UNIVERSITY OF CALICUT  

(Abstract)

B.Sc. Programme in Microbiology – under Choice-based Credit Semester System – Scheme and Syllabus – implemented w.e.f. 2009 admission onwards – approved – Orders issued –

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GENERAL & ACADEMIC I – ‘J’ SECTION

No.GA.I/J1/2838/07  Dated, Calicut University P.O., 25-06-2009

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2) Minutes of meeting of B/S in Microbiology held on 28.04.2009.

3) Item No. 2(xvi) of the minutes of meeting of Faculty of Science held on 05.05.2009.

4) Item No. – II A.17 of the minutes of meeting of the Academic Council held on 14.05.2009.

ORDER

Choice-based Credit Semester System and Grading has been introduced for UG curriculum in all affiliated colleges under this University with effect from 2009 admission onwards and the regulations for the same implemented vide paper cited (1) above.

As per paper read as (2) above, the Board of Studies has resolved to approve the scheme and syllabus of B.Sc. programme in Microbiology under Choice-based Credit Semester System.

As per paper read as (3) & (4) above, the Faculty of Science held on 05.05.2009 endorsed the minutes of Board of Studies and the Academic Council held on 14.05.2009 approved the same.

Sanction has therefore been accorded to implement the scheme and syllabus of B.Sc. programme in Microbiology under Choice-based Credit Semester System in this University with effect from 2009 admission onwards.

Orders are issued accordingly. Scheme and syllabus appended.

Sd/-
DEPUTY REGISTRAR (G & A I)

For REGISTRAR

To

The Principals of all affiliated colleges offering B.Sc. programme in Microbiology.

Copy to: CE/EXI/EGI/DR, B.Sc./System Administrator with a request to upload in the University website/Tabulation Section/Enquiry/GA I-'F’ Section/SF/DF/FC.

Forwarded/ By Order

SECTION OFFICER

UNIVERSITY OF CALICUT

B.Sc. MICROBIOLOGY (CCSS)

SYLLABUS
2009
Code Course Title Hrs/week Credit Total Credits
A01 Communication skills in English 4 3
A02 Critical Reasoning, Writing and Presentation 5 3
A07(03) Communication skill in the languages other than English for B.Sc alternate pattern 5 4
MB1B01 General Microbiology 3 3
Elementary biochemistry-I 2 2 17
Biochemistry Practical 2 *
Computer Applications Fundamentals 2 2
Computer Applications Practical I 2 *
Total 25 17
A03 Reading Literature in English 4 4
A04 Indian constitution, Secularism and Sustainable Environment. 5 4
A09(03) Literature in languages other than English for B.Sc. Alternate pattern 5 4
MB2B02 Microbial Taxonomy 2 3
MB2B03(P) Microbiology Practical I 1 * 21
Elementary biochemistry-II 2 2
Biochemistry Practical 2 *
C – Language, Data Base Management System & SQL 2 2
Computer Applications Practical II (Exam for practical I-II) 2 2
Total 25 21
A06 History and Philosophy of Science 5 4
A12 General informatics 5 4
MB3B04 Molecular biology 3 3
MB3B05(P) Microbiology Practical II 2 * 15
Enzymology and metabolism -I 3 2
Biochemistry Practical 2 *
Biostatistics I 3 2
Biostatistics Practical I 2 *
Total 25 15
A13 Basic numerical skills 5 4
A14 Etreprenurship development 5 4
MB4B06 Microbial Genetics and Genetic Engineering 3 3
MB4B07(P) Microbiology Practical III (Exam for Microbiology practical I – III) 2 4 25
Enzymology and metabolism -II 3 2
Biochemistry Practical (with exam) 2 4
Biostatistics II 3 2
Biostatistics Practical II (Exam for Biostatistics practical I-II) 2 2
Total 25 25
MB5B08 Microbial Physiology 3 3
MB5B09(P) Microbiology Practical IV 2
MB5B10 Medical Microbiology 3 3
MB5B11(P) Microbiology Practical V 2 *
MB5B12 Food And Agricultural Microbiology 3 3 16
MB5B13(P) Microbiology Practical VI 2 *
MB5B14 Environmental and sanitation Microbiology 3 3
MB5B15(P) Microbiology Practical VII 2 *
MB B16 (Pr) Project Work 2 *
MB5D01 Open course-from other departments 3 4
Total 25 16
MB6B17 Industrial Microbiology 5 4
MB6B18(P) Microbiology Practical VIII (Exam for Microbiology practical IV & VI – VIII) 5 6 26
MB6B19 Immunology 5 4
MB6B20(P) Microbiology Practical IX (Exam for Microbiology practical V & IX) 5 6
MB6B21 (E1) Biosafety and Bioethics
MB6B21 (E2) Cell and Tissue culture
MB B22 (Pr) Project Work 2 4
Total 25 26 120

