



MAHATMA GANDHI UNIVERSITY
KOTTAYAM

KERALA

INDIA

SCHEME & SYLLABUS (CBCS)

and

Model Question Papers

For

B.Sc.MICROBIOLOGY PROGRAMME

&

COMPLEMENTARY COURSES OFFERED BY THE
MICROBIOLOGY DEPARTMENTS

(W.E.F.2016 ADMISSION)

BOARD OF STUDIES IN MICROBIOLOGY (U.G.)

1. Prof.(Dr.) A.V.Saramma ,Cochin University of Science and Technology
2. Prof.(Dr.)M.S.Jisha School of Biosciences, Mahatma Gandhi University'Kottayam
3. Dr.Sumi Mary George,Sree Sankara College,Kalady
4. Sri.Noby Mathew,St.Thomas College ,Pala
5. Smt.Nivya Mariam Paul,M.A.College ,Kothamangalam
- 6.Smt.Neethu P.C. St.George College Aruvithura
7. Prof. (Dr.) Jyothis Mathew (Chairman)
School of Biosciences,Mahatma Gandhi University,Kottayam
Email:jyothismathews@mgu.ac.in
Mob.9495524779

CONTENTS

	Page
1. Eligibility criteria for admission	4
2. Scheme for B.Sc.Microbiology theory Courses and project	5-6
3. Scheme for B.Sc.Microbiology Practical Courses	7
4. Syllabus for B.Sc.Microbiology	8-56
5. Question paper pattern and Model question papers for B.Sc.Microbiology	57-107
6. Syllabus for complementary courses	108-117
7. Question paper pattern and Model question papers for complementary courses	118-129

Eligibility criteria for admission to B.Sc.Microbiology programme

Pass in plus two or equivalent with biology as a subject or vocational higher secondary in any biological/paramedical/agricultural /related branch.

Scheme for B.Sc.(Microbiology) Programme-Theory courses							
Semester	Course Category	Course code and subject title	Inst.Hrs.		Credits	Marks	
			T	P		Intl	Extl
I Sem	Common1	English	5	-	4	20	80
	Core1	MB1CRT01 Fundamentals of Microbiology	4	-	4	20	80
	Core2	MB1CRT02 Microbial Physiology & Metabolism	4	-	4	20	80
	Compl.-1	Biochemistry-1	2	-	2	20	80
	Compl.-2	Biotechnology-1	2	-	2	20	80
II Sem	Common2	English	5	-	4	20	80
	Core 3	MB2CRT03 Immunology	4	-	4	20	80
	Core 4	MB2CRT0 4 Microbial Genetics	4	-	4	20	80
	Compl.-3	Biochemistry-2	2	-	2	20	80
	Compl.-4	Biotechnology-2	2	-	2	20	80
III Sem.	Core 6	MB3CRT06 Bioinstrumentation and Techniques	4	-	4	20	80
	Core 7	MB3CRT07 Industrial Microbiology	4	-	4	20	80
	Core 8	MB3CRT08 Food Microbiology	4	-	4	20	80
	Compl.-7	Biochemistry-3	2	-	2	20	80
	Compl -8	Biotechnology-3	2	-	2	20	80

IV Sem	Core 9	MB4CRT09 Fundamentals of Biostatistics, Bioinformatics & Research Methodology	4	-	4	20	80
	Core 10	MB4CRT10 Environmental Microbiology	4	-	4	20	80
	Core 11	MB4CRT11 Agricultural Microbiology	4	-	4	20	80
	Compl.-9	Biochemistry - 4	2	-	2	20	80
	Compl.-10	Biotechnology - 4	2	-	2	20	80
V Sem.	Core13	MB5CRT13 Medical Bacteriology-1	4	-	4	20	80
	Core 14	MB5CRT14 Medical Bacteriology - 2	4	-	4	20	80
	Core 15	MB5CRT15 Medical Mycology	4	-	4	20	80
	Core 16	MB5CRT16 Medical Parasitology	4	-	3	20	80
	Generic Elective	MB5 GET01 Human Physiology / MB5 GET02 Aquatic Microbiology / MB5GET 03 Environmental Science	3	-	3	20	80
VI Sem.	Core17	MB6CRT17 Medical Virology	4	-	4	20	80
	Core18	MB6CRT18 Diagnostic Microbiology	4	-	4	20	80
	Core 19	MB6CRT19 Molecular Microbiology	2	-	2	20	80
	Choice Based Course	MB6CBT01 Microbioprocess / MB6CBT02 Sanitation Microbiology/ MB6CBT03 Medical Entamology	4	-	4	20	80
	Project	MB6PRP01 Project	-	5	4	20	80

Scheme for B.Sc.(Microbiology) Programme -Practical courses							
Semester I&II	Course Category	Course code and subject title	Inst.Hrs./we ek		Credits	Marks	
			T	P		Intl	Extl
I&II	Core 5	MB2CRP05 Microbiology Practical-I	-	4	4	20	80
	Compl.-5	Practical Biochemistry-1	-	2	2	20	80
	Compl.-6	Practical Biotechnology-1	-	2	2	20	80
III& IV Sem.	Core 12	MB4CRP12 Microbiology Practical-2	-	5	4	20	80
	Compl.-11	Practical Biochemistry - 2	-	2	2	20	80
	Compl.-12	Practical Biotechnology - 2	-	2	2	20	80
V&VI Sem.	Core 20	MB6CRP20 Microbiology Practical -3	-	6	4	20	80

Core Course- 1

MB1CRT01 Fundamentals of Microbiology

Total hours of instruction 80

Credits: 4

Unit 1

Definition, Scope and history of microbiology. Diversity of microbial world. Beneficial and harmful microbes. Five kingdom classification. Eukaryotes and prokaryotes.

References

Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

Microbiology by Daniel Lim

Microbiology: Principles and Explorations by Jacquelyn G. Black

Prescott/Harley/Klein's Microbiology by Joanne Willey, Linda Sherwood, and Chris Woolverton

Microbiology Pelczar, Chan and Krieg.

Unit 2

Differentiate between eukaryote and prokaryote. Principles of classification- classification of bacteria. Differences between archaebacteria and eubacteria. Ultrastructure of prokaryotic cell.

References:

General microbiology Vol 1 Powar & Dagainawala

Microbiology Pelczar, Chan and Krieg.

Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

Unit 3

Staining techniques, Culture media and culture methods (including anaerobic bacteria). Isolation of pure cultures.

References:

Microbiology Pelczar, Chan and Krieg.. Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

Prescott/Harley/Klein's Microbiology by Joanne Willey, Linda Sherwood, and Chris Woolverton
General microbiology Vol 1 Powar & Dagainawala

Unit 4: Sterilisation and disinfection – physical and chemical methods. Antibiotics – Classification & mode of action. Disinfectants and its testing

References:

Microbiology Pelczar, Chan and Krieg.

Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

Prescott/Harley/Klein's Microbiology by Joanne Willey, Linda Sherwood, and Chris Woolverton

General microbiology Vol 1 Powar & Dagainawala

Core Course- 2

MB1CRT02 Microbial Physiology &Metabolism

Total hours of instruction 80

Credits: 4

Unit 1: Nutrition, nutritional types, Preservation and transport of bacteria. Microbial Photosynthesis. Microbial life in extreme environments.

References:

General microbiology Vol 1 Powar & Daginawala

General microbiology Vol 2 Powar & Daginawala

Microbiology Pelczar, Chan and Krieg

Prescott/Harley/Klein's Microbiology by Joanne Willey, Linda Sherwood, and Chris Woolverton

Unit 2 : Growth requirements and conditions influencing growth, growth curve, growth kinetics, cell division, sporulation, germination. Enumeration & quantitation of bacteria and microbes.

References:

General microbiology Vol 1 Powar & Daginawala

General microbiology Vol 2 Powar & Daginawala

Microbiology Pelczar, Chan and Krieg

Prescott/Harley/Klein's Microbiology by Joanne Willey, Linda Sherwood, and Chris Woolverton

Unit 3 : Enzymes, factors affecting enzyme activity, transition state in enzyme catalysed reactions, high energy compounds- ATP, GTP, role of reducing power of NAD, NADPH.

References:

General microbiology Vol 1 Powar & Daginawala

General microbiology Vol 2 Powar & Daginawala

Microbiology Pelczar, Chan and Krieg

Unit 4: Bacterial metabolism- Carbohydrate metabolism- glycolysis, alcoholic fermentation, TCA cycle, glyoxalate cycle, electron transport chain, substrate level and oxidative phosphorylation, pentose phosphate pathway. Transamination.

References:

General microbiology Vol 1 Powar & Daginawala

General microbiology Vol 2 Powar & Daginawala

Microbiology Pelczar, Chan and Krieg

Prescott/Harley/Klein's Microbiology by Joanne Willey, Linda Sherwood, and Chris Woolverton

Core Course - 3

MB2CRT03 Immunology

Total Instruction hours- 80

Credits- 4

Unit I:

History of Immunology, Introduction to Infection, Types of Immunity- innate immunity and acquired immunity, Detailed study of cells and organs involved in immune system

References:

Immunology Janis Kuby, Thomas J. Kindt, Barbara A. Osborne, and Richard A. Goldsby

Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

.Kannan (2007), "Immunology",MJP Publishers, Chennai 600005.

Roitt's Essential Immunology by Peter Delves , Seamus Martin , Dennis Burton, Ivan Roitt

Unit II:

Antigens- types, properties, Haptens, Adjuvants; Vaccines - Types - Toxoids - antitoxins., Immunoglobulins- Structure, types and properties. Complement- function of complement, components and pathways, Major histocompatibility complex

Antigen antibody reaction- precipitation reactions, agglutination reactions, complement fixation, Neutralisation reactions, Immunofluorescence, ELISA, RIA.

References:

Immunology Janis Kuby, Thomas J. Kindt, Barbara A. Osborne, and Richard A. Goldsby

Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

I.Kannan (2007), "Immunology",MJP Publishers, Chennai 600005.

Roitt's Essential Immunology by Peter Delves , Seamus Martin , Dennis Burton, Ivan Roitt

Unit III:

Humoral Immune response- Theories of antibody production, plasma cells and antibody secretion, Monoclonal antibodies, Cell mediated immune response- Cytokines, natural killer cells and antibody dependent cell mediated cytotoxicity

References:

Immunology Janis Kuby, Thomas J. Kindt, Barbara A. Osborne, and Richard A. Goldsby

Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

.Kannan (2007), "Immunology",MJP Publishers, Chennai 600005.

Roitt's Essential Immunology by Peter Delves , Seamus Martin , Dennis Burton, Ivan Roitt

Unit IV:

Immunohaematology- Blood groups. Blood transfusion- Rh incompatibilities, Hypersensitivity Reactions- Type I, II, III, & IV. Brief of Transplantation Immunology- Types of grafts, GVH, HLA typing .Autoimmunity- Classification-Grave's Disease, Hashimoto's, Pernicious anaemia, SLE. Tumor Immunology- introduction, immune surveillance theory

References:

Immunology Janis Kuby, Thomas J. Kindt, Barbara A. Osborne, and Richard A. Goldsby

Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

I.Kannan (2007), "Immunology",MJP Publishers, Chennai 600005.

Roitt's Essential Immunology by Peter Delves , Seamus Martin , Dennis Burton, Ivan Roitt

Core Course-4

MB2CRT04 Microbial Genetics

Total Instruction hours- 80

Credits- 4

Unit I:– Bacterial chromosome- structure, Experiments to prove DNA as genetic material, replication, Extrachromosomal genetic material-introduction- Plasmids – structure, replication, incompatibility, Transposons –Brief Introduction, transposition- Cut & Paste mechanism.

References:

Microbial Genetics Stanley R. Maloy, Freifelder and Cronan

Molecular Genetics of Bacteria Snyder and Charminess.

Fundamentals of molecular Biology by Veer Bala Rastogi Ane books India

Unit II: Genetic exchange – Experiments & Mechanism - Conjugation, Transformation, Transduction. Mechanism and Spread of Antibiotic Resistance in Bacteria based on plasmid conjugation.

References:

Microbial Genetics Stanley R. Maloy, Freifelder and Cronan

Molecular Genetics of Bacteria Snyder and Charminess.

Fundamentals of molecular Biology by Veer Bala Rastogi Ane books India

Unit III: Gene expression in prokaryotes - Central Dogma, Transcription, Translation, Enzymes involved. Control of Gene Expression in Prokaryotes – Induction, Repression, Positive Control, Negative Control – based on Lac operon.

References:

Microbial Genetics Stanley R. Maloy, Freifelder and Cronan

Molecular Genetics of Bacteria Snyder and Charminess.

Fundamentals of molecular Biology by Veer Bala Rastogi Ane books India

Unit IV: Mutation – Spontaneous, Induced – Mutagens, Physical & Chemical.

Types of Mutation - base pair changes, frame shift, deletion, addition. Useful phenotypes of mutants (Auxotrophs, conditional, lethal, resistant). Reversion vs suppression. Ames test. DNA repair in bacteria- Excision Repair & SOS repair.

References:

Microbial Genetics Stanley R. Maloy, Freifelder and Cronan

Molecular Genetics of Bacteria Snyder and Charminess.

Fundamentals of molecular Biology by Veer Bala Rastogi Ane books India

Core Course - 5

MB2CRP05 Microbiology Practical – I

Total hours of instruction: 160(80 in Semester I plus 80 in Semester II)

Credit: 4

Study the parts and usage of a Compound Microscope

Study the parts and working and uses of

Autoclaves

Hot air oven

Membrane Filter

LAF

Anaerobic Jar

Preparation of culture Media(NB, NA, MA) and dispensing media in test tubes, bottles, petridishes.

