genetic engineering - DNA finger printing, Micro array - protein engineering [7 L]
[Total: 45 L]

Text book Recommended

1. Brown, T.A (1999) Gene cloning. (3rd Edition) chapman and Hall publication

2. Old RW and primrose, 1995 principles of Gene manipulation, 5th edition, Blackwell scientific publication FRG

3. T.A. Brown 1995, 3rd edition, An introduction to Gene cloning

4. Glick B.R and Pasternak JJ 1994 Molecular Biotechnology, Principles and Application of recombinant DNA, ASM press Washington

MSU/2017-18/UG-Colleges/Part-III(B.Sc.,Microbiology)/Semester -IV

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-IV/Part-III/

ALLIED PRACTICAL – IV

Preamble: Exposing students exhibiting passion over teaching, research and jobs in industries to basics and routine experiments carried out in diverse areas pertaining to their theory background so as to improve their experimental skills, reliability and effectiveness needed for effective research and employment.

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GENETIC ENGINEERING

1. Isolation of Chromosomal DNA from Bacteria.
2. Separation of protein by SDS- PAGE.
3. Quantification of Protein by Lowry's Method.
4. Isolation of RNA from bacteria.
5. Quantification of RNA.
6. Southern blotting technique (Demonstration)
7. Western blotting technique (Demonstration)
8. Northern blotting technique (Demonstration)
9. Isolation of bacteriophages from sewage.
10. Polymerase chain reaction (Demonstration).

References:

- J.G. Cappuccino and N.Sherman 1996 Microbiology - A laboratory manual - Benjamin Cummins, New York
- M. Kannan 1996, Laboratory Manual in General Microbiology

- P. Gunasekaran - Laboratory Manual in Microbiology
- Dr.S.Rajan and Mrs.R.Selvi Christy - Experimental procedures in Life Sciences - Ajantha book house, chennai

MSU/2017-18/UG-Colleges/Part-III(B.Sc.,Microbiology)/Semester -IV

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-IV/Part-III

Skill based subject **L T P C**

A. DIAGNOSTIC MICROBIOLOGY **2 2 0 4**

Preamble: Exposing students about the different methods and techniques followed in the field of diagnostic microbiology to prepare efficient technicians for creating healthy society.

Unit –I : Laboratory methods in basic mycology

collection and transport of clinical specimans - Direct Microscopic examination, culture media and incubation, serological test for fungi - Antifungal susceptibility testing

Unit - II Mycology

-Superficial infections - Dermatophytes - Microsporum, Trichophyton, Epidermophyton - Madura mycosis - Opportunistic fungal infections - *Candida albicans, Aspergillus, Mucor*

Unit - III Laboratory methods for parasitic infections

Diagnostic techniques for faecal, gastrointestinal and urino - genital specimen parasitic diseases - *Entamoebahistolytica, Giardia, TaeniaSolium, Ascaris, Enterobolus, Trichuristrichura, Plasmodium vivax, Wucheriabancrofti*

Unit –IV Clinical diagnosis

Etiology and laboratory diagnosis of urinary tract infections - Meningitis, Diarrhea, Respiratory tract infections - pyogenic infection

Unit - V Laboratory methods in basic virology

Viral culture, Media and cells used - specimen processing - isolation and identification of viruses, Detection of viral antigen (flourescent antibody and solid phase immunoassays) viral serology.

Text book Recommended

- Ananthanaryanan R and Panikar J (200) Text book of Microbiology, Orient Longmans
- Rajan (2007) Medical Microbiology MJP Publisher, Chennai
- Kani L Mukherjee, Medical Lab technology Hill Publishing Co., Ltd., New Delhi Vol I-III

MSU/2017-18/UG-Colleges/Part-III(B.Sc.,Microbiology)/Semester -IV

2017-18/MSU/46thSCAA/Affili.Coll./UG./B.Sc.(Microbio)/sem-IV/Part-III/

Skill based subject **L T P C**

2 2 0 4

B. ENTREPRENEURIAL MICROBIOLOGY

Preamble: Motivating the students to exploit the microbial techniques and resources to emerge out as an entrepreneur to support the growth of economy of our nation.