B.Sc. MICROBIOLOGY
CORE COURSE SYLLAUS
SEMESTER 1
MB1B01 General Microbiology
3. Structure and function of cell wall, flagella, pili, capsule, membrane, spores, nuclear material, inclusion bodies. Staining methods - simple and differential - Grams, spore, flagella, volutin, capsule, negative and Fuelgen staining of DNA.
Antimicrobial chemotherapy - Penicillins, Cephalosporins, Sulfonamide, Aminoglycosides, Quinolones, Erythromycin and Macrolides, Chloramphenicol, Antifungal and antiviral drugs.

References
1. Fundamentals of Bacteriology by A.J Salle
2. Microbiology by Pelczar et al
3. Fundamentals of Microbiology by Mertus Frobisher
4. General microbiology by Stanier et al
6. Principles of Microbiology by Ronald Atlas

SEMESTER II
MB2B02 Microbial Taxonomy
1. Levels of classification; classification systems - phenetic and phylogenetic classification, numerical taxonomy.
2. Various criteria used in bacterial classification: - classical characteristics, morphological characteristics, physiological and metabolic characteristics, ecological characteristics and genetic analysis.
3. Molecular characteristics - comparison of proteins, nucleic acid base composition,
4. Phage typing, serotyping, nucleic acid hybridization and nucleic acid sequencing, 16 S ribosome studies.

References
1. Fundamentals of Bacteriology by A.J Salle
2. Microbiology by Pelczar et al
3. Fundamentals of Microbiology by Mertus Frobisher
4. General microbiology by Stanier et al
6. Principles of Microbiology by Ronald M Atlas

MB2B03 (P) Microbiology Practical 1
1. Cleaning and sterilization of glass ware.
2. Introduction to hot air oven, autoclave and incubator.
4. Simple Staining.
5. Grams staining.
7. Spore Staining.
8. Flagella Staining.
9. Preparation of media (Nutrient broth, Nutrient agar).
10. Isolation of pure culture.
11. Enumeration of microbial cells (pour plate method).
12. Fungal staining.
13. Fungal Culture.
15. Use of differential and selective media.
16. Oligodynamic action of heavy metals on microbes.
17. Categorizing bacteria from various sources (air, water, soil, food etc.) based on morphological, microscopic, cultural and biochemical and other characteristics.

4

SEMESTER III

MB3B04 Molecular Biology
2. Nucleic acids: Structure of DNA and RNA, Types and forms – DNA, t-RNA, r-RNA, m-RNA – Definition and functions. DNA replication in prokaryotes and eukaryotes, D loop and rolling circle replication
3. Transcription in prokaryotes. RNA processing in prokaryotes and eukaryotes.
5. Operon concept and gene regulation in prokaryotes. Lac and Trp operons. DNA binding proteins.

References:

MB3B05 (P) Microbiology Practical II
1. Demonstration of mitosis and meiosis.
2. Extraction and estimation of DNA.
3. Extraction and estimation of RNA.
4. β-galactosidase induction.
5. Demonstration of polyten chromosomes.
7. Electrophoresis.
8. Preparation of gradient solutions.
SEMESTER IV
MB4B06 Microbial Genetics and Genetic Engineering.
1. DNA as the genetic material, Experimental proof. Semiconservative replication of DNA. Replication of Prokaryotic and eukaryotic DNA. Different RNA and their role in transcription and translation. Prokaryotic and eukaryotic translation. Operon concept constitutive and inducible enzyme. Mutation, spontaneous and induced mutation, Physical and chemical mutagens. Ames test
Reference:

MB4B07 (P) Microbiology Practical III
1. Conjugation
2. Transformation
3. Agarose gel electrophoresis of DNA
4. Restriction digestion of DNA

SEMESTER V
MB5B08 Microbial Physiology
1. Effect of various parameters and Environmental factors on microbial growth-Temperature, pH, O2 requirement etc., special conditions like thermophilic, psychrophilic, halophilic, barophilic and extremophilic growth, Nutritional requirements, Mode of
nutrition, Nutritional types of bacteria.
2. Growth curve and its significance, generation time, steady state culture, synchronous culture and Diauxic culture, Aerobic and Anerobic culture methods
5. Viral and bacteriophage nutrition, cultivation and their Quantitation methods.