Cultivation of Bacteria on nutrient Agar for obtaining isolated colonies.Study of cultural colony characters- Size, shape, colour etc.

Viable Count of bacteria by pour plate/ spread plate method.

Preparation and examination of Hanging drop mount for studying the motility of bacteria.

Preparation of slide smears for staining.

Staining- Principle & techniques

- Simple staining

- Gram Staining

- Negative Staining.

- Special Staining – endospores

Slide agglutination test - Blood grouping, ASO

Precipitation reaction – RPR , ODD, RID

ELISA-Demonstration

Titration of Antibody – Widal Test.

References:

Microbiology – Concepts and Application – Pelzer Jr. Chang Kreig Mac Graw Hill Inc

Microbiology – Prescott, Harley and Klein Wim.C.Brown Publishers.

Practical Microbiology – R.C Dubey, D.K Maheshwari, S Chand and Company, New Delhi.

Microbiology Laboratory Manual – Cappuccino, Sherman, Pearson Education

Manual of Microbiology Kanika Sharma Ane Books Pvt. Ltd.

Bailey and Scott's Diagnostic Microbiology

Practical Medical Microbiology by Mackie & Mc Cartney

Hand book of experimental immunology by D.M. Weir

Practical Microbiology by Dubey and Maheswari

Core Course – 6

MB3CRT06 Bioinstrumentation and Techniques

Total hours - 80

Credits: 4

Unit I

Beer Lambert's Law. Principles and application of Colorimetry, Turbidimetry, nephelometry, luminometry, Flame Photometer.

Microscopy- Principle– bright field, dark field, phase contrast, fluorescent & Electron Microscope

Reference

Practical Biochemistry by Pattambiraman

Biophysical Chemistry Principles and Techniques- Upadhyay, Nath.

Practical Biochemistry- Principles and Techniques - Ed Keith Wilson and John Walker

Cambridge University press, Cambridge , U K.

Modern Experimental Biochemistry Rodney F Boyer, The Benjamin /Cummings

Publishing Company

.Biophysics R.N.Roy

Unit 2

Basic Principle and application of chromatography.

Paper, Thin layer, gas- liquid, ion exchange, column chromatography, H PLC.

Reference

Biophysical Chemistry Principles and Techniques- Upadhyay, Nath.

Practical Biochemistry Principles and Techniques - Ed Keith Wilson and John Walker

Cambridge University press, Cambridge , U K.

Modern Experimental Biochemistry Rodney F Boyer, The Benjamin /Cummings

Publishing Company

Unit 3

Basic Principles and application of Differential centrifugation, Density gradient centrifugation. Basic Principle and application of Electrophoresis

AGE, PAGE, SDS PAGE. Two dimensional electrophoresis

Reference

Biophysical Chemistry Principles and Techniques- Upadhyay, Nath.

Practical Biochemistry Principles and Techniques - Ed Keith Wilson and John Walker

Cambridge University press, Cambridge , U K.

Modern Experimental Biochemistry Rodney F Boyer, The Benjamin /Cummings Publishing Company

Biochemical Methods- S. Sadasivam and A. Manikam

Unit 4

Spectrophotometry: Principles and application –UV, Visible and infrared Spectrophotometry, fluorescence Spectrophotometry, AAS, Introduction to flow cytometry

Reference

Biophysical Chemistry Principles and Techniques- Upadhyay, Nath.

Practical Biochemistry” Principles and Techniques - Ed Keith Wilson and John Walker Cambridge

University press, Cambridge , U K.

Modern Experimental Biochemistry Rodney F Boyer, The Benjamin /Cummings

Publishing Company

Practical Biochemistry by Pattambiraman

Core Course-7

MB3CRT07 Industrial microbiology

Total hours of instruction:80

Credits:4

Unit I:

General concepts of industrial microbiology. Principles of exploitation of microorganisms for their products. Introduction to fermentation, types of fermentation -single, batch, continuous, dual or multiple, solid- state and submerged fermentation. Industrial strains– characteristics and isolation techniques- primary and secondary screening techniques, strain improvement- introduction.

References

Principles of Fermentation Technology by Peter F. Stanbury, Stephen J. Hall, and Allan Whitaker

Industrial Microbiology by L.E. Casida

Industrial and Environmental Biotechnology by Nuzhat Ahmed ; Fouad M Qureshi and Obaid Y.Khan

Unit II:

Fermentor- parts of stirred tank fermentor, Fermentation media formulation strategies, sterilization, control of foaming, product recovery and purification(outlines only).

References

Principles of Fermentation Technology by Peter F. Stanbury, Stephen J. Hall, and Allan Whitaker

Industrial Microbiology by L.E. Casida

Unit III:

Industrial products derived from microbes- alcohol & alcoholic beverages, organic acids, industrial enzymes-amylase, proteinase, cellulase. Amino acid production - glutamic acid and lysine. Production of antibiotics- penicillins, streptomycins

References

Manual of Industrial Microbiology and Biotechnology by Ronald M. Atlas

Prescott and Dunn's Industrial Microbiology by Gerald Reed

Industrial Microbiology by Samuel C. Prescott

Industrial Microbiology by L.E. Casida

Unit IV

Microbial leaching and metal recovery. Microbes in mining and enhanced oil recovery.

Immobilization methods, adsorption; covalent linkages, membrane entrapment- advantages and disadvantages.

Brief study of Intellectual Property Rights (IPR) –Definition& Function

References

Principles of Fermentation Technology by Peter F. Stanbury, Stephen J. Hall, and Allan Whitaker

Manual of Industrial Microbiology and Biotechnology by Ronald M. Atlas

Prescott and Dunn's Industrial Microbiology by Gerald Reed

Industrial Microbiology by Samuel C. Prescott

Industrial Microbiology by L.E. Casida

Core Course- 8

MB3CRT08 Food Microbiology

Total hours- 80

Credits- 4

Unit I:

History of Food Microbiology. Beneficial role of microbes in food industry; Molds, yeasts and bacteria .

Principles of food preservation - High temperature - Low temperature - Drying - Food additives-organic acids & their salts, nitrites & nitrates,sulfur dioxide & sulfites, wood smoke

References

Frazier, W.C. 1978. Food Microbiology. McGraw Hill

Modern Food Microbiology by James M. Jay, Martin J. Loessner, and David A. Golden

Unit II:

Contamination and spoilage - vegetables and fruits, meat and meat products, milk and milk products - fish and sea food - Poultry, Spoilage of canned foods.Food borne infections, poisoning and intoxications. Microbiological examination of food, Milk. HACCP- definition and principles (out line)

References

Frazier, W.C. 1978. Food Microbiology. McGraw Hill

Modern Food Microbiology by James M. Jay, Martin J. Loessner, and David A. Golden

Unit III:

Importance of microbes in food industries.Fermented food products by microbes – Bread, Vinegar. Alcoholic beverages- wine, beer, cedar. Oriental fermented foods. Fermented vegetables. Milk and milk products- butter, cheese, Probiotics (brief study)

Reference

Frazier, W.C. 1978. Food Microbiology.McGraw Hill.

Industrial Microbiology by Samuel C. Prescott

Parihar and Parihar Dairy Microbiology, Saraswati Purohit, Jodhpur India, 2007
Prajapati J. B. (1995), Fundamentals of Dairy Microbiology.

Unit IV:

Microbial cells as food-single cell proteins- Baker's yeast

Edible mushroom- types and production- *Agaricus bisporus*, *Volvariella volvacea*, *Pleurotus*

Enzymes in food industry-amylase, protease, invertase, pectinase, glucose oxidase

References

Frazier, W.C. 1978. Food Microbiology.McGraw Hill.

Industrial Microbiologyby L.E. Casida

Core Course- 09

MB4CRT09 Fundamentals of Biostatistics, Bioinformatics & Research Methodology

Total hours of instruction: 80

Credits-4

Unit I

Nature and scope of statistical methods and their limitation.

compilation, classification, tabulation, and application in life science.

Graphical representation, Measure of average and dispersion mean, medium, mode.

Reference

Fundamentals of Biostatistics. Bernard Rosner

Biostatistics for medical, nursing and pharmacy students. A. Indrayan and L. Satyanarayana.

Statistics for Biologists. Campbell. R.C

Unit II

Sampling methods – simple random, stratified, systematic and cluster sampling procedures. Sampling distribution, Probability, Tests of significance based on T, Chi-square and F Test Designing and methodology of experiment

Reference

Fundamentals of Biostatistics. Bernard Rosner

Biostatistics for medical, nursing and pharmacy students. A. Indrayan and L. Satyanarayana.

Statistics for Biologists. Campbell. R.C

Unit III

Introduction to Bioinformatics, Importance and scope of Bioinformatics, Data base types, Data mining and data analysis methods - Computer tools for sequence analysis, Finding and retrieving sequences, Similarity searching

Reference

Bioinformatics: A Beginner's Guide. By Jean- Michel Claverie and Cedric Noterdame; Wiley Publishing, Inc. 2003.

Bioinformatics: A practical approach. K. Mani and Vijayaraj, Aparnaa Publication, 2004

Unit IV

Introduction to research methodology. Experimentation in science and data handling, design of an experiment; Experimentation; observation; data collection; interpretation and deduction. Documentation of experiments, record keeping

Reference

Debbie Holmes, Peter Moody, Diana Dine. Research methods for the Biosciences, International Student Ed., Oxford University Press Inc. New York

S K Aggarwal. Foundation Course in Biology, Ane's Student Ed., Second Ed.

R C Sobti, V L Sharma. Essentials of Modern Biology, Ane's Student Ed.

Core Course -10

MB4CRT10 Environmental microbiology

Total hours of instruction: 80

Credits:4

Unit 1

Soil microflora and factors affecting them. Rhizosphere concept, R:S ratio, Quantitative and qualitative analysis of microorganisms in soil. Major biogeochemical cycles carbon-nitrogen-phosphorus and sulphur. Biological nitrogen fixation

References

1. Soil microbiology; An exploratory approach- Mark.s.coyne
2. Introduction to soil microbiology- Martin Alexander
3. Soil microorganisms and plant growth- N.S. Subba Rao
4. Advances in biogas technology- Chawla, O.P
5. Biotechnology – B.D. Singh
6. Soil microorganisms and plant growth Somani.L.L and Bhandari,S.C
7. Biofertilizers- Somani *etal*
8. Soil microorganisms and crop growth Somani.L.L and Bhandari,S.C
9. Biofertilizers in agriculture- Subba Rao, N.S

Unit 2

Distribution of microorganisms in the aquatic environment. Biofilms formation. Algal blooms, Eutrophication, BOD concept, Potability of water. Purification and disinfection of water. Indicator organisms. Microbiological examination of drinking water. Waterborne diseases and control measures.

References

- Aquatic microbiology- Rheinheiner
- Marine pollution- Clark
- Elements of microbiology- Pelczar, Reid and Chan
- Fundamentals of bacteriology- A.J. Salle

Ecological aspect of waste water treatment vol 2 biological activities and treatment process-Cruds C.R and hawkes

Microbiology-Prescott,M.J;harley,j.p.and klein,D.A

Industrial microbiology-Casida,L.E

Environmental microbiology-Vijaya Ramesh

Introduction to environmental microbiology-Mitchel,R

Soil microbiology-Waksman S.A

Microbial ecology-Atlas and Bartha

Environmental aspects of microbiology-Joseph C. Daniel

Unit 3

Microbes in air Sources and transmission of microorganisms in air. Biosensors and biological indicators. Biodeterioration of industrial products such as paper and wood. Microbes in composting and biogas production - Methanogenesis

References.

General microbiology-Pelczar, Reid andChan

Microbiology-Prescott,M.J;harley,j.p.and klein,D.A

Biology of microorganisms-T.D.Brock

Foundations in microbiology-Talaro,K and Talaro,A

Microbiology:an introduction- Tortora,G.j,Funke.B.R. and Case C.L

Microbial ecology-Atlas and Bartha

Environmental molecular Microbiology: Protocols and applications by Paul A.Rochelle

Industrial Biotechnology by Abhilash S.Mathuriya Ane books

Unit 4

Waste water management and sewage treatment. Bioremediation and strategies for bioremediation. Phytoremediation Microbial degradation of petroleum and petroleum products, Pesticide degradation. Biostimulation and bioaugmentation.

References

Pesticide microbiology-Hill,I.R.andWright,S.J.I

Petroleum microbiology-Atlas.R.M

Microbiology-Pelczar, Chan and Kreig

Bioremediation-Baker K.H and Herson

Biodegradation and bioremediation-Martin Alexander

Environmental microbiology-Vijaya Ramesh

Introduction to environmental microbiology-Mitchel R

Microbiology fundamentals and applications-Ronald.M.Atlas

Core Course-11

MB4CRT11 Agricultural microbiology

Total hours of instruction: 80

Credits : 4

Unit1

Brief account of microbial interactions –symbiosis-mutualism-commensalism-Amensalism-synergism-parasitism-predation.Plant –microbe interactions- Mycorrhiza–VAM, Ecto, Endo and Ectendomycorrhiza. Actinomycetes

References

Microbiology Fundamentals and applications-Ronald M. Atlas

Soil microorganisms and plant growth-N.S.Subba Rao

Agricultural microbiology- G.Rangaswamy and D.J. Bagyaraj

Microbial ecology-Atlas and Bartha

General microbiology-Pelczar, Reid and Chan

Microbiology-Prescott, M.J.; Harley, J.P. and Klein, D.A

Unit 2

Microbial diseases of plants-common **bacterial**-crown gall disease (Agrobacterium), potato scab (Streptomyces), soft rot disease (Erwinia), Bacterial wilt of potato (Pseudomonas), citrus canker (Xanthomonas) , **fungal**- Club root disease (Plasmodiophora), Wart disease of potato (Synchytrium), Brown spot of maize (Physoderma), ergot of cereals (Claviceps) , Tikka leaf spot of peanut (Cercospora) and **viral** -Tobacco Mosaic disease (TMV), Bunchy Top of Banana, Bhendi Vein- clearing or Yellow vein Mosaic (Bhendi Mosaic virus), Tomato spotted wilt, Sugar cane mosaic (SMV)-pathogens-Transmission and control measures. Natural defense mechanisms of plants.