Unit – I :Entrepreneurial society

Entrepreneur development – activity – Institutions involved – Government contributions to entrepreneurs – risk assessment (10 L)

Unit – II: Bread baking

Bread – leavening – Baking process – Rye bread, San Francisco dough Bread – idli – Dosa, Fermented fish products – Ngari, Hentak, Tungtap, Gnuchi (15 L)

Unit – III : Mushroom cultivation

Mushroom cultivation – edible and poisonous mushroom – cultivation of *Agaricus campestris*, *Agaricus bisporus*, and *Volvariella volvaciae*, Preparation of compost, filling tray beds, spawning, maintain optimal temperature, casing, watering, harvesting, storage (12 L)

Unit – IV: History of patening

Patent and secret process, History of patening, composition, subject matter and characteristics of a patent, inventor, infringement, cost of patent. Patent in india and other countries – Fermentation economics (10 L)

Unit – V : Alcoholic products

Indian alcoholic beverages – Ennog/sai mod- Apong – Kodokojaanr – Xajpani – Zutho – judima – Antingba – Kiad – sujan, Brewing of beer: Grape wine – wine from other fruits (13 L)

[Total: 60 L]

MSU/2017-18/UG-Colleges/Part-III(B.Sc.,Microbiology)/Semester -IV

Textbook recommended

- Industrial Microbiology – L.E Caseda New age publication
- Entrepreneurial development in India – By Arora
- Experiments in Microbiology, plant pathology Tissue culture and mushroom production technology – K.R Aneja, New age international Publication S.Chand publication 6th Edition
- Food microbiology – William C Frazler, Dennis C Weshoff (2013) – 5th edition (Food of Indian origin)

MSU/2017-18/UG-Colleges/Part-IV(B.Sc.,Microbiology)/Semester -IV

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-IV/Part-IV/

Non-major Elective

L T P C

2 0 0 2

A .MICROBES AND INFECTIONS

Preamble: Highlighting the students about diverse microbial pathogens and its effect and managerial strategies.

Unit –I : Route of transmission

Sources of infection - Routes of transmission - control measures - Testing by Koch's postulates - Antibiotic sensitivity testing (6 L)

Unit –II : Bacterial pathogens

Bacterial pathogens - *Streptococcal, staphylococci, E.coli, Vibrio, Salmonella, Shigella and Mycobacterium* (6 L)

Unit –III : Fungal pathogens

Fungal pathogens - *Candida, Aspergillus* – Dermatophytes (6 L)

Unit – IV: Viral pathogens

Viral pathogens - Pox virus, Mumps virus, Rabies virus and HIV (6 L)

Unit - V : Protozoan pathogens

Protozoan pathogens - Malarial, Amoebic Giardiasis and Yellow fever (6 L)

[Total: 30 L]

Text book Recommended

- Ananthanaryanan R and Panikar J (200) Text book of Microbiology, Orient Longmans
- Rajan (2007) Medical Microbiology MJP Publisher, Chennai
- Kani L Mukherjee, Medical Lab technology Hill Publishing Co., Ltd., New Delhi Vol I-III

MSU/2017-18/UG-Colleges/Part-IV(B.Sc.,Microbiology)/Semester -IV

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-IV/Part-IV/

Non - Major Elective

L T P C

2 0 0 2

B.BASICS OF BIOTECHNOLOGY

Preamble: Inculcating the history, components, techniques and applications of biotechnology for effective usage of natural resources to produce valuable products friendly for mankind.

Unit - I :History of biotechnology

History of biotechnology - selection of Industrial microorganisms - Media and strain improvement (6 L)

Unit –II : Fermentation process

Fermentation process - standard fermented - Types of fermentation (Batch, Continuous and fed batch) - media used (6 L)

Unit - III :Industrial production of enzymes

Industrial production of enzymes (Amylase) Beverages - wine, beer, Antibiotics (Penicillin) (6 L)

Unit – IV: Vaccination

Vaccine production and Therapeutic agents - Attenuated and live - Engineered organisms (6 L)

Unit –V : Agriculture and Environmental microbes

Role of microbes in agriculture and environment - GMO's (6 L) [Total: 30 L]

Text Books Recommended

- Gupta P.K. (1996). Elements of Biotechnology. Rastogi and Co., Meerut. India
- MukheshPasupuleti (2006). Molecular Biotechnology. MJP Publishers. Chennai.
- Dubey. R-C (1996). A Text Book of Biotechnology. S.Chand and Co. Ltd., New Delhi.