References
8. Fundamentals of Bacteriology by A.J Salle
9. Microbiology by Pelczar et al
10. Fundamentals of Microbiology by Mertus Frobisher
11. General microbiology by Stanier et al
12. Text book of Microbiology by Prescott

MB5B09 (P) Microbiology Practical IV
1. Effect of temperature of growth of microorganisms.
2. Influence of pH on growth.
3. Bacterial growth curve.
4. Isolation of petit mutants of yeast.
5. Isolation of bacteriophages from sewage.

MB5B10 Medical Microbiology
2. Diseases caused by the following pathogens with special importance to their epidemiology, symptomatology, laboratory diagnosis and treatment – S.aureus, str.pyogenes, str.pneumoniae, N.gonorhroeae, corynebacterium, diphtheriae, clostridium tetani, cl.botulinum, Mycobacterium tuberculosis, M.leprae, Salmonella typhi, Shigella dysenteriae, Treponema pallidum and Leptospira icterohaemorrhagiae. Brief account on Rickettsial diseases.
3. Viral diseases -Chicken pox, influenza, mumps, measles, rubella, hepatitis, rabies and AIDS (HIV)

References:-
1. Text Book of Microbiology by Ananthanarayanan and Jayaram Panikkar.
2. Medical Microbiology by Macie and Mc Cartney.
3. Bailey and Scott’s Diagnostic Microbiology by Baron et al

MB5B11 (P) Microbiology Practical V
1. AFB staining.
2. Biochemical reactions for identification of various groups of bacteria.
3. Identification of bacterial isolates from clinical samples.
4. Antibiotic sensitivity test.

**MB5B12 Food and Agricultural Microbiology.**
1. Introduction: Importance of food and dairy Microbiology – Types of microorganisms in food – Source of contamination (primary sources) – Factors influencing microbial growth in foods (extrinsic and intrinsic)
4. Food Poisoning : food borne infections (a) Bacterial: Staphylococcal, Brucella, Bacillus, Clostridium, Escherichia, Salmonella (b) Fungal : Mycotoxins including aflatoxins, (c) Viral: Hepatitis, (d) Protozoa – Amoebiasis.

**References:**
MB5B13 (P) Microbiology Practical VI
1. Aerobic mesophilic count of fish samples and milk.
2. Isolation of constituent flora of fermented milk.
3. Production of wine.
5. Isolation of rhizobium and azotobacter.
6. Amonification and nitrification of organic compounds.

MB5B14 Environmental and Sanitation Microbiology
3. Microbiology of air: Microbiology of air – organisms in air, distribution and sources. Disease forecasting in plants. Droplet nuclei, aerosol, infectious dust and microbiological sampling of air. Brief account of air borne transmission of harmful microbes.
5. Solid waste management: Sources and types of solid waste, need for management, Land fills, composting, vermin composting, anaerobic digesters, methanogenesis and production of biogas. Design and management of biogas plant.

References:
2. Microbiology concepts and applications by Pelzar et a.l

MB5B15 (P) Microbiology Practical VII
1. Examination of microflora of soil
2. Study of antibiosis by microorganism, determination of antimicrobial spectrum.
3. Determination of water quality.
4. Determination of BOD of water.
5. Air sampling.

MB B16 (Pr): Project (work to be completed by the end of VI semester)
MB5D01/MB5D02. Open course from other departments
10

SEMESTER V1

MB6B17 Industrial Microbiology
1. Basic Concepts of Fermentations: introduction to Fermentations. Fermentor design – parts & their functions. Types of fermentors – Batch, Continuous, Dual and Multiple.
4. Traditional use of fermentation for processing surplus food eg., bread, cheese, wine, idli and pickle making general concept of value addition using microbial fermentations.
5. Lactic acid cultures and yoghurt making, cheese making – ripening by microbes study. Production of SCP with respect to Saccharomyces cerevisiae, Biogas-microorganisms used, substrates, Different types of digesters and their working, Mechanism of biogas production, Biofertilizer- applications: Azotobacter, Rhizobium and PSB, Biopesticides production and applications - B. thuringenesis as biopesticides.