References

Soil microorganisms and plant growth-N.S.Subba Rao

Plant microbiology-. –Campbell, R

Agricultural microbiology- G.Rangaswamy and D.J. Bagyaraj

Advances in Agricultural microbiology-subba Rao

Diseases of crop plants in India-G.Rangaswamy.

Crop diseases and their management-Chaube H.S. and Pundhir V.S

Unit 3

Rhizosphere and Phyllosphere microflora and its importance. Endophytic microflora. Microbiology of silage, Tobacco curing. Role of microbes in retting. Rumen microbiology

References

1. Soil microorganisms and plant growth-N.S.Subba Rao
2. Plant microbiology-. –campell,R
3. Agricultural microbiology- G.Rangaswamy and D.J. Bagyaraj
4. Advances in Agricultural microbiology-subba Rao
5. Microbiology Fundamentals and applications-Ronald M. Atlas

Unit 4

Biopesticides-Bacterial-viral-fungal pesticides. Biological control of plant diseases. Integrated pest management, Biofertilizers – nitrogen fixers, phosphate solubilisers,

References

- 1 Soil microorganisms and plant growth-N.S.Subba Rao
2. Plant microbiology-. –campell,R
3. Agricultural microbiology- G.Rangaswamy and D.J. Bagyaraj
4. Advances in Agricultural microbiology-subba Rao
5. Microbiology Fundamentals and applications-Ronald M. Atlas
6. Microbial ecology-Atlas and Bartha
7. General microbiology-Pelczar, Reid and Chan
- 8 Microbiology-Prescott, M.J.; Harley, J.P. and Klein, D.A

Core Course 12

MB4CRP12 Microbiology Practical – II

Total hours of instruction: 200(100 in Semester III plus 100 in Semester IV)

Credit : 4

Enumeration of soil microbes by Plate culture method and isolation of Microorganisms from soil sample – Bacteria, Fungi, Actinomycetes and Azotobacteria.

Wine Production from grapes

Immobilization of yeast cells

Study of Microbial contamination in food products

Analysis of food samples- Vegetables, Fruits, Fish and Meat

Milk analysis by MBRT

Isolation of Lactobacillus from curd

Mushroom cultivation

Enumeration and isolation of microorganism from water.

Microbial investigation of drinking water samples, total bacteria count, coliform test – MPN.

Estimation of BOD.

Study of common Plant pathogen

Estimation of rhizosphere microbial population and calculation of R: S ratio.

Isolation of nitrogen fixing bacteria – Rhizobium

Reference

Experiments in Microbiology, Plant Pathology and Biotechnology by K.R. Aneja

Practical Microbiology – R.C Dubey, D.K Maheshwari, S Chand and Company, New Delhi.

Microbiology Laboratory Manual – Cappuccino, Sherman, Pearson Education

Manual of Microbiology Kanika Sharma Ane Books Pvt. Ltd.

Experiments in Microbiology, Plant Pathology and Biotechnology by K.R. Aneja

Text book of Biotechnology by R.C. Dubey

Microbiology Laboratory Manual by Cappuccino Sherman

Core Course- 13

MB5CRT13 Medical Bacteriology- I

Total hours – 80

Credits – 4

Detailed study of Morphology, Cultural characteristics, Biochemical, Epidemiology, Pathogenesis, Laboratory diagnosis, Prophylaxis and Treatment of the following bacteria:

Unit I:

Staphylococcus aureus, Streptococcus pyogenes, Streptococcus agalatae

Reference:

Mackie and Mc Carteny Practical Medical Microbiology – 13th Edition, Churchill Livingstone.
.Ronald M. Atias (1989). Microbiology, Fundamentals and Applications. II edition. Maxwell Macmillan International editions.

David Greenwood, Richard C.B. Stack and John Forrest Peutherer. (1992). Medical Microbiology. 14th edition. ELBS with Churchill Livingstone.

Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

Unit II:

Pneumococcus, Neisseria

Reference:

1. Mackie and Mc Carteny Practical Medical Microbiology – 13th Edition, Churchill Livingstone.
2. Ronald M. Atias (1989). Microbiology, Fundamentals and Applications. II edition. Maxwell Macmillan International editions.

3. David Greenwood, Richard C.B. Stack and John Forrest Peutherer. (1992). Medical Microbiology. 14th edition. ELBS with Churchill Livingstone. .

4. Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

Unit III:

Corynebacterium, Bacillus, Clostridium perfringens, Clostridium tetani, Clostridium botulinum

Reference:

.Mackie and Mc Carteny Practical Medical Microbiology – 13th Edition, Churchill Livingstone.
Ronald M. Atias (1989). Microbiology, Fundamentals and Applications. II edition. Maxwell Macmillan International editions. .

Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

Unit IV:

Enterobacteriaceae I- Coliforms, *Proteus mirabilis*, Enterobacteriaceae II:- *Shigella dysenteriae*, *Salmonella typhi* & *Salmonella paratyphi*, *Vibrio cholerae*, *Pseudomonas*.

Reference:

Ronald M. Atlas (1989). Microbiology, Fundamentals and Applications. II edition. Maxwell Macmillan International editions.

David Greenwood, Richard C.B. Stack and John Forrest Peutherer. (1992). Medical Microbiology. 14th edition. ELBS with Churchill Livingstone.

Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

Mackie and Mc Cartney Practical Medical Microbiology – 13th Edition, Churchill Livingstone.

Core Course- 14

MB5CRT14 Medical Bacteriology- II

Total hours instruction - 80

Credits - 4

Detailed study of Morphology, Cultural characteristics, Biochemical, Pathogenicity, Epidemiology, pathogenesis, laboratory diagnosis, prophylaxis and treatment of the following bacteria

Unit I:

Mycobacterium tuberculosis, M. leprae, Atypical mycobacteria

Reference:

- 1..Ronald M.Atias (1989). Microbiology, Fundamentals and Applications.II edition.Maxwell Macmillan International editions.
- 2..David Greenwood, Richard C.B.Stack and John Forrest Peutherer. (1992). Medical Microbiology.14th edition.ELBS with Churchill Livingstone.
- 3.Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

Unit II:

Haemophilus, Bordetella, Brucella, Yersinia.

- 1.Mackie and Mc Carteny Practical Medical Microbiology – 13th Edition, Churchill Livingstone.
- 2.Ronald M.Atias (1989). Microbiology, Fundamentals and Applications.II edition.Maxwell Macmillan International editions.
- 3.David Greenwood, Richard C.B.Stack and John Forrest Peutherer. (1992). Medical Microbiology.14th edition.ELBS with Churchill Livingstone. .
- 4..Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

Unit III:

Spirochetes-Treponema and Leptospira, Mycoplasma pneumoniae

Reference:

- .Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar
- Mackie and Mc Carteny Practical Medical Microbiology – 13th Edition, Churchill Livingstone.
- Ronald M.Atias (1989). Microbiology, Fundamentals and Applications.II edition.Maxwell Macmillan International editions.
- David Greenwood, Richard C.B.Stack and John Forrest Peutherer.(1992). Medical Microbiology.14th edition.ELBS with Churchill Livingstone.
- Topley / Wilson's (1990). Principles of Bacteriology, Virology and Immunity, VIII edition, Vol..III Bacterial Diseases, Edward Arnold, London.

Unit IV:

Rickettsiaceae- Genus Rickettsia, Genus Coxiella, *Chlamydiae pneumoniae*, *Chl.trachomatis*

Reference:

Mackie and Mc Carteny Practical Medical Microbiology – 13th Edition, Churchill Livingstone.

Ronald M. Atlas (1989). Microbiology, Fundamentals and Applications. II edition. Maxwell Macmillan International editions.

David Greenwood, Richard C.B. Stack and John Forrest Peutherer. (1992). Medical Microbiology. 14th edition. ELBS with Churchill Livingstone. .

Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

Core Course 15

MB5CRT15 Medical Mycology

Total hours of instruction: 80

Credits : 4

Unit I

General Characters of Fungi- Yeast and mold.Cultivation of Fungi – Culture methods,Culture media and cultural characters. Staining methods used in mycology – wet mount and LPCB .Ultra structure of yeast.

Reference

Text book of medical mycology - Jagadish Chander , Interprint, New Delhi.

Introduction to Mycology- Alexopolus.

Botany for Degree students Fungi – B R Vashishta , A K Sinha

Unit II

Reproduction in Fungi- Asexual and Sexual method.Classification of Fungi – Principles and Approaches. Antifungal agents- Mechanism of action

Reference

Text book of medical mycology - Jagadish Chander , Interprint, New Delhi.

Botany for Degree students Fungi – B R Vashishta , A K Sinha

Unit III

Fungal Diseases: Causative Fungi, Clinical Manifestations, Laboratory Diagnosis and treatment of following diseases-Superficial mycoses .Pityriasis versicolor , Dermatophytoses, Piedra.

Subcutaneous mycoses – Mycetoma, Rhinosporidiosis, Phycomycosis, Sporotrichosis.

Reference:

Text book of Medical Mycology - Jagadish Chander , Interprint, New Delhi.

Mycology and Virology – Topley and Wilson. Volume 4

Medical Mycology by Rippon .W B Saunders. Co

Manual of Clinical Mycology by Conant, Smith,Baker,Callaway& Mertics

Core Course 16

MB5CRT16 Medical Parasitology

Total hours of instruction: 80

Credit : 3

Unit I

Parasitology – General Concepts – Introduction to Parasitology, Classification – Host parasite relationship. Laboratory techniques in parasitology-Blood –Thick and thin smear, Faeces –Examination for ova and cyst .

Reference

- Text book of Parasitology by Jayaram Panickar
- Bailey and Scott's Diagnostic Microbiology
- Practical Medical Microbiology – Mackie, McCartney
- Text book of Medical Parasitology by Parija S.C.

Unit II

Protozoology: Pathogenic mechanisms, Disease transmissions, their life cycles and Lab Diagnosis of the following-*Entamoeba histolytica*, *Plasmodium vivax*, *Plasmodium falciparum*, *Leishmania donovani*, *Giardia lamblia*, *Trichomonas vaginalis*, *Balantidium coli*, *Toxoplasma gondii* and *Cryptosporidium parvum*.

Reference

- Parasitology by K.D. Chatterjee
- Text book of Parasitology by Jayaram Panickar
- Text book of Medical Parasitology by P. Chakraborty

Unit III

Helminthology: Classification, Cestodes – *Taenia solium*, *T. saginata*, *T. echinococcus*, trematodes – *Schistosoma haematobium*, *Fasciola hepatica*, Nematodes – *Ascaris*, *Anchylostoma*, *Trichuris*, *Enterobius* and *Wuchereria*- their life cycle , Transmission, pathogenicity and Lab Diagnosis.

Reference:

- Text Book of Medical Parasitology by P. Chakraborty
- Text Book of Parasitology By Jayaram Panicker
- Text Book of Medical Parasitology by Parija S.C.
- Parasitology by K.D. Chatterjee

Generic Elective course

MB5GET01 Human Physiology

Total hours of instruction: 60

Credits: 3

Unit 1.

Elementary tissues- Epithelial, connective, muscular and nervous tissue.Homeostasis.Structure of different muscles.Mechanism of muscular contraction, Rigor mortis.Introduction to nervous system.Classification of nervous system.Synapse ,Myoneural junction, Neurotransmitters.

References:

Textbook of Medical Physiology. Arthur C.Guyton and John E.Hall

Essentials of Medical Physiology. K.Sembulingam and Prema Sembulingam

Unit 2.

Composition and functions of blood, Haemoglobin, Blood clotting. Blood groups, Blood transfusion. Structure of heart.Action potential in cardiac muscle.Cardiac cycle.Heart sounds.Conducting mechanism.Cardiac output Blood pressure, Pulmonary and systemic circulation.Organisation of respiratory system.Pulmonary ventilation. Gas transport.Control of respiration.

References:

1.Textbook of Medical Physiology. Arthur C.Guyton and John E.Hall

2.Essentials of Medical Physiology. K.Sembulingam and Prema Sembulingam

Unit 3

Salivary and gastric glands and their secretions. HCL secretion and regulation.Pancreas structure and pancreatic juice.Structure and functions of liver- Bile. Kidney-structure and functions.Nephron.Renal regulation of water and electrolyte balance.

References:

1.Textbook of Medical Physiology. Arthur C.Guyton and John E.Hall

2.Essentials of Medical Physiology. K.Sembulingam and Prema Sembulingam

Unit 4

Chemical classes of hormones. Action of hormones. Endocrine glands- Hypothalamus, pituitary, thyroid, pancreas, adrenal and pineal gland. Role of reproductive hormones, gastrointestinal hormones and neurohormones. Endocrine disorders.

References:

1. Endocrinology. Mac E. Hadley.
2. Molecular Endocrinology. Fraklyn F. Bolander

Generic Elective course

MB5GET02 Aquatic microbiology

Total hours of instruction: 60

Credits-3

Unit 1

The aquatic environment and distribution of microorganisms in the aquatic environment. Aquatic ecosystem-fresh water (ponds, lakes, stream) marine (estuaries, mangroves, deep sea). Water zonation-upwelling. Benthic microorganisms. Marine microflora and biofouling.