MSU/2017-18/UG-Colleges/Part-V(B.Sc.,Microbiology)/Semester -IV

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-IV/Part-V/

EXTENSION ACTIVITIES

(NCC, NSS, YRC or YWF) **L T P C**

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MSU/2017-18/UG-Colleges/Part-III(B.Sc.,Microbiology)/Semester -V

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-V/Part-III/Core-7

L T PC
4 0 0 4

ENVIRONMENTAL AND AGRICULTURAL MICROBIOLOGY

Preamble: Transforming student society caring nature as an eco-friendly one by introducing the relationship between microbes and nature, its roles and its utilization for the creation sustainable environment

Unit –I : Aero Microbiology

Aero Microbiology - Aerosol - droplet nuclei - air pollution - sources (Microbiological) - Air quality analysis, air sampling devices - air borne pathogens.

[10 L]

Unit –II : Solid waste management

Solid waste management - sources and types of solid waste, Methods of solid waste disposal (composting and sanitary landfill) - Liquid waste management, composition (BOD and COD) Primary, secondary (oxidation pond, trickling filter, activated sludge process and septic tank) and tertiary treatment.[15L]

Unit –III : Environmental Microbiology

Distribution of microorganisms in nature - Microbial communities in soil - physical and chemical characteristics of soil - Factors influencing the microbial density in soil – Bioleaching [10 L]

Unit –IV : Symbiosis

Microbial associations - Symbiosis – commensalism- competition - amensalism - synergism - parasitism and predation - Rumen microbiology [10 L]

Unit –V :Xenobiotics

Microorganisms in the decomposition of organic matter - Nitrogen cycle - carbon cycle - phosphorous and sulphur cycle, degradation - Xenobiotic degradation (Haloalkyl Propellants, Alkyl Benzyl Solfonates)[15 L] [Total: 60 L]

MSU/2017-18/UG-Colleges/Part-III(B.Sc.,Microbiology)/Semester -V

Text book Recommended

- Rangasamy G and Bagyaraj. D.J. (1996) - Agricultural Microbiology - Prentice - Hall of India pvt Ltd, New delhi
- Atlas R.M and Bartha M (2003) Microbial ecology - Fundamentals and applications.

L T P C

INDUSTRIAL MICROBIOLOGY 4 0 0 4

Preamble: Displaying concepts, regular affairs, techniques involved in the production of microbial based industrial products among the interested students and to make them employable in industries or to convert them as an entrepreneur.

Unit –I : Development of industrial microbiology

Brief history and developments in Industrial Microbiology - Types of fermentation process - solid state and liquid state (Stationary and submerged) fermentations - batch, fed batch and continuous fermentations [12 L]

Unit – II: Fermentor

Components of a typical bioreactor, Types of bioreactors - Laboratory, Pilot - scale and production fermenters, constantly stirred tank and air lift fermenter - Measurement and control of fermentation parameters - P^H, temperature, dissolved oxygen, foaming and aeration. [15 L]

Unit –III : Industrial Microbes

Sources of industrially important microbes and methods for their isolation, Preservation and maintenance of industrial strains - Strain improvement medium formulation [13 L]

Unit - IV :Down stream processing

Down stream processing - cell distruption - filtration centrifugation - solvent extraction-precipitation, lyophilization, spray drying [10 L]

Unit –V : Commercial Production

Production of Citric acid and Vinegar - Ethanol - Glutamic acid Vitamin B_{12} - Antibiotics (Penicillin - Streptomycin), Dextran and Xanthan.[10 L] [Total: 60 L]

Text book recommended

- Stanbury P.F.A. Whitakar and Hal S.J (1995) Principles of fermentation technology (2^{nd} Edition)
- Casida, L.E.1989 - industrial Microbiology willey Eastern Limited New delhi

MSU/2017-18/UG-Colleges/Part-III(B.Sc.,Microbiology)/Semester -V

2017-18/MSU/46thSCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-V/Part-III/

MAJOR - ELECTIVE

L T P C

4 0 0 4

Preamble: Introducing the basics of bioinformatics among motivated students to carryout effective research using bioinformatics tools in the future.