References:
1. Industrial Microbiology by Prescott and Dunns.
5. Comprehensive Biotechnology by Murray and Moo Yung.

MB6B18 (P) Microbiology Practical VIII
1. Differences in abrupt and gradual scale up of inoculum.
2. Enrichment of coir pith degraders.
3. Sterilization problems with suspended solids in media.
4. Demonstration of SSF, fixed bed and fluidized bed systems.
5. Pellicle formation.
7. Isoelectric focusing.
8. Salting out.
10. Production of alcohol from fruit juice.
11. Microbiological assay of penicillin.
12. Production of citric acid using Aspergillus.
13. Isolation and screening of industrially important microorganisms from soil/environment – cellulose digesting amylase producing.

MB6B19 Immunology
3. Antigen Antibody reaction – different types and their clinical applications (eg:- widal, VDRL, ELISA and western blot for HIV etc.)

References:-
1. Text Book of Microbiology by Ananthanarayanan and Jayaram Panikkar.
2. Immunology by Coleman et al
3. Fundamental Immunology by Paul W.E. et al
4. Introduction to Immunology John W Kimbal et al
7. Immunology by Roitt.
8. Fundamentals of Immunology by Kuby

MB6B20 (P) Microbiology Practical IX
1. Differential count of leukocytes.
2. Lymphocyte isolation.
4. WIDAL agglutination test.
5. ASO latex agglutination test.
6. RA latex agglutination test.
7. HBs. Ag. Latex agglutination test.
8. RPR test.

MB6B21 (E1) Biosafety and Bioethics
Biosafety during industrial production using GMO’s. Biosafety guidelines in India.
Introduction to bioethics, applications of bioethics, Human genome project and its ethical issues, Molecular detection of pre-symptomatic genetic diseases and its importance in health care, prenatal diagnosis, genetic manipulations and their ethical issues, Ethical, legal and social implications of human genome project. Genetic studies on ethnic races.

References:-
11. Bioethics: An introduction for the Biosciences by Ben Mepham

MB6B21 (E2) Cell and Tissue culture
7. Laboratory cultivation of plant and animal cells and tissue culture. Application of plant and animal cell and tissue culture. Basic laboratory requirements, Maintenance of sterile condition Explant selection, sterilization and inoculation
8. Different types of culture, Callus culture, Suspension culture, Primary cell culture, Attach dependent cells attach independent cells, Cell lines, Organ culture, Types of media used and its formulations. Role of hormones, Hormones: Auxins, cytokinins, Gibberellins, Abscisic Acid, ethylene. Different media used for plant cell.
9. Plant regeneration: organogenesis. Somatic embryogenesis; somaclonal variation, its genetic basis and application in crop improvement. Clonal propagation, production of
pathogen–free virus free plants haploid production: Induction and growth parameters; Chromosomal variability in callus culture. Plant regeneration Androgenesis; Anther and pollen culture.


References:-
2. Genetic engineering, Molecular biology and tissue culture of crop pest and disease management – P.Vidyasekaran, Paya Publication.

MB B22 (Pr): Project Work

MODEL QUESTION PAPER

University of Calicut
BSc. Microbiology- Semester III
MB3B05 Medical Microbiology
(Model Question paper )
Time 3 hrs Weightage-30

I. Answer all questions :
Choose the correct answer weightage 1x3
1. Weil's disease is caused by,
a) Leptospira interrogans (b) Leptospira biflexa (c) Leptospira icterohaemorrhagiae (d) Treponema vincenti
2. An example for a Differential medium,
a) Nutrient agar (b)Mac Conkey's agar (c) Chocolate agar (d) Tellurite agar
3. Modified Thayer -Martin medium is a selective medium used for ,
a)Neisseria (b) Clostridium (c) Pneumococcus (d) Brucella.
4. The shape and position of the spore in Cl. etani is,
a) oval and terminal (b) spherical and terminal (c) central and oval (d) central and spherical.
Write True or False
5. Hepatitis A Virus is an enveloped virus.
6. Rocky Mountain Spotted Fever is transmitted by Flea.
7. Malchite green in the Lowenstein-Jenson medium is a selective agent.
8. Streptococcus is Catalase positive while Staphylococcus is negative.
Answer in one word:
9. Name a fungus infection of hair.
10. Which is the receptor host cell in HIV infection?
11. Name a pathogenic yeast-like fungi.
12. Which is the famous serological test for the diagnosis of Enteric Fever?