References

.Aquatic microbiology-Rheinheiner

.Marine pollution-Clark

Unit 2

Techniques for the study of aquatic microorganisms. The role and importance of aquatic microbial ecosystem. Microbial consortia. Surface attachment and biofilm development. Antibacterial and bioactive compounds from aquatic microorganisms.

References

Elements of microbiology- Pelczar, Reid and Chan

Aquatic microbiology-Rheinheiner

Unit 3

Water pollution, microbial changes induced by inorganic and organic pollutants. Metals as pollutants. Algal blooms. Biological and chemical control of algal blooms

References

Elements of microbiology- Pelczar, Reid and Chan

Aquatic microbiology-Rheinheiner

Fundamentals of bacteriology-A.J.Salle

Ecological aspect of waste water treatment vol 2 biological activities and treatment process-Cruds C.R and Hawkes

Microbiology-Prescott, M.J; Harley, J.P. and Klein, D.A

Unit 4

Potability of water.Purification and disinfection.Indicator organisms.Microbiological examination of drinking water.Water born diseases and control measures.

References

Elements of microbiology- Pelczar,Reid and chan

Aquatic microbiology-Rheinheiner

Fundamentals of bacteriology-A.J.Salle

Ecological aspect of waste water treatment vol 2 biological activities and treatment process-Cruds C.R and hawkes

Microbiology-Prescott,M.J;harley,j.p.and klein,D.A

Industrial microbiology-Casida,L.E

Generic Elective course

MB5GET03 Environmental science

Total hours of instruction: 60

Credits: 3

Unit 1

Ecology definition and basic principle. Ecosystem-biotic and abiotic components. Energy flow in ecosystem. Structure and function of ecosystem. Food chain and food web. Evolution of life and life forms.

References

Fundamentals of ecology-Odum

Modern concepts in ecology-Kumar.H.D

Ecology and environment-Sharma P.D

Ecology principles and application-Chapman and Reiss

Environmental biology-Jobes A.M

Essential Environmental Studies S.P.Misra,S.N.Pande Ane Books Pvt.Ltd.

Environmental Science V.K. Ahluwalia, Sunita Malhotra Ane Books Pvt.Ltd.

Unit 2

Population ecology-characteristics of population. Community ecology. Species diversity in community, endangered flora, ecological indicators.

References

.Fundamentals of ecology-Odum

Modern concepts in ecology-Kumar.H.D

Ecology and environment-Sharma P.D

Ecology principles and application-Chapman and Reiss

Environmental biology-Jobes A.M

Essential Environmental Studies S.P.Misra,S.N.Pande Ane Books Pvt.Ltd.

Unit 3

Environmental pollution-air and water pollution-Sources, types and effects of pollution on human beings and plants. Green house effect, global warming, and acid rain.

References

A text book of environmental sciences-Aravind kumar

Environmental sciences- Jones and Bartlett

Microbial ecology-Atlas and Bartha

Essentials of environmental studies-Kurian Joseph and Nagendran R

Environmental Science V.K. Ahluwalia, Sunita Malhotra Ane BooksPvt.Ltd.

Essential Environmental Studies S.P.Misra,S.N.Pande Ane Books Pvt.Ltd.

Unit 4

Environmental management-air, water and soil quality management. Management of forestry-social forestry, management of mangrove vegetation. National parks and sanctuaries.

References

Ecology and environment-Sharma P.D

Microbial ecology-Atlas and Bartha

Ecology principles and application-Chapman and Reiss

Environmental biology-Jobes A.M

A text book of environmental sciences-Aravind kumar

Environmental sciences- Jones and Bartlett

Essentials of environmental studies-Kurian Joseph and Nagendran R

Core course 17

MB6CRT17 Medical Virology

Total hours of instruction: 80

Credit:4

Unit 1

General characters of viruses – structure, classification- Baltimore, cultivation. Structure and replication of bacteriophages. Replication of animal viruses.

References

Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

Belshe RB Textbook of Human Virology St. Louis: Mosby Year Book.

Dimock & Primrose Introduction to modern virology Oxford: Blackwell

White & Fenner Medical Virology New York : Academic Press

Collier & Oxford Human Virology London Oxford University Press

Fields et al Virology Philadelphia: Lippincott – Raven

Zuckerman Clinical Virology Chichester : JohnWiley.

Topley & Wilson.Principles of Bacteriology, Virology and Immunity, VIII edition, Vol.III Bacterial Diseases, Edward Arnold, London.

Unit 2:

Characters and pathogenic significance of pox viruses, herpes viruses, picorna viruses & myxoviruses – Influenza,Mumps,Measles.

References

Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

Belshe RB Textbook of Human Virology St. Louis: Mosby Year Book.

Dimock & Primrose Introduction to modern virology Oxford: Blackwell

White & Fenner Medical Virology New York : Academic Press

Collier & Oxford Human Virology London Oxford University Press

Fields et al Virology Philadelphia: Lippincott – Raven

Zuckerman Clinical Virology Chichester : JohnWiley.

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

Unit 3:

Characters and pathogenic significance of arboviruses –Bunya virus, Togavirus, Flavivirus. Rhabdoviruses, hepatitis viruses, oncogenic viruses & HIV.

References

.Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

Belshe RB Textbook of Human Virology St. Louis: Mosby Year Book.

Dimock & Primrose Introduction to modern virology Oxford: Blackwell

White & Fenner Medical Virology New York : Academic Press

Collier & Oxford Human Virology London Oxford University Press

Fields et al Virology Philadelphia: Lippincott – Raven

Zuckerman Clinical Virology Chichester : JohnWiley.

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

Unit 4:

Diagnosis of viral infections. Immunoprophylaxis and chemoprophylaxis of viral infections.

References

Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan, C.K. Jayaram Panikar

Belshe RB Textbook of Human Virology St. Louis: Mosby Year Book.

Dimock & Primrose Introduction to modern virology Oxford: Blackwell

White & Fenner Medical Virology New York : Academic Press

Collier & Oxford Human Virology London Oxford University Press

Fields et al Virology Philadelphia: Lippincott – Raven

Zuckerman Clinical Virology Chichester : JohnWiley.

Topley / Wilson's (1990). Principles of Bacteriology, Virology and Immunity, VIII edition, Vol.III

Bacterial Diseases, Edward Arnold, London.

Core Course 18

MB6 CRT18 Diagnostic Microbiology

Total hours of instruction: 80

Credits: 4

Unit 1.

Laboratory associated infections. Microbiological safety cabinets- Types. Disinfection and decontamination of laboratory wastes. WHO safe code of practice for a clinical microbiology laboratory. Guidelines for the collection and transport of specimens. Nosocomial infection.

References

Medical Laboratory Manual For Tropical Countries Vol.II Microbiology. Monica Cheesbrough ELBS

Bailey & Scott □ Diagnostic Microbiology. E.J. Baron, L.R. Peterson and S.M. Finegold. Mosby

Unit 2.

Scheme for the microbiological examination of sputum, throat and mouth specimens, wound aspirates, CSF, blood and bone marrow.

Scheme for the Microbiological examination of stool specimens, urine, urogenital specimens, skin specimens.

References

Medical Laboratory Manual For Tropical Countries Vol.II Microbiology. Monica Cheesbrough ELBS

Ananthanarayanan and Paniker Textbook of Microbiology Orient Longman

Unit 3.

Serological diagnosis: Applications of serological techniques such as agglutination reactions-Widal (typhoid fever), precipitation reactions RPR (syphilis), complement fixation tests, and enzyme immunoassay for the diagnosis of Bacterial viral and immunological diseases. Molecular techniques in Microbiology- principles and applications Hybridisation, PCR, RFLP.

References

Mackie & McCartney Practical Medical Microbiology J.G. Collee, A.G. Fraser, B.P. Marmion and A. Simmons (Eds.) Churchill Livingstone

Manual of Clinical Microbiology P.R. Murray, E.J. Baron, J.H. Tenover, M.A. Tenover and R.H. Tenover ASM Press Washington DC

Unit 4

Antibiotic sensitivity tests. Disc diffusion and dilution methods, Determination of MIC and MBC. Animal inoculation in clinical studies. Egg inoculation.

References

Medical Laboratory Manual For Tropical Countries Vol.II Microbiology. Monica Cheesbrough ELBS

Ananthanarayanan and Paniker Textbook of Microbiology Orient Longman

Core Course- 19

MB6CRT19 Molecular Microbiology

Total hours of instruction 40

Credits: 2

UNIT I

Nucleic acid amplification, PCR, Variations and modifications of PCR- A brief outline of principles of multiplex PCR, Nested PCR, Reverse transcriptase PCR and Real time PCR, Molecular typing methods- Brief outline of principles of ribotyping, Pulsed field gel electrophoresis, Multilocus sequence typing,

References

1. Molecular Microbiology Diagnostic principles and practice David H. Persing (Ed) ASM Press
2. Brock Biology of Microorganisms Madigan et al Benjamin Cummings (Pearson)
3. An Introduction to Genetic Engineering Desmond S.T. Nicholl Cambridge

UNIT II

Molecular identification of bacteria- 16S rDNA sequence analysis, Nucleic acid hybridization, A brief study on microarray based microbial identification, Unculturable bacteria and metagenomics

References

1. Molecular Microbiology Diagnostic principles and practice David H. Persing (Ed) ASM Press
2. Brock Biology of Microorganisms Madigan et al Benjamin Cummings (Pearson)
3. General Microbiology Hans G. Schlegel Cambridge

UNIT III

Molecular basis of microbial pathogenesis, Molecular basis of virulence properties, Entry of pathogens into host cells, Adherence, Invasion of host cells, Bacterial toxins- Endotoxins and Exotoxins – Enterotoxin, Neurotoxin, Molecular basis of biofilm formation- Quorum sensing

References

1. Molecular Microbiology Diagnostic principles and practice David H. Persing (Ed) ASM Press
2. Brock Biology of Microorganisms Madigan et al Benjamin Cummings (Pearson)
3. General Microbiology Hans G. Schlegel Cambridge
4. An Introduction to Genetic Engineering Desmond S.T. Nicholl Cambridge

Core Course -20

MB6CRP20 Microbiology Practicals - III

Total hours of instruction: 240 (120 in Sem 5 plus 120 in Sem 6)

Credit: 4

General procedure for the systematic study of Bacteria – Morphology, Staining, Colony Characteristics on BA ,MA,other selective Media.

Biochemical reactions of Bacteria: Sugar Fermentation, IMVIC, H₂S production, urease, Catalase, Oxidase,TSI

Identification of Bacteria- Staphylococcus, E.coli, Klebsiella, Pseudomonas, Proteus

Antimicrobial activity – Disc diffusion

Cultivation of Fungi- Study of colony characters of yeasts and Molds.

Microscopic morphology of molds- Pencillium, Aspergillus. Mucor, Rhizopus, Fusarium by Lactophenol cotton blue mount examination.

Gram staining of yeast.

Examination of Germ tube – *Candida albicans*

Egg inoculation demonstration

Reference

Medical Microbiology by Robert Cruickshank

Bailey & Scott's Diagnostic Microbiology

Practical Medical Microbiology-Mackie & Mc Cartney

Microbiology Laboratory Manual – Cappuccino Sherman

Text book of Microbiology – Ananthanarayanan and Jayaram – Orient Longman

Text book of Medical Mycology – Jagadish Chander . Interprint

Manual for identification of Medical Bacteria by. S.T. Cowan

Choice Based Course

MB6CBT01 Microbioprocess

Total hours of instruction 80

Credits: 4

Unit 1.

Typical bioprocess. Different stages in bioprocess. Advantages of bioprocess over chemical process. Industrially important microbial metabolites. Isolation, screening and selection of industrially important microorganism. Mode of culturing- Batch, Continuous and Fed-batch culture. Specific growth rate and yield.

References

1. Microbial biotechnology-Principles and Applications L.Y.Kun (Ed.) World Scientific
2. Modern concepts of Biotechnology H.D.Kumar Vikas Publishing Co. Pvt. Ltd. New Delhi
3. Industrial Microbiology Casida Jr. Wiley Eastern Ltd.

Unit 2.

Designing of media for fermentation. Defined and undefined media, Factors affecting fermentation. Optimisation of bioprocess. Precursors, inducers, inhibitors, antifoam agents Submerged and solid state fermentation.

References

1. Industrial Microbiology Casida Jr. Wiley Eastern Ltd.
2. Industrial Microbiology – An Introduction M.J.Waites ,N.L.Morgan, J.S.Rockey & G. Higton Blackwell Science

Unit 3.

Bioreactor. Parts of bioreactor. Instrumentation of bioreactor. Aerobic microbioprocess. Importance of dissolved oxygen. Volumetric oxygen transfer coefficient. Agitation. Aeration.

References

- Microbial biotechnology-Principles and Applications L.Y.Kun (Ed.) World Scientific
- Industrial Microbiology – An Introduction M.J.Waites ,N.L.Morgan, J.S.Rockey & G. Higton Blackwell Science

Unit 4.

Downstream processing- methods. Separation of biomass. Purification of the products-various techniques. Economics and market potentials of fermentation products.

References

1. Industrial Microbiology Casida Jr. Wiley Eastern Ltd.
2. Microbial biotechnology-Principles and Applications L.Y.Kun (Ed.) World Scientific

Choice Based Course

MB6CBT02 Sanitation Microbiology

Total hours of instruction: 80

Credits:4

Unit 1

General concept of sanitation and disinfection .Sanitation of industrial and food processing units Safe location of animal houses, hospitals, industrial fermentation units etc. Biosafety Biosafety in hospitals and laboratories. Regulations and measures

References

Fundamentals of bacteriology-A.J.Salle

Microbiology-Prescott,M.J;harley,j.p.and klein,D.A

Biology of microorganisms-T.D.Brock

Environmental aspects of microbiology-Joseph C. Danie

Microbiology essentials and applications-Larry Mckane and Judy Kandel

Unit 2

Airborne diseases and preventive measures. Methods of sampling air. Quantification of air microflora Air sanitation – techniques and applications

Biological weapons, their regulation and precaution.