PAPER I : BIOINFORMATICS

Unit –I : Data Analysis

RDBMS - Definition of relational database - Mode of data transfer (FTP, TCP), advantage of encrypted data transfer (10 L)

Unit –II : Biological database

Biological database - nucleic acid, genome, protein sequence and structure, gene expression databases, database of metabolic pathway, Mode of data storage - File - formats - FASTA, Gene bank and Uniprot, Data submission and retrieval form NCBI, DDBJ, Uniprot, PDB (15 L)

Unit –III : Sequence alignment

Local and Global sequence alignment, pairwise and multiple sequence alignment, scoring an alignment, scoring matrices, PAM and BLOSUM Series of matrices - Types of Phylogenic trees - Different approaches of phylogenetic tree construction – UPGMA.(10 L)

Unit –IV : Diversity of Genomes

Diversity of Genomes : Viral, prokaryotic and eukaryotic genomes - transcriptome - proteome, 2-D gel electrophoresis, MALDI - TOF Spectrometry, Major features of completed genomes : *E.Coli, S. cerevisiae***,** Arabidopsis, Human. .(10 L)

Unit –V : Protein structure

Hierarchy of protein structure - primary, secondary and tertiary structures, modeling, structural classes, Motifs, Folds and Domains, Protein structure prediction -Research in bioinformatics:- Comparative analysis, Homology Modeling and Drug discovery and design insilico method (15 L) [Total: 60 L]

Text book recommended

- Saxena Sanjay (2003) A first course in computers, Vikas Publishing house
- Pradeep and SinhaPreeti (2007) Foundations of computing 4th edition BPB Publication
- LeskM.A(2008) introduction to Bioinformatics oxford Publication, 3rd International student edition.
- Dr.A.John De Britto (2011) Bioinformatics .

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-V/Part-III/

MAJOR - ELECTIVE

L T P C

4 0 0 4

Preamble: To make the students aware of the types, relationship between microbes and dairy, factors affecting, quality improvement of dairy products to strengthen the dairy sector.

PAPER II : DAIRY MICROBIOLOGY

Unit –I : Milk Protein

Milk - Composition of milk, Protein - casein, whey proteins - Fat - Milk enzymes - Lactose (carbohydrate), milk colour, viscosity, flavor and Acidity - Nutritive value of milk - Antimicrobial systems in Raw milk (Lyzozyme, Lactoferrin, Lactoferoxidase). (10 L)

Unit –II : Sources of microorganisms

Sources of microorganisms in milk (The cow's udder, the skin of the cow, Milking utensils, Feeds, Air of the stable, Hands of milk persons, Receiving of milk)- Classification of microbes (Biochemical types, temperature characteristics and pathogenicity) (15 L)

Unit –III : Dairy products

Dairy products - Curd - Butter milk - cheese - Yogurt - Acidophilus milk - Kefir - Koumiss - sour cream,Viili (10 L)

Unit - IV :Milk borne bacterial disease

Milk borne bacterial disease (Diptheria, Pasteurellosis, Q fever, Tuberculosis, Mastitis) viral - Foot and mouth disease Fungal - Microsporam, Aspergillosis (10 L)

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Unit - V Bacteriological tests for milk

Bacteriological tests for milk - Phosphatase milk - standard plate count - Direct microscopic count (DMC) - Burri smear - (clot - on - boiling) - Alizarin alcohol test - shake culture method - Rejection or platform testing - Detection of *Staphylococcus aureus* in milk (15 L) [Total: 60 L]

Text book recommended

- Parihar and parihar - Dairy Microbiology (2011 Agrobios (india)
- Adams M.R and Moss M.O (1995) Food Microbiology
- Frazier W.C and westhoff D.C (2014) Food microbiology Tata MC Craw Hill Publishing co Ltd New delhi
- Jay J.M (1987) Modern food Microbiology

MSU/2017-18/UG-Colleges/Part-III(B.Sc.,Microbiology)/Semester -V

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-V/Part-III/

MAJOR PRACTICAL – V

ENVIRONMENTAL AND AGRICULTURAL MICROBIOLOGY

Preamble: Exposing students exhibiting passion over teaching, research and jobs in industries to basics and routine experiments carried out in diverse areas pertaining to their theory background so as to improve their experimental skills, reliability and effectiveness needed for effective research and employment.