References

Environmental Microbiology Vijay Ramesh

Medical Laboratory Manuel for Tropical Countries Monica cheesbrough ELBS

Environmental aspects of microbiology-Joseph C. Danie

Unit 3

Microbiology of municipal sewage and sewage treatment. BOD and COD Concept. Treatment of Industrial effluent- Waste water treatment-Mechanical and biological. Aerobic and anaerobic treatments. Domestic septic tank. Treatment of municipal water supplies. Water borne diseases.

References

Fundamentals of bacteriology-A.J.Salle

Ecological aspect of waste water treatment vol 2 biological activities and treatment process-Cruds C.R and hawkes

Microbiology-Prescott,M.J;harley,j.p.and klein,D.A

.Biology of microorganisms-T.D.Brock

Unit 4

Solid waste disposal-sanitary land fills, composting,vermicompost.Disposal of animal and agricultural waste.Methanogenesis and biogas production

References

Fundamentals of bacteriology-A.J.Salle

Ecological aspect of waste water treatment vol 2 biological activities and treatment process-Cruds C.R and hawkes

Microbiology-Prescott,M.J;harley,j.p.and klein,D.A

Foundations in microbiology-Talaro,K and Talaro,A

Microbiology:an introduction- Tortora,G.j,Funke.B.R. and Case C.L

Industrial microbiology-Casida,L.E

Choice Based Course

MB6CBT03 Medical Entomology

Total hours of instruction: 80

Credit: 4

Unit 1

Scope of Medical Entomology. Entomology and disease transmission. Modern concepts of Entomology, Knowledge of the biology and life cycles of Arthropod vectors- metamorphosis. Mechanism of disease transmission and types. Control measures with particular reference to vectors and disease in India.

Reference:

Applied Entomology by P.G.Fenemore and Alka Prakash

Modern Entomology by D.B.Tembhare

General and applied Entomology by Nayar, Ananthakrishnan and David

Unit 2

Arthropods of Medical Importance-A brief account of the Biology, Life cycle, Mechanism of disease transmission and Control measures.

Class Insecta- Mosquitoes, flies- Sand fly, Tsetse fly, house fly, bed bugs, louse, fleas

Reference

A hand book of Medical Entomology and Elementary Parasitology by G.K.Rathnaswamy

Hand book of Medical Entomology- Easwari Nayar

Unit 3

Class Arachnida- Ticks (hard and soft), mites

Class Crustacea- Water fleas, crabs, Shrimps

Arthropods producing toxic or allergic reactions in man-biting insects, spiders, scorpions.

Reference

A hand book of Medical Entomology and Elementary Parasitology by G.K.Rathnaswamy

Hand book of Medical Entomology- Easwari Nayar

Modern Entomology by D.B.Tembhare

Unit 4

Entomological Techniques-Collection and maintenance for short periods for identification or isolation of pathogens.Preservation,labeling etc. for future use.

Reference

Applied Entomology by P.G.Fenemore and Alka Prakash

Hand book of Medical Entomology-EaswariNayar

Modern Entomology by D.B.Tembhare

B Sc MICROBIOLOGY

Model Question Papers

(As per Syllabus w.e.f.2016 admission)

Pattern of question papers for courses with four modules

Module	No. of questions under each section			
	Section A(2 marks for each question)	Section A(4 marks for each question)	Section A(6 marks for each question)	Section A(10marks for each question)
1	3	2	2	1
2	3	3	1	1
3	3	2	1	1
4	3	2	1	1
Total No.of questions	12	9	5	4
No. of questions to be answered	9	6	3	2

Pattern of question papers for courses with three modules

Module	No. of questions under each section			
	Section A(2 marks for each question)	Section A(4 marks for each question)	Section A(6 marks for each question)	Section A(10marks for each question)
1	4	3	1	2
2	4	3	2	1
3	4	3	2	1
Total No.of questions	12	9	5	4
No. of questions to be answered	9	6	3	2

**B. Sc. MICROBIOLOGY
FIRST SEMSTER**

MB1CRT01 Fundamentals of Microbiology

Time: Three Hours

Maximum: 80 Marks

Section A

Short answers. Answer any 9 questions

Write briefly on:

1. Generation time
2. Eubacteria
3. Contributions of Louis Pasteur
4. Selective media
5. Halophytes
6. HEPA
7. Tyndallization
8. Bacterial ribosome
9. Mesosomes
10. Capsule
11. Pili
12. Reducing agents in anaerobic culture media

(9 x 2 = 18)

Section B

Paragraph Questions. Answer any 6 questions

Write short notes on:

- 13). Gram negative cell wall
14. Bacterial endospore

15. Gaspack method
16. Differentiate enriched and enrichment media with example
17. Mode of action of alcohols and aldehydes
18. Factors affecting antimicrobial action
19. Streak plate method
20. Differential media
21. Koch's Postulates

(6 x 4 = 24)

Section C

Short Essay. Answer any 3 questions

- 22). Differential staining with examples
23. Explain the methods for the isolation of pure culture
24. Filtration techniques
25. Sporulation and germination
26. Five kingdom classification

(3 x 6 = 18)

Section D

Long Essay. Answer any two questions.

- 27). Define sterilization. Explain heat sterilization method
28. Explain anaerobic culture methods
29. Explain Beneficial and harmful microbes with examples
30. Explain Mode of action of antibiotics with example

(2x10 = 20)

B. Sc. MICROBIOLOGY FIRST SEMSTER

MB1CRT02 Microbial Physiology & Metabolism

Time: Three Hours

Maximum: 80 Marks

Section A

Short Answers. Answer any 9 questions

1. Classification of bacteria on the basis of energy source
2. ATP
4. Germination
3. Capnophyles
5. Archebacteria
6. Halophyles
7. Activation energy
8. Coenzyme
9. Lithotrophs
10. Phosphofructokinase
11. Binary fission
12. Substrate phosphorylation

(9 x 2 = 18)

Section B

Paragraph Questions. Answer any 6 questions

- 13). Lyophilisation
14. Classification of microbes on the basis of oxygen requirement
15. Spread plate method
16. Role of reducing powers of NAD
17. GTP

18. Factors affecting enzyme activity
19. ATP production in glycolysis
20. Transport medium
21. Classification of bacteria based on temperature requirement

(6 x 4 = 24)

Section C

Short Essay. Answer any 3 questions

- 22). Growth curve of bacteria
- .23.Sporulation
24. Transamination
25. Growth kinetics
26. Preservation methods

(3 x 6 = 18)

Section D

Long Essay. Answer any two questions.

- 27). Explain ETC
28. Explain enumeration and quantitation of Bacteria
29. Explain TCA Cycle
30. Microbial photosynthesis

(2x10 = 20)

B.Sc. Microbiology Second Semester Examination

MB2CRT03 Immunology

Time : 3 hrs

Maximum: 80 marks

Part A

(Short answer questions) - Answer any 9 each carries 2 mark

1. Edward Jenner
2. Cross infection
3. Haptens
4. Phagocytosis
5. B lymphocytes
6. Thymus
7. Complement
8. Toxoid
9. Antibody dependent cytotoxicity
10. Types of grafts
11. Functions of IgE
12. Pernicious anaemia

Part

(Paragraph) - Answer any 6 questions- each carries 4 marks

13. Types of Infection
14. Barriers of innate immunity
15. Structure and functions of spleen
16. Cytokines
17. Properties of antigen
18. ELISA
19. Details on complement and its functions
20. Hashimoto's disease
21. Lattice hypothesis

Part C

(Short Essays) any 3- each carries 6 marks

22. Differentiate exotoxin and endotoxin
23. Explain vaccine and its types
24. Theories of antibody production
25. Monoclonal antibodies
26. Medical applications of blood groups

Part D

(Long Essays) any 2- each carries 10 marks

27. Structure and functions of different immunoglobulins with diagram
28. Define serological reactions and its applications
29. Explain immediate and delayed hypersensitivity reactions
30. Explain complements with its structure and pathways

B.Sc. Microbiology
Second Semester Examination
MB2CRT04 Microbial Genetics

Time: Three Hours

Maximum: 80 Marks

Section A

Short Answers. Answer any 9 questions

- 1). Episomes
- 2). Plasmid incompatibility
- 3). Pribnow box
- 4). Translocation
- 5). Nucleoid
- 6). Compare addition and deletion
- 7). Auxotrophs
- 8). Operon
- 9). Enzymes in transcription
- 10). Transition mutation
- 11). Types of plasmids
- 12). Enzymes in DNA replication

(9 x 2 = 18)

Section B

Paragraph Questions. Answer any 6 questions

- 13). Transposons
- 14). Compare Inducer and Suppressor
- 15). Transduction
- 16). Translation

17). Frame shift mutation

18). Aminoacyl tRNA

19). SOS repair

20). What is transposition

21). Spontaneous mutation

(6 x 4 = 24)

Section C

Short Essay. Answer any 3 questions

22). Antibiotic resistance in bacteria

23). What is Ames test?

24). Comment on different types DNA

25). Spontaneous mutation

26). Explain Excision repair

(3 x 6 = 18)

Section D

Long Essay. Answer any two questions.

27). Briefly explain the mechanism of DNA replication

28). Explain the mechanism of transfer of genetic material Conjugation

29). Explain briefly the positive regulation of gene expression in prokaryotes

30). Describe Induced mutation

(2x10 = 20)

B.Sc. Microbiology Second Semester Examination

MB2CRP05 Microbiology Practical – I

Time: 5 hrsX2 days (on 2 consecutive days)

Total Marks: 80

1. Perform Gram staining with the given sample - 15 Marks
2. Perform pure culture technique for the given sample - 15 marks
3. Identify the blood group by agglutination method- 10 Marks
4. Detect the presence of antibodies by performing
(Either WIDAL or ODD or RID) - 15 Marks

4. Spotters (5Nos.) -10Marks

3. Viva - 10 Marks

4. Record - 5 Marks

B.Sc. Microbiology Third Semester Examination

MB3CRT06 Bioinstrumentation and Techniques

Time: Three Hours

Maximum: 80 Marks

Section A

Short Answers. Answer any 9 questions

1. Beer Lambert's Law
2. RF value
3. Svedberg unit
4. Partition Coefficient
5. Coomassie Brilliant blue
6. Molecular markers
7. Zone electrophoresis
8. DEAE Cellulose
9. AGE
10. Diffusion
11. Resolving power
12. Elution

(9 x 2 = 18)

Section B

Paragraph Questions. Answer any 6 questions

- 13).Luminometry
14. Flourrescent microscope
15. Advantages of TLC over paper chromatography.
16. Flow cytometry
17. Differential centrifugation

18. Principles of Column Chromatography

19. Application of flame photometer

20. Principle of dark field microscopy

21. Principle of Nephelometry

(6 x 4 = 24)

Section C

Short Essay. Answer any 3 questions

22). Briefly explain principle and application of turbidometry

23. SDS PAGE

24. Distinguish between colorimetry and spectrophotometry

25. Briefly explain density gradient centrifugation

26. Principle and application of GLC

(3 x 6 = 18)

Section D

Long Essay. Answer any two questions.

27). Explain principle and application of two dimensional electrophoresis

28. Explain electron microscopy

29. Briefly explain UV visible and Infra Red spectrophotometry

30. HPLC and Ion Exchange chromatography

(2x10 = 20)

B.Sc. Microbiology Third Semester Examination

MB3CRT07 Industrial microbiology

Time: 3hrs

Maximum: 80 marks

Part A (Short answer questions)

Answer any 9 Each carries 2 mark

1. Chemostat
2. Sterilization of air in fermentation
3. Distilled alcoholic beverages
4. Auxotroph
5. Role of buffers in fermentation
6. Advantages of immobilization
7. Why low pH values preferred for citric acid production by *Aspergillus niger*?
8. Catabolite repression
9. High value low volume products
10. Brief note on *Zymomonas mobilis*
11. Antifoam agent
12. Primary metabolites

Part B (Brief answer questions)

Answer any 6 questions- each carries 4 marks

13. Production process of streptomycin
14. Fed batch fermentation
15. IPR
16. Advantages of enzyme immobilization
17. Working of a turbidostat
18. Industrial production of glutamic acid
19. Biochemistry of cellulose
20. Advantages of MEOR
21. Downstream processing

Part C (Short Essays)

Answer any 6- each carries 4 marks

22. Advantages and disadvantages of microbial leaching
23. Types of fermentation
24. Primary screening techniques
25. Production process of Penicillin
26. Techniques for strain improvement

Part D (Long Essays)

Answer any 2- each carries 15 marks

27. How carbon, nitrogen and phosphorous affect primary metabolite production in micro organisms
28. Strain improvement strategies in industrial organisms
29. Immobilization methods used in industrial fermentation processes
30. Different types of fermentor? Characteristics of an ideal fermentor

B.Sc. Microbiology Third Semester Examination

MB3CRT08 Food Microbiology

Time: 3hrs

Maximum: 80 marks

Part A

Short answer questions (Answer any nine)

1. a_w

2. Quick freezing

3. Natural preservative methods

4. phosphatase test

5. Probiotics

6. Baker's yeast

7. Aflatoxin

8. Coliforms

9. EPEC & ETEC

10. Ascospore

11. Putrefaction

12. Fermentation

(2X9=18)

Part B

Paragraph Questions. Answer any six

13. Nutritional requirement of microorganisms

14. Bacterial growth curve

15. Canning

16. Spoilage of meat

17. Microbial examination of milk

18. Pasteurization

19. Important fermented milk products & organisms involved

20. Characters of good anti-microbial preservatives

21. Production of Wine

(4X6=24)

Part C

Short essay . Answer any three

22. Different types of chemical preservatives used in food

23. Explain different types of food poisoning with example.

24. General features of microorganisms in food microbiology

25. Explain production of Beer

26. Oriental fermented foods

(3X6=18)

Part D

Long Essay. Answer any two

27. Discuss principles of food preservation in detail

28. Explain different types of important enzymes in food production

29. Explain the production process of any one edible mushroom

30. Explain types of hazards and principles of HACCP

(2x10=20)

B.Sc. Microbiology Fourth Semester Examination

MB4CRT09 Fundamentals of Biostatistics, Bioinformatics & Research Methodology

Time: Three Hours

Maximum: 80 Marks

Section A

Short Answers. Answer any 9 questions

1. Define sampling & sampling unit
2. Limitation of statistics
3. What are probability & non probability sampling
4. Bar diagram
5. Define median
6. What is bioinformatics ?
7. Histogram
8. Similarity search
9. Observation
10. Mode
11. Objectives of classification
12. Arithmetic mean

Section B

Paragraph Questions. Answer any 6 questions

13. Collection of data
14. Scope of biostatistics
15. State principles of sampling
16. Discuss advantage & disadvantage of average
17. Different types of bioinformatics tools
18. What circumstances stratified random sampling is used ?