L T P C

0 0 4 2

- Determination of BOD
- Determination of COD
- Microbial degradation of cellulose
- Most probable number test (MPN)
- Membrane filter technique for the quality analysis of water
- Estimation of total suspended solids of effluent
- Isolation of bacteria from soil
- Isolation of fungi from soil
- Isolation of actinomycetes from soil
- Testing antagonistic activity of soil microbes

- Isolation of microbes from rhizosphere.
- Estimation of soil pH
- Estimation of soil Nitrate
- Estimation of soil Sulphate
- Estimation of soil Phosphorus

References:

- J.G. Cappuccino and N.Sherman 1996 Microbiology - A laboratory manual - Benjamin Cummins, New York.
- M. Kannan 1996, Laboratory Manual in General Microbiology
- P. Gunasekaran - Laboratory Manual in Microbiology
- Dr.S.Rajan and Mrs.R.Selvi Christy - Experimental procedures in Life Sciences - Ajantha book house, chennai

MSU/2017-18/UG-Colleges/Part-III(B.Sc.,Microbiology)/Semester -V

2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-V/Part-III/

MAJOR PRACTICAL – VI

INDUSTRIAL MICROBIOLOGY

L T P C
0 0 4 2

Preamble: Exposing students exhibiting passion over teaching, research and jobs in industries to basics and routine experiments carried out in diverse areas pertaining to their theory background so as to improve their experimental skills, reliability and effectiveness needed for effective research and employment.

1. Demonstration of fermentation from yeast
2. Protoplast Fusion – Somatic hybridization (demonstration)
3. Sterility testing of injectables (demonstration)
4. Isolation of industrially important microbes
5. Preservation of industrially important microbes (Demonstration)
6. Purification of protein by ammonium sulphate precipitation

7. Production of antibiotic from Microorganisms

8. Production of Vitamins using Microorganisms (demonstration)

9. Production of Glutamic acid using microorganisms (demonstration)

10. Lyophilization (demonstration)

References:

- J.G. Cappuccino and N.Sherman 1996 Microbiology - A laboratory manual - Benjamin Cummins, New York
- M. Kannan 1996, Laboratory Manual in General Microbiology
- P. Gunasekaran - Laboratory Manual in Microbiology.
- Dr.S.Rajan and Mrs.R.Selvi Christy - Experimental procedures in Life Sciences – Ajantha book house, chennai

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2017-18/MSU/46thSCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-V/Part-III/

MAJOR PRACTICAL – VII

DAIRY MICROBIOLOGY

L T P C

0 0 4 2

Preamble: Exposing students exhibiting passion over teaching, research and jobs in industries to basics and routine experiments carried out in diverse areas pertaining to their theory background so as to improve their experimental skills, reliability and effectiveness needed for effective research and employment.

1. Methylene Blue reduction test

2. Resazurin test

3. Milk Phosphatase test (Demonstration)

4. Standard Plate Count of Milk

5. Microbial examination of Curd
6. Direct Microscopic Count of Milk (DMC)
7. Clot on boiling test (COB test)
8. Yoghurt preparation
9. Alcohol test (for milk)
10. Isolation of Lactobacilli from milk

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2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-VI/Part-III/ Core-9

L T P C

4 0 0 4

FOOD MICROBIOLOGY

Preamble; To make the students to understand the positive and negative impact of microbes and its role in food spoilage and production to favor food security.

Unit –I : Food as a substrate for micro organisms

Food as a substrate for micro organisms (pH, a^w value, Oxidation reduction potential, Nutrient content) - Microorganisms important in food microbiology - Mold, Bacteria and Yeast - General principles of food preservation : Asepsis, Removal, Anaerobic conditions. [15 L]

Unit – II: Contamination of food

Contamination of food (From green plant and fruits - animals - sewage - soil - water - air - during handling and processing) - Classification of foods by Ease of spoilage - Chemical changes caused by Micro organisms [10 L]

Unit –III : Preservation of food

Preservation - High temperature, Low temperature - Drying - Food additives - Sanitation - Hazard analysis, Critical control point - personal hygiene - oriental fermended food (Piden, Minchin, Fermented coffe, Soy sauce) [15 L]

Unit –IV : Contamination, spoilage of foods

Contamination, spoilage of foods - cereals and cereal products - vegetable and fruit - meat and meat product - milk and milk product - poultry - egg and egg products[10 L]

Unit –V : Food poisoning

Food poisoning - Food borne infections - Bacterial (Staphylococcus, Clostridium, Salmonella) - Fungal (Mycotoxins - Aflatoxin, Patulin, ochratoxin) - Viral (Hepatitis) - Rickettsia – Trichinosis [10 L] [Total: 60 L]

Text book recommended

- Parihar and parihar - Dairy Microbiology (2011 Agrobios (india)
- Adams M.R and Moss M.O (1995) Food Microbiology
- Frazier W.C and westhoff D.C (2014) Food microbiology Tata MC Craw Hill Publishing co Ltd
- Jay J.M (1987) Modern food Microbiology

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MAJOR PRACTICAL – VIII

FOOD MICROBIOLOGY

L T P C

0 0 4 2

Preamble: Exposing students exhibiting passion over teaching, research and jobs in industries to basics and routine experiments carried out in diverse areas pertaining to their theory background

so as to improve their experimental skills, reliability and effectiveness needed for effective research and employment.

- Enumeration of microorganism from bread
- Isolation and identification of microbes from fruits
- Isolation and identification of microbes from vegetable
- Isolation of microorganisms from grains
- Determination of thermal death time
- Determination of thermal death Point
- Isolation of yeast from grapes
- Wine production using yeast (Demonstration)
- Isolation of *Salmonella* from poultry products
- Bread preparation (Demonstration)

References:

1. J.G. Cappuccino and N.Sherman 1996 Microbiology - A laboratory manual - Benjamin Cummins, New York
2. M. Kannan 1996, Laboratory Manual in General Microbiology
3. P. Gunasekaran - Laboratory Manual in Microbiology

4. Dr.S.Rajan and Mrs.R.Selvi Christy - Experimental procedures in Life Sciences - Ajantha book house, chennai

5. Dr.S.M.Reddy and Dr.S.Ram Reddy - Microbiology A laboratory manual - BSC Publishers and Distributors – Hyderabad

MSU/2017-18/UG-Colleges/Part-III(B.Sc.,Microbiology)/Semester -VI

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L T P C

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CLINICAL MICROBIOLOGY

Preamble: To educate the students about the relationship between microbes and man, its effect and control measures of diseases.

Unit - I sources of infection

Normal microbial flora of the human body - sources of infection : Food, water, vector and air - mode of transmission : Direct - person to person and animal to person - In direct : Air and other modes (Food, water and insects) - Koch's postulates - control measures - Virulence factors of microbes - invasiveness and pathogenicity - Non specific resistant factors.[13 L]

Unit - II Diagnostic Microbiology

Diagnostic Microbiology - collection and transport of specimen for microbiological examination - General methods for isolation and identification of bacteria. Typing of bacterial isolates – Serodiagnosis [10 L]

Unit - III Clinical Symptoms Bacterial infections

Clinical Symptoms - Epidemiology, Pathogenesis, Laboratory diagnosis, Prevention and treatment of the following bacterial infections - Streptococcal infections - Meningitis - Tuberculosis - Leprosy : Gastrointestinal disorders - Typhoid, Cholera, Bacillary dysentery : Sexually transmitted disease - Syphilis and Gonorrhea : Anaerobic wound infection (Tetanus and gas gangrene) [13 L]

Unit - IV Clinical Symptoms of Viral infections

Clinical Symtoms - Epidemiology, Pathogenesis, laboratory diagnosis, Prevention and treatment of the following viral infections - Respiratory infections (Common cold, infiuenza, Measles, Mumps and Rubella) - Immunodeficiency disease (AIDS, Cytomegalovirus) and Herpes simplex virus.[12 L]

Unit - V : Clinical Symptoms of Protozoan infections

Clinical Symptoms - Epidemiology, pathogenesis, laboratory, prevention and treatment of the following fungal and protozoan infections - systemic mycoses – subcutaneous mycoses,protozoan: Amoebiasis, Malaria, Leishmaniasis - Nosocomial infections.

[12 L] [Total: 60 L]

Text book Recommended

- Ananthanaryanan R and Panikar J (200) Text book of Microbiology, Orient Longmans
- Rajan (2007) Medical Microbiology MJP Publisher, Chennai
- Kani L Mukherjee, Medical Lab technology Hill Publishing Co., Ltd., New Delhi Vol I-III

L T P C

4 0 0 4

MICROBIAL BIOTECHNOLOGY

Preamble: Portraying history, tools, techniques and applications of biotechnology among interested students to understand their importance and its scope in research and generation of employment.