19. Construction of phylogenetic tree

20. Application of bioinformatics in genetic research

21. Test of significance

4X6=24

Section C

Short Essay. Answer any 3 questions

22. Documentation and record keeping

23. Explain hypothesis

24. State uses of Chi-square test

25. t-test

26. BLAST

(3X6=18)

Section D

Long Essay. Answer any two questions.

27. Explain systematic sampling, discuss advantage & disadvantage of this ?

28. Describe methods used for collection, classification & tabulation of data

29. Briefly explain computer tools for retrieving sequence

30. Designing & methodology of experiment.

(2x10)

B.Sc. Microbiology Fourth Semester Examination
MB4CRT10 Environmental microbiology

Time: Three Hours

Maximum: 80 Marks

Section A

Short Answers. Answer any 9 questions

1. Tube sampler
2. Septic tank
3. Impingement
4. Oxidation pond
5. R:S ratio
6. Soil microflora
7. Microorganisms in aquatic environment
8. BOD
9. Biogeochemical cycles
10. Methonogenesis
11. Trickling filter
12. Biostimulation

(9 x 2 = 18)

Section B

Paragraph Questions. Answer any 6 questions

- 13). Carbon and nitrogen cycle
14. Qualitative and quantitative analysis of microorganisms in soil
15. Biofilm
16. Eutrophication
17. Indicator organisms
18. Bioaugmentation

- 19. Phytoremediation
- 20 Algal blooms
- 21 Disinfection of water

(6 x 4 = 24)

Section C

Short Essay. Answer any 3 questions

- 22). Microbiology of drinking water
- 23 Membrane filter techniques
- 24. Microbial degradation of petroleum and petroleum products
- 25. Water borne diseases
- 26. Composting

(3 x 6 = 18)

Section D

Long Essay. Answer any two questions.

- 27). Waste water management and sewage treatment
- 28. Biogas production
- 29. Source of microorganisms in air, and methods of sampling air
- 30. Major biogeochemical cycles and the organisms

(2x10 = 20)

B.Sc. Microbiology Fourth Semester Examination
MB4CRT11 Agricultural microbiology

Time: Three Hours

Maximum: 80 Marks

Section A

Short Answers. Answer any 9 questions

- 1). Mutualism
- 2). Example for Synergism
- 3) Lichens
- 4) Parasitism and Predation
- 5) List out different plant diseases caused by bacteria and fungi
- 6) Rhizosphere
- 7) Agrobacterium tumefaciens
- 8) Pseudobacterium
- 9) Define biofertilizer
- 10) Bacillus thuringiensis
- 11) TMV
- 12) Streptomyces

(9 x 2 = 18)

Section B

Paragraph Questions. Answer any 6 questions

- 13). Explain plant microbe interaction
- 14) .Mycorrhizae
- 15) Actinomycetes
- 16) Phyllosphere microflora and its importance
- 17) Tobacco curing
- 18) Rhizobium as biofertilizer

- 19) Viral pesticides
- 20) Endophytic microflora
- 21) Role of microbes in retting

(6 x 4 = 24)

Section C

Short Essay. Answer any 3 questions

- 22) IPM
- 23) Common bacterial pathogens
- 24) Biological control of plant diseases
- 25) Natural defence mechanism of plants
- 26) Biopesticides

(3 x 6 = 18)

Section D

Long Essay. Answer any two questions.

- 27). Explain microbial diseases of plant- bacterial, fungal, and viral
- 28) Explain biofertilizers and different types of biofertilizers
- 29) Rumen microbiology
- 30) Explain plant – microbe interaction

(2x10 = 20)

B.Sc. Microbiology Fourth Semester Examination

MB4CRP12 Microbiology Practical – II

MB4B 12U Microbiology Practical – II

Time: 5 HrsX2 days (on consecutive days)

Total Marks: 80

1. Isolate and enumerate bacteria from the given rhizosphere soil sample and calculate R:S ratio - 15 Marks

2. Estimation of DO - 15 Marks

3. Perform MBRT of the given milk sample - 10 Marks

4. Perform MPN of the given water sample - 15 Marks

4. Spotters (5 Nos.) -10Marks

3. Viva - 10 Marks

4. Record - 5 Marks

FIFTH SEMESTER B. Sc. MICROBIOLOGY EXAMINATION
MB5CRT13 Medical Bacteriology- I

Time: Three Hours

Maximum: 80 Marks

Section A

Short Answers. Answer any 9 questions

- 1). Enterotoxin
- 2 .Endemic diseases
3. DPT
4. Septiceamia
5. Pseudomembrane
6. Tetanospasmin
7. M'Fadyean's reaction
8. Pigments of *Pseudomonas*
9. Enrichment media
10. Metachromatic granules
11. Cholera red reaction
12. Puerperal sepsis

(9 x 2 = 18)

Section B

Paragraph Questions. Answer any 6 questions

- 13). ASO test
14. TSST and SSSS
15. IMViC
16. Meningococcal meningitis
17. Significant bacteriuria
18. Bacillary dysentery

19. Naegler reaction
20. RCM
21. Quellung reaction

(6 x 4 = 24)

Section C

Short Essay. Answer any 3 questions

- 22).Toxins of *Staphylococcus*.
23. Various modes of transmission in bacterial diseases.
24. Comment on the role of blood agar in the diagnosis of pathogens.
25. Gas gangrene.
26. Methods of detection of toxins of *Corynebacterium*.

(3 x 6 = 18)

Section D

Long Essay. Answer any two questions.

- 27).Explain the infections caused by gram negative Diplococci.
28. Briefly explain the morphology, cultural characteristics and the disease of *Bacillus anthracis*.
29. Discuss the pathogenesis , diagnosis and method of control of *Salmonella typhi*.
30. Write an account on the Staphylococcal infections and its virulent factors.

(2x10 = 20)

**B Sc MICROBIOLOGY Fifth Semester Examination
Core Course- 14**

MB5CRT14 Medical Bacteriology- II

Time: Three Hours

Maximum: 80 Marks

Section A

Short answers. Answer any 9 questions

- 1). Morphology of *Treponemapallidum*
2. Parapertussis
3. Tularemia
4. Mediterranean fever
5. Elementary body
6. Relapsing fever
7. Morphology of Actinomycetes
8. Body louse
9. Primary Atypical pneumonia
10. Chancre
11. Niacin test
12. Psittacosis

(9 x 2 = 18)

Section B

Paragraph Questions. Answer any 6 questions

13. Classification of Atypical Mycobacteria
14. Cultivation of Mycoplasma
15. Weil's disease
16. Actinomycosis

- 17. Rickettsial disease
- 18. Prophylaxis of typhus fever
- 19. Cultural characters of Bordetella pertussis
- 20. Mycetoma
- 21. Lab diagnosis of pulmonary tuberculosis (6 x 4 = 24)

Section C

Short Essay. Answer any 3 questions

- 22. Life cycle and diseases of Chlamydia
- 23. Lab diagnosis of Syphilis
- 24. Pathogenesis and epidemiology of Brucellosis
- 25. Pathogenesis and Lab diagnosis Plague
- 26. Pathogenesis and Lab diagnosis Leptospirosis (3 x 6 = 18)

Section D

Long Essay. Answer any two questions.

- 27. Classification of Mycobacteria in detail
- 28. Pathogenesis and Lab diagnosis Leprosy
- 29. Pathogenesis and Lab diagnosis of Haemophilus
- 30. Pathogenesis and Lab diagnosis Mycoplasma (2x10 = 20)

B.Sc. Microbiology Fifth Semester Examination

**Core Course- 15
MB5CRT15 Medical Mycology**

Time 3hrs

Maximum: 80 marks

Part A (Short answer questions)
Answer any 9- Each carries 2 marks

1. Trichophyton
2. *Tinea pedis*-Athlets foot-
3. Rhinosporidiosis
4. Morphology of *Malassezia furfur*
5. SDA
6. Phycomycosis
7. Onychomycosis
8. Deuteromycetes
9. Antifungal agents
10. Yeast like fungi
11. Trichosporon
12. Chlamydospores

Part B (Paragraph)

Answer any 6questions- each carries 4 marks

13. Dermatophytes
14. Mycetoma
15. *Ultra structure of yeast*
16. Sexual spores of fungi
17. Cultivation of fungi
18. Staining methods used in mycology
19. Special hyphal structures
20. Ascomycetes
21. *Sporotrichosis*

Part C (Short Essays)

Any 3- each carries 6 marks

22. Vegetative structure of fungi
23. Asexual spores of fungi
24. Reproduction of yeast
25. Pityriasis versicolor
26. Madura mycoses

Part D (long essay)

Answer any 2 each carries 10 marks

27. Explain characteristics of fungi
28. Explain antifungal agents and its mechanism of action
29. Etiology, clinical manifestations and lab diagnosis of ring worm infections
30. Explain subcutaneous mycoses

**B Sc MICROBIOLOGY Fifth Semester Examination
Core Course 16**

MB5CRT16 Medical Parasitology

Time: Three Hours

Maximum: 80 Marks

Section A

Short Answer Questions. Answer any 9 questions

- 1).Definitive host
- 2).Premunition
- 3).Thick smear
- 4). Trichomonas
- 5). Schizogony
- 6). Pernicious malaria
- 7). Pseudocyst and tissue cyst
- 8). Cryptozoites and Phanerozoites
- 9). Carriers
- 10). LD body
- 11). Incubation period
- 12). Xenodiagnosis

(9 x 2 = 18)

Section B

Write Paragraph Questions. Answer any 6 questions

- 13). ALA
- 14). Steatorrhea
- 15). PKDL
- 16). Hydatid Cyst
- 17). Congenital Toxoplasmosis

18). Larva migrans

19). Cysticercus

20). NIH swab

21). Sand fly

(6 x 4 = 24)

Section C

Write Short Essay. Answer any 3 questions

22). Life cycle of *Fasciola hepatica*

23). Developmental and morphological types of Leishmania

24). Concentration technique

25). *Cryptosporidium parvum*

26). *Balantidium coli*

(3 x 6 = 18)

Section D

Write Long Essay. Answer any two questions.

27). Life cycle and pathogenicity of *Ancylostoma duodenale*

28). Name the organism causing endemic haematuria . Explain its life cycle and pathogenicity

29). Life cycle and pathogenicity of *Wuchereria bancrofti*

30). What is black water fever? Explain the life cycle of its pathogen

(2x10 = 20)

BSc Microbiology Fifth Semester Examination

**Core -17
Choice Based Course-I
MB5GET01 Human Physiology**

Time: 3hrs

Max marks=80

Section A

Short answer : Answer any 9

(9×2=18 marks)

1. Rigor mortis
2. Synapse
3. Blood Pressure
4. Pineal gland
5. Electrolytes
6. Endocrine gland
7. Glomerular filtration rate
8. Haemoglobin
9. Universal donor
10. Bombay blood group
11. ECG
12. Homeostasis

Section B

Write short paragraph on any six

(4×6=24)

1. Explain the normal morphology of the blood cells and functions of red blood cells
- 2 Explain the functions of bile
3. Name the salivary gland. Explain the functions of Saliva
4. Write about the functions of blood

5. Pulmonary ventilation
6. Functions of liver
7. Functions of nephrons.
8. Explain the mechanism of secretion of HCl in stomach
9. Pancreatic juice

Section C

Write short essay on any three

(6×3=18)

1. Explain the primary and secondary active transport with example
2. Describe the nervous and chemical regulation of respiration
3. Draw and explain the structure of kidney
4. Discuss the role of reproductive hormones
5. Comment on neurotransmitters

Section D

Long Essay (Answer any two)

(10×2=20)

1. Explain the structure of structure and functions of heart
2. Discuss about various elementary tissues
3. Explain the mechanism of urine formation and factors regulating GFR
4. Comment on Gastrointestinal hormones

BSc Microbiology Fifth Semester Examination

**Core -17
Choice Based Course-I
MB5GET02 Aquatic microbiology**

Time:3hrs

Max marks=80

Section A

Short answer :Answer any 9

(9×2=18 marks)

1. Phytoplankton
2. Biofilm
3. Zooplankton.
4. Benthos.
5. Lentic ecosystem
6. Flow cytometer
7. Algal blooms
8. Chlorine demand of water
9. MPN
10. SPC.
11. Upwelling
12. Euphotic zone.

Section B

Write short paragraph on any six

(4×6=24)

1. Briefly explain Microbial consortia.
2. Discuss the coagulation and flocculation.
3. Explain the biological and chemical control of algal blooms.
4. Comment on BOD and COD.

5. Explain Eutrophication.
6. Comment on screening and straining.
7. Comment on water zonations.
8. Discuss the membrane filtration technique.
9. Explain the role of microorganism in lotic ecosystem.

Section C

Write short essay on any three

(6×3=18)

1. Explain the recent techniques to study aquatic microorganisms.
2. Discuss about estuaries.
3. Comment on mangrove ecosystem.
4. Explain filtration method for water purification.
5. Discuss biofilm formation.

Section D

Long Essay (Answer any two)

(10×2=20)

1. Explain the marine bioactive compounds.
2. Discuss about water borne diseases and its control measures.
3. Define water pollution? Explain organic and inorganic pollutants.
4. Comment on purification and disinfection of water.

BSc Microbiology Fifth Semester Examination
Core -17
Choice Based Course-I
MB5GET03 Environmental science

Time:3hrs

Max marks=80

Section A

Short answer :Answer any 9

(9×2=18 marks)

- 1.Ecology
- 2.Biotic component.
- 3.Ecological niche.
- 4.Commensalism.
- 5.Any four national parks
- 6.Endangered flora.
- 7.Ecological pyramid.
- 8.Natality and mortality.
9. Species diversity
10. Acid rain.
- 11.Food chain.
- 12.Evolution.

Section B

Write short paragraph on any six

(4×6=24)

1. Briefly explain types of ecosystem.
2. Discuss the Ecological indicators.
- 3.Explain the concept of global warming.
- 4.Comment characteristics of a community.
- 5.Explain Age pyramid.

6. Discuss the energy flow in ecosystem.
7. Comment on Environmental management..
8. Discuss inorganic pollutants in water.
9. Explain the concept of food web with suitable examples.

Section C

Write short essay on any three

(6×3=18)

1. Explain the concept of ecology.
2. Discuss about spacial and habitat niche.
3. Comment on green house effect.
4. Discuss the population characteristics.
5. Comment on major air pollutants.

Section D

Long Essay (Answer any two)

(10×2=20)

1. Explain the structure of ecosystem.
2. Discuss about origin of life.
3. Explain air pollution.
4. Comment on population ecology.

B.Sc. Microbiology Sixth Semester Examination

Core Course- 18

MB6CRT17 Medical Virology

Time: Three Hours

Maximum: 80 Marks

Section A

Short Answers. Answer any 9 questions

- 1). Antigenic shift
2. Viroids
3. Continuous cell culture
4. Pox
5. Inclusion bodies
6. OPV
7. Define capsid and capsomere
8. Interferon
9. Dengue fever
10. CPE
11. Dane particles
12. Salk and sabin vaccine

(9 x 2 = 18)

Section B

Paragraph Questions. Answer any 6 questions

- 13). Difference between enveloped and naked virus.
14. Difference between lytic and lysogenic cycle
15. EBV
16. Chicken pox

17. Hepatitis A

18. Chemoprophylaxis of viral infections

19. Dengue fever

20. Oncogenic virus

21. Eclipse phase (6 x 4 = 24)

Section C

Short Essay. Answer any 3 questions

22).Viral Vaccines

23. Pathogenesis of Rabies

24. Replication of Virus

25. Arbovirus

26. Picorna virus (3 x 6 = 18)

Section D

Long Essay. Answer any two questions.

27).Explain the Cultivation methods of virus

28. Pathogenesis, transmission and prophylaxis of HIV

29. Baltimore classification of virus

30. Pathogenesis, transmission and prophylaxis of Influenza virus (2x10 = 20)

B.Sc. Microbiology Sixth Semester Examination

Core Course 19

MB6 CRT18 Diagnostic Microbiology

Time: Three Hours

Maximum: 80 Marks

Section A

Short Answer questions. Answer any 9 questions

1. Formaldehyde gas
2. Gene probe
3. Incineration
4. UTI
5. HEPA filters
6. Nosocomial infection
7. Otitis media
8. MIC
9. Halogens
10. Biosafety
11. Taq Polymerase
12. RPR

2x9= 18

Section B

Paragraph Questions. Answer any 6 questions

13. WHO safe code of practice for microbiological laboratory
14. Classification of microorganisms on the basis of hazards
15. Scheme for analysis of urine sample
16. Scheme for analysis of ear specimen
17. Classification of laboratories
18. PPE
19. Biological safety cabinets
20. Explain the chemical and fire safety to be taken in a microbiology laboratory

21. Stokes method

4x6=24

Section C

Short essay. Answer any 3 questions

22. Good laboratory practices

23. WIDAL test

24. Scheme for the microbiological examination of CSF

25. Explain the collection, transport and laboratory diagnosis of Blood and bone marrow.

26. Biomedical waste management

3x6=18

Section D

Long essay. Answer any 2 questions

27. Discuss the different enzyme immune assays used to diagnose bacterial, viral and immunological diseases.

28. Describe the scheme for the examination of clinical samples from humans.

29. Discuss the general aspects of organization of animal experiments.

30. Briefly explain the molecular techniques used in microbiology laboratory. 2x10=20

B Sc MICROBIOLOGY
Core Course- 20
MB6CRT19 Molecular Microbiology

Time: Three Hours

Maximum: 80 Marks

Section A

Short Answers. Answer any 9 questions

Write briefly on:

1. PCR
2. Nested PCR
3. RT-PCR
4. Ribotyping
5. 16SrDNA
6. Probe
7. Unculturable bacteria
8. Microbial community
9. Virulence factors
10. Adhesins
11. Enterotoxin
12. Botulinum toxin

(9 x 2 = 18)

Section B

Paragraph Questions. Answer any 6 questions

Write short notes on:

- 13). PFGE
14. Real time PCR
15. Principle and advantages of multiplex PCR
16. Metagenomics
17. Microarray based microbial identification

18. Molecular identification of bacteria
19. Biofilm formation
20. Quorum sensing
21. Endotoxins

(6 x 4 = 24)

Section C

Short Essay. Answer any 3 questions

- 22). Molecular typing methods
23. Techniques used for metagenome analysis
24. Application of molecular methods to study Microbial diversity
25. Steps involved in microbial invasion to host cell
26. Exotoxins

(3 x 6 = 18)

Section D

Long Essay. Answer any two questions.

- 27). Multilocus sequence typing and its applications
28. Applications of various PCR methods
29. Nucleic acid hybridisation
30. Bacterial toxins and its mechanism of action

(2x10 = 20)

B.Sc.Microbiology Sixth Semester Examination

MB6CRP20 Microbiology Practicals - III

Time: 5 hrs.X 3days (on three consecutive days)

Total Marks: 80

1. a). Identify the Bacteria in the given isolate.

b). Do antibiotic sensitivity test with the isolated organism

(25 Marks)
2. Cultivate the given fungus and identify by LPCB mount (20 Marks)
3. Perform Germ tube test (10 Marks)
4. Spotters (5 Nos.) (10 Marks)
5. Viva Voce (10 Marks)
6. Record (5 Marks)

B.Sc. Microbiology Sixth Semester Examination

Choice Based Course - II

MB6CBT01 Microbioprocess

Time 3hrs

Maximum: 80 marks

Part A (Short answer questions)

Answer any 9 Questions- Each carries 2 marks

1. Precursors
2. Defined media
3. Secondary metabolite
4. Continuous culture
5. Sparger
6. Commercial applications of fermentation
7. Antifoam agents
8. Whey
9. Crystallization
10. Protoplast fusion
11. Bioreactor
12. Bioprocess

**(9×2=18
marks)**

Part B (Paragraph)

Answer any 6 questions- each carries 4 marks

13. Cell disruption techniques
14. Sources of nutrition for fermentation medium
- 15.** Advantages of bioprocess over chemical process
16. Isolation of industrially important micro organisms
17. Factors affecting fermentation
18. Economics potential of fermentation products
19. Importance of dissolved oxygen

- 20. Difference between submerged and solid state fermentation
- 21. Industrially important microbial metabolites

(4×6=24)

Part C (Short Essays)

Answer Any 3- each carries 6 marks

- 22. Biological assays
- 23. Different modes of culturing industrially important microorganism
- 24. Main recovery processes in fermentation industry
- 25. Primary screening
- 26. Different stages in bioprocess

(6×3=18)

Part D (Long Essays)

Answer Any 2- each carries 10 marks

- 27. Explain bioreactor and its parts with diagram
- 28. Explain downstream processing
- 29. Explain screening techniques for industrially important microorganism
- 30. Explain media formulation for fermentation

(10×2=20)

B.Sc. Microbiology Sixth Semester Examination
Core 21
Choice Based Course-II
MB6CBT02 Sanitation Microbiology

Time:3hrs

Max marks=80

Section A

Short answer :Answer any 9
(9×2=18 marks)

1. Methanogens
2. Sanitation
3. Vermicompost
4. Sewage.
5. Microstrainer
6. Zooglear film
7. Sludge
8. Humus tank
9. Alum
10. Acetogenesis
11. Enteric fever
12. Sources of air pollution.

Section B :

Write short paragraph on any six
(4×6=24)

1. Comment on laminar air flow.
2. Causative agent and symptoms of scarlet fever.
3. Explain the settle plate method.
4. Sources of air borne diseases.

5. HEPA filter
6. Anaerobic sludge digestion.
7. Activated sludge.
8. Biological lagoons.
9. Biological weapons.

Section C

Write short essay on any three

(6×3=18)

1. Explain the concept of BOD and COD.
2. Discuss about Aerobic sewage treatment process.
3. Comment on Biogas production.
4. Explain methods of air sanitation.
5. Explain types of composting

Section D

Long Essay (Answer any two)

(10×2=20)

1. Explain safe location of animal houses based on air microbiology.
2. Discuss about air borne diseases and control measures
3. Explain air sampling techniques.
4. Comment on disposal of effluent.

B Sc Microbiology Sixth Semester Examination

Choice Based Course -II

MB6CBT03 Medical Entomology

Time: Three Hours

Maximum: 80 Marks

Section A

Short Answer Questions. Answer any 9 questions

- 1) Anopheles Mosquito
- 2) Vomit drop
- 3) Repellents
- 4) Pupa
- 5) Vector
- 6) Metamorphosis
- 7) Paris green
- 8) Cyclopropagative
- 9) Hibernation
- 10) Tiger mosquito
- 11) Integrated approach
- 12) Baits

(9 x 2 = 18)

Section B

Write Paragraph Questions. Answer any 6 questions

- 13). Transmission of Arthropods
- 14).Life history of mosquito
- 15). AnophelesMosquito
- 16).Black fly
- 17).Synthetic insecticides
- 18). Mineral oil
- 19).Resting habits of insects
- 20). Space sprays
- 21). Bed bug

(6 x 4 = 24)

Section C

Write Short Essay. Answer any 3 questions

- 22). Habits of mosquito

23). Mites

24).Tsetse fly

25).Cyclops

26). Ticks

(3 x 6 = 18)

Section D

Write Long Essay. Answer any two questions.

27). Mosquito control measures

28). Life cycle of Sand Fly and its control measures

29). Toxicity of insecticides

30).Life cycle of Rat flea and its control measures

(2x10 = 20)

Complementary Courses

Offered by the Department:

1. MB1CMT01 Fundamentals of Microbiology-1

2. MB2CMT02 Fundamentals of Microbiology-II

3. MB2CMP03 Microbiology Practical-1

4. MB3CMT04 Applied Microbiology

5. MB4CMT05 Medical Microbiology

6. MB4CMP06 Microbiology Practical-II

Complementary course offered by the Department:

MB1CMT01 Fundamentals of Microbiology-1

Total hours of instruction : 40

Credits :2

Unit 1:

Microbial world. Diversity of Microbial World. History of microbiology. Beneficial and harmful microbes. Differentiate between prokaryote & Eukaryote. Scope and different fields of Microbiology- Medical, Industrial, Agricultural, Food, Immunology etc., Principles and methods of bacterial classification. Ultrastructure of bacteria-cell wall, cytoplasmic membrane, inclusions, flagella, endospore. Differentiate between archaebacteria and Eubacteria

Reference

Prescott/Harley/Klein's Microbiology by Joanne Willey, Linda Sherwood, and Chris Woolverton

Microbiology Pelczar, Chan and Krieg.

General microbiology Vol 2 Powar & Dagainawala

Unit 2:

Microscopy – optical, phase contrast, fluorescent, darkfield, electron (TEM & SEM) - Principle Pathway of Light.

Reference

Prescott/Harley/Klein's Microbiology by Joanne Willey, Linda Sherwood, and Chris Woolverton

Microbiology Pelczar, Chan and Krieg.

General microbiology Vol 2 Powar & Dagainawala

Biophysics R.N.Roy

Unit 3:

Staining – preparation of specimens for staining, simple staining, differential staining & negative staining. Microscopic examination of microorganisms- hanging drop, simple, differential and negative staining

Reference

Prescott/Harley/Klein's Microbiology by Joanne Willey, Linda Sherwood, and Chris Woolverton

Microbiology Pelczar, Chan and Krieg.

General microbiology Vol 2 Powar & Dagainawala

Complementary course offered by the Department:

MB2CMT02 Fundamentals of Microbiology-II

Total hours of instruction: 40

Credits: 2

Unit 1:

Bacterial Nutritional requirements & Sources, Culture Media, Culture Methods, Anaerobic culture methods, Isolation of Pure Culture, Sterilisation and disinfection-Physical and chemical methods. Principles and Application. Antibiotics mode of action of β -Lactam antibiotics, antibiotics act on protein synthesis & DNA replication – Antibiotic Sensitivity Test – Disc Diffusion.