Unit –I : History of biotechnology

Milestone in biotechnology - Definition - concepts - History and achievements Principle and Application of rDNA technology [12 L]

Unit –II:Physical methods for gene transfer

Transformation of DNA - Chemical method, Electroporation, Gene delivary - microinjection - biolistic method (gene gun), liposome and viral mediated delivery, agro Enzyme production technology through microbes Protein engineering and site directed mutagenesis - Enzyme immobilization and application [13 L]

Unit – III: DNA Sequencing

Introduction to genomics Sanger's methods of DNA Sequencing : traditional introduction to new generation sequencing - primar walking and shotgun sequencing [10 L]

Unit - IV :Transgenic plants

Transgenic plants - Ti plasmid - virus, herbicide resistant plants: Trangenic animals - mice - retroviral method - embroyonic stem cell method - Application - Trangenic sheep - transgenic fish - Hybridoma and monoclonal antibodies.[12 L]

Unit –V : Products of microbial biotechnology

Products of microbial biotechnology - products of human therapeutic interest - insulin - hGH, antisense molecules, Bt transgenic - cotton, brinjal, Gene Therapy, recombinant vaccine.[13L]

[Total: 60 L]

Text book recommended

- Stanbury P.F.A. Whitakar and Hal S.J Principles of fermentation technology (2nd Edition)
- Casida, L.E.1989 - industrial Microbiology willey Eastern Limited New delhi

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MAJOR PRACTICAL – IX

CLINICAL MICROBIOLOGY

L T P C

0 0 4 2

Preamble: Exposing students exhibiting passion over teaching, research and jobs in industries to basics and routine experiments carried out in diverse areas pertaining to their theory background so as to improve their experimental skills, reliability and effectiveness needed for effective research and employment.

- Isolation of normal flora from mouth
- Isolation of bacteria from pus
- Isolation of bacteria from urine
- Isolation of normal bacteria from blood
- Antibiotic susceptibility testing by Disc diffusion method
- Fungi - slide culture techniques
- Parasite - iodine wet mount
- Giemsa staining
- Leishman staining
- Widal test - Slide and tube test

- ELISA technique - Demonstration

References:

- J.G. Cappuccino and N.Sherman 1996 Microbiology - A laboratory manual - Benjamin Cummins, New York
- M. Kannan 1996, Laboratory Manual in General Microbiology
- P. Gunasekaran - Laboratory Manual in Microbiology
- Dr.S.Rajan and Mrs.R.Selvi Christy - Experimental procedures in Life Sciences - Ajantha book house, chennai
- Dr.S.M.Reddy and Dr.S.Ram Reddy - Microbiology A laboratory manual - BSC Publishers and Distributors – Hyderabad

MSU/2017-18/UG-Colleges/Part-III (B.Sc.,Microbiology)/Semester -VI

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MAJOR PRACTICAL – X

MICROBIAL BIOTECHNOLOGY

L T P C

0 0 4 2

Preamble: Exposing students exhibiting passion over teaching, research and jobs in industries to basics and routine experiments carried out in diverse areas pertaining to their theory background so as to improve their experimental skills, reliability and effectiveness needed for effective research and employment.

- Restriction Digestion of DNA (Demonstration)
- Ligation of insert DNA to vector DNA (Demonstration)
- Immobilization of bacterial cells and enzymes
- Production of Amylase enzyme from bacteria
- Production of Protease from bacteria
- Preparation of single cell protein from *Spirullina*
- Production of ethanol from cane sugar using Yeast.

- Production of Monoclonal antibodies (Demonstration)
- Vermi -composting - Demonstration
- Mushroom cultivation - Demonstration

References:

- J.G. Cappuccino and N.Sherman 1996 Microbiology - A laboratory manual - Benjamin Cummins, New York
- M. Kannan 1996, Laboratory Manual in General Microbiology
- P. Gunasekaran - Laboratory Manual in Microbiology
- Dr.S.Rajan and Mrs.R.Selvi Christy - Experimental procedures in Life Sciences - Ajantha book house, chennai
- Dr.S.M.Reddy and Dr.S.Ram Reddy - Microbiology A laboratory manual - BSC Publishers and Distributors – Hyderabad

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2017-18/MSU/46th SCAA/Affili.Coll./UG./B.Sc.(Microbio)/Sem-VI/Part-III/

PROJECT (Compulsory)

MICROBIOLOGY

L	**T**	**P**	**C**
0	**0**	**7**	**7**

Preamble: To address and assess the diverse problems associated with various fields relevant to microbes through the techniques learnt to design managerial measures for a healthy environment