Reference

Microbiology Pelczar, Chan and Krieg

Prescott/Harley/Klein's Microbiology by Joanne Willey, Linda Sherwood, and Chris Woolverton

General microbiology Vol. 2 Powar & Dagainawala

Ananthanarayan and Paniker's Textbook of Microbiology R. Ananthanarayan,

C.K. Jayaram Panikar

Unit II:

Factors affecting growth of bacteria. Growth curve. Nutritional Types of Bacteria – Classification.- Autotrophs, Heterotrophs, chemotrophs, lithotrophs and organotrophs

Microbial metabolism- Glycolysis, Alcoholic Fermentation, TCA Cycle, Glyoxalate cycle, Pentose phosphate pathway.

Reference

Microbiology Pelczar, Chan and Krieg

Prescott/Harley/Klein's Microbiology by Joanne Willey, Linda Sherwood, and Chris Woolverton

General microbiology Vol 1 & 2 Powar & Dagainawala

Unit III :

Bacterial genetics - Genetic exchange- transformation, transduction and conjugation. Extra chromosomal genetic material-Plasmid. Genetic mechanisms of drug resistance in bacteria based on plasmid.

Reference

Microbiology Pelczar, Chan and Krieg

Prescott/Harley/Klein's Microbiology by Joanne Willey, Linda Sherwood, and Chris Woolverton

General microbiology Vol. 2 Powar & Dagainawala

4 .Microbial Genetics Stanley R. Maloy, Freifelder and Cronan

5. Molecular Genetics of Bacteria Snyder and Charminessology M.J.Pelczar,Jr. ECSChan and N.R.Krieg Tata McGraw-Hill

Complementary course offered by the Department

MB2CMP03 Microbiology Practical-I

Total hours of instruction: 80 (40 in semester I & 40 in Semester II)

Credit :2

Study the parts and usage of a compound microscope

Study the parts and working and uses of

Autoclaves

Hot air oven

Membrane Filter

Safety Cabinet

Anaerobic Jar

Incubator

Preparation of culture Media (NB, NA, MA) and dispensing media in test tubes, bottles, petridishes.

Preparation and examination of Hanging drop mount for studying the motility of bacteria.

Preparation of slide smears for staining.

Staining techniques

- Simple staining
- Gram Staining
- Negative Staining.

Cultivation of Bacteria on nutrient Agar for obtaining isolated colonies. Study of cultural colony characters- Size, shape, colour etc.

Viable Count of bacteria by pour plate/ spread plate method.

Demonstration of antibacterial activity by disc diffusion method

References:

Microbiology – Concepts and Application – Pelzer Jr. Chang Kreig Mac Graw Hill Inc

Microbiology – Prescott, Harley and Klein Wim.C.Brown Publishers.

Practical Microbiology – R.C Dubey, D.K Maheshwari, S Chand and Company, New Delhi.

Microbiology Laboratory Manual – Cappuccino, Sherman, Pearson Education.

Complementary Course offered by the Department

MB3CMT04 Applied Microbiology

Total hours of instruction :40

Credits :2

Unit 1:

Food as substrate for microorganisms. Principles of food preservation-High temperature,Low temperature, drying, chemical preservation- Production of edible mushrooms-Pleurotus,Agaricus,Volvariella, milk products-Butter, Cheese. Oriental fermented Food products-Miso,tempeh. Single cell protein,Probiotics. Microbiological examination of milk. Spoilage –milk,meat

References:

Principles of Fermentation Technologyby Peter F. Stanbury, Stephen J. Hall, and Allan Whitaker

Manual of Industrial Microbiology and Biotechnologyby Ronald M. Atlas

Prescott and Dunn's Industrial Microbiologyby Gerald Reed

Industrial Microbiologyby Samuel C. Prescott

Food Microbiology Frazier

Unit 2:

Soil microbiology- Microorganisms & interactions. Biogeochemical cycles- Nitrogen and Phosphorous. Biofertilizers-Rhizobium, Biodegradation of pesticides, Biopesticides, biogas production.

References

Agricultural Microbiology Bagraja & Rangaswami

Soil Microorganisms & Plant Growth - N.S. Subba Rao

Micrbial Echology – Atlas & Bartha

Environmental aspects of Microbiology – Joseph C. Daniel

Bioremediation Baker & Herson

Unit 3:

Microbial assessment of water quality, water purification. Aeromicrobiology – definition, Microbiological assessment of air quality. A brief account of microbial production of useful products-antibiotics , alcohol, organic acids and enzymes

References

Microbial ecology – Atlas & Bartha

Environmental aspects of Microbiology – Joseph C. Daniel

Microbiology Pelczar, Chan and Krieg.

Complementary course offered by the Department

MB4CMT05 Medical Microbiology

Total hours of instruction: 40

Credits : 2

Unit .1

Sources of infection. Methods of transfer of infections. Factors determining pathogenic potentials of microbes. A brief study on bacterial pathogens-Staphylococcus, Streptococcus, Corynebacterium diphtheria, E.coli, Salmonella typhi, Shigella Vibrio cholera and Mycobacterium tuberculosis

References:

Ananthanarayanan and Paniker Textbook of Microbiology Orient Longman

Unit 2: Introduction to virology – unique properties and structure of viruses A brief study on viral diseases –Small pox ,chicken pox, polio, influenza, hepatitis , rabies, influenza and AIDS

References

Ananthanarayanan and Paniker's Textbook of Microbiology R. Ananthanarayanan, C.K. Jayaram Panikar

Prescott/Harley/Klein's Microbiology by Joanne Willey, Linda Sherwood, and Chris Woolverton

Microbiology Pelczar, Chan and Krieg

Unit 3. Introduction to mycology, General characters of fungi, classification, cultivation, cultural characters , microscopic morphology. Mycotoxins. A brief study on diseases caused by fungi. Pythiriasis, Dermatophytoses & Candidiasis

References

Ananthanarayanan and Paniker Textbook of Microbiology Orient Longman

Microbiology M.J.Pelczar,Jr. ECChan and N.R.Krieg Tata McGraw-Hill

Complementary course offered by the Department

MB4CMP06 Microbiology Practical-II

Total hours of instruction: 80 (40 in semester III & 40 in Semester IV)

Credits :2

Isolation & Enumeration of microorganisms from soil sample

Study of microbial contamination in food products.

Analysis of milk quality by Methylene blue reductase test

Study of microorganisms in air exposed plate method.

Identification of common fungus like Mucor, Rhizopus, Penicillium , Aspergillus by Lactophenol cotton blue mount examination.

Preparation of fungal media

Cultivation of fungi study of colony characters of yeast and mold.

Microscopic morphology of yeast and molds.

References:

Practical Microbiology – R.C Dubey, D.K Maheshwari, S Chand and Company, New Delhi.

Experiments in Microbiology, Plant Pathology and Biotechnology- K R Aneja , New Age International Publishers

Microbiology Laboratory Manual – Cappuccino, Sherman, Pearson Education.

Bailey and Scott's Diagnostic Microbiology.

MODEL QUESTION PAPERS
FOR
COMPLEMENTARY COURSES
OFFERED BY
MICROBIOLOGY DEPARTMENT

Pattern of question papers for courses with three modules

Module	No. of questions under each section			
	Section A(2 marks for each question)	Section A(4 marks for each question)	Section A(6 marks for each question)	Section A(10marks for each question)
1	4	3	1	2
2	4	3	2	1
3	4	3	2	1
Total No.of questions	12	9	5	4

Complementary Course

MB1CMT01 Fundamentals of Microbiology-1

Time: Three Hours

Maximum: 80 Marks

Section A

Short Answers. Answer any 9 questions

1. Beneficial microorganisms
2. Archebacteria
3. Staining
4. Microscope
5. Differentiate between prokaryote and eukaryote
6. Harmful microorganisms
7. Flagella
8. Resolving power
9. Gram staining
10. Acidic and basic dyes
11. Mordant
12. Spore

(9 x 2 = 18)

Section B

Paragraph Questions. Answer any 6 questions

- 13). Scope and Different fields of microbiology
14. Optical microscope
15. Hanging drop technique
16. Different types of staining
17. History of Microbiology
18. Koch's postulates

19. Differentiate between Archebacteria and Eubacteria

20. Importance of Oil Immersion

21 . Bacterial cell wall

(6 x 4 = 24)

Section C

Short Essay. Answer any 3 questions

22). Ultra structure of bacteria

23.Smear Preparation of specimens for staining

24. Gram staining and acid fast staining

25. Endospore formation

26. Phase contrast microscope

(3 x 6 = 18)

Section D

Long Essay. Answer any two questions.

27). Explain electron microscopy

28. Principles and methods of bacterial classification

29. Scope of Microbiology in the field of food and agriculture

30. Beneficial and harmful microorganisms

(2x10 = 20)

Complementary Course

MB2CMT02 Fundamentals of Microbiology-II

Time: Three Hours

Maximum: 80 Marks

Section A

Short Answers. Answer any 9 questions

1. Capnophilic Microbes
2. Incineration
3. Selective media
4. Classification of bacteria on the basis of energy source
5. Halophytes
6. Generation time
7. Transformation
8. Plasmid
9. Lithotrophs
10. Affect of drying and sunlight
11. Stroke culture
12. RCM

(9 x 2 = 18)

Section B

Paragraph Questions. Answer any 6 questions

- 13). Filtration
14. Gaspack
15. Differential media

16. Mode of action of gases
17. Streak plate method
18. Beta lactum antibiotics
19. Glycolysis
- 20 . Tranformation
- 21.Genetic drug resistance in bacteria

(6 x 4 = 24)

Section C

Short Essay. Answer any 3 questions

- 22). Explain typical bacterial growth curve
23. Explain the methods for isolation of pure culture
24. Disc diffusion method
25. Glyoxalate cycle
26. Transduction

(3 x 6 = 18)

Section D

Long Essay. Answer any two questions.

- 27).Explain anaerobic culture methods
28. Define sterilization and explain heat method of sterilisation
29. Explain TCA cycle
30. Define mutation and explain different types of mutation

(2x10=20 marks)

Complementary course
MB2CMP03 Microbiology Practical-I

Time: (5 hrs.X 2 days) on 2 Consecutive days

Total Marks: 80

1. Perform Gram staining with the given sample- 15 Marks
2. Perform Hanging drop with the given sample- 15 Marks
3. Isolate and enumerate bacteria from the given soil sample using either pour plate or spread plate method - 15 Marks
4. Detect the antibiotic sensitivity of the given sample - 10 Marks
5. Spotters (5 Nos.) -10Marks
6. Viva - 10 Marks
7. Record - 5 Marks

Complementary Course
MB3CMT04 Applied Microbiology

Time: Three Hours

Maximum: 80 Marks

Section A

Short Answers. Answer any 9 questions

1. Aerobiology
2. Xenobiotics
3. Name a chemical preservative used in food
4. Endotoxin
5. Name a bacteria which carries spoilage of milk
6. Pasteurization
7. Use of Rennet
8. Biodegradation
9. Bioremediation
10. Name any two edible mushrooms
11. Droplet nuclei
12. Hesses tube

(9 x 2 = 18)

Section B

Paragraph Questions. Answer any 6 questions

- 13). Botulism
14. SCP
15. Probiotics and its significant

16. Biopesticides.

17. Note on Milk Products

18. Significance of Microbe in maintaining soil fertility

19. write about positive microbial interaction among microorganisms.

20. Phosphorus cycle

21. Explain any two oriental fermented food products

(6 x 4 = 24)

Section C

Short Essay. Answer any 3 questions

22). Note on water purification

23. Explain biogas production

24. Write about assessment of air quality

25. Microbiological examination of milk

26. Note on marine microorganisms

(3 x 6 = 18)

Section D

Long Essay. Answer any two questions.

27). Give an account on food preservation

28. Explain biogeochemical cycle. Write about nitrogen cycle and significance

29. Give an account on microbial assessment of water quality

30. Note on bacterial insecticide

(2x10 = 20)

COMPLEMENTARY COURSE
MB4CMT05 Medical Microbiology

Time: Three Hours

Maximum: 80 Marks

Part A

Short answer

Answer any 9 questions each carries 2 mark

1. Nosocomial infection

2. Adhesins

3. Chicken pox

4. *Candida albicans*

5. Healthy carrier

6. Endogenous infection

7. Acid fast bacteria

8. Aflatoxin

9. Cholera red reaction

10. Salk vaccine

11. Capsid

12. Viroid

(2x9=18)

Part B

Paragraph

Answer any 6 each carries 4 mark

13. Antigenic variation in *Salmonella*

14. Eclipse phase

15. LPCB

16. Diagnosis and control of typhoid fever

17. Bacteriophage structure

18. Pulmonary tuberculosis

19. Hepatitis A

20. Importance of fungus in food production

21. Polio virus

(4x6=24)

Part c

Short essay

Answer any 3 each carries 6 marks

22. Dermatophytoses

23. Sources of infection

24. Transmission of AIDS

25. Hepatitis B

26. Control of fungal diseases

(3x6=18)

Part D

Long essay

Answer any 2 each carries 10 marks

27. Discuss any two Mycobacterial diseases?

28. Explain replication of virus?

29. Pathogenesis of HIV in detail

30. Pathogenesis and lab diagnosis of Vibrio

(2x10=20)

Complementary course

MB4CMP06 Microbiology Practical-II

Time: (5 hrs.X 2 days) on 2 Consecutive days

Total Marks: 80

1. Isolate and enumerate bacteria from the given food sample- 20 Marks
2. Perform MBRT with the given milk sample - 10 Marks
3. Cultivate the given fungal specimen by slide culture technique – 15 Marks

4. Identify the given fungus by LPCB Method -10 Marks

5. Spotters (5 Nos.) -10Marks
6. Viva - 10 Marks
7. Record - 5 Marks