II. Comment briefly on all the following: weightage 1x9
III. Write short essay on any 5 of the following: weightage 2x5
22. Subcutaneous mycoses
23. Type B Hepatitis
24. Kirby-Bauer test
25. Laboratory diagnosis of diphtheria
26. Rickettsial diseases
27. Varicella
28. Filariasis
IV. Answer any 2 of the following: weightage 4x2
29. Explain the different methods of transmission of infection with suitable example
30. Discuss the epidemiology and laboratory diagnosis of syphilis

OPEN COURSES FOR OTHER DEPARTMENTS

5D01. Public Health and Emerging Microbial Diseases

5D02. Environmental Microbiology
1. Basic concepts of Ecology and Environment - Ecosystem - concept, components, food chains, food webs and tropic levels. Energy transfer efficiencies between tropic levels. Environmental factors influencing the growth and survival of microorganisms. Physical factors - temperature, light, osmotic pressure and
hydrostatic pressure. Chemical factors - pH, O2 and CO2. Biological factors - Interactions of microbial population and community dynamics.
4. Dispersal of airborne microorganisms. Air sampling principles and techniques. Microorganisms and sewage treatment; COD, BOD and DO, trickling filters, activated sludge process, oxidation ponds; sludge treatment (anaerobic digestion)
5. Global environmental problems: ozone depletion, green house effect and acid rain, their impacts and biotechnological approaches for management. Xenobiotic metabolism, biomagnification, release of GMO’s to environment and their impact, ethical issues

COMPLEMENTARY COURSE
BIOSTATISTICS AND
COMPUTER
APPLICATIONS

SEMESTER I
MB1C03 Computer Applications Fundamentals
MB1C04 (P) Computer Applications Practical I

SEMESTER II
MB2C07. C-Language, Data Base Management System & SQL.
MB2C08 (P) Computer Applications Practical II (with exam)

SEMESTER III
MB3C11 Biostatistics I
MB3C12 (P) Biostatistics Practical I

SEMESTER IV
MB4C15 Biostatistics II
MB4C16 (P) Biostatistics Practical II (with exam)

SEMESTER 1
MB1C03 Computer Applications Fundamentals


Reference Books:

4. MB1C04 (P) Computer Applications Practical I
Exercises to familiarize the student with various tools and packages available in a Personal Computing environment: word processing, drawing tools, managing information using a spreadsheet, presentation tools.

SEMESTER II

MB2C07. C- Language, Data Base Management System & SQL
1. Programming concepts: algorithm, flowcharts, Variables, constants, basic data types, int, float double and char qualifiers long short and unsigned declarations-Arithmetic expression.
2. Operator: arithmetic, logical bitwise increment decrement, assignment-precedence and order of evaluation conditional expressions scanf, printf operations.
3. Control flow if statement if . .else and else if constructs-nested if statements switch statements —looping-for loops-nested loop while and do while statements break and continue statements.
4. Array: -initializing array elements multidimensional arrays sorting. Functions arguments and local variables declaration-return values variables auto, static, external and register variables-recursive functions.
5. Structure and unions type def statements data type con erions ty1e casting- character strings-string functions escape characters introduction to pointers.
6. Introduction—Purpose of database systems, data models database languages transaction management, database administrator, data base users system structure.
8. Relational Model: Basic concepts, Design issues, mapping constraints, Keys, Entity Relationship Diagram, Weak Entity sets, DML, DDL, DCL Statements In Detail, Normalization-First, Second, Third And BCNF.
9. SQL: Background, Basic Structure, set operations, Aggregate functions, Null Values, Nested Sub queries, Derived relations, Views, Modification of the database, Joined relations data Definition Language, Embedded SQL.

Reference books

Reference:
1. An Introduction to Database Systems, C. J. Date, 1994, Addison-Wesley

MB2C08 (P). Computer Applications Practical II
1. Menu driven program to concatenate two strings and find the length of a string using pointer.
2. Program to convert upper case into lower case and vice versa.
3. Program to count the number of occurrences of a charter in a string
4. Program to print the right most digit in a number.
5. Program to count the number of numerals, upper case, lower case and special character in a given string.
6. Program to check whether a string is palindrome or not.
7. Program to find the value of Sin(x)/Cos(x) using mathematical series.
8. Program to print the transpose of a matrix.
9. Program to find the product of two matrices.
10. Program to arrange numbers in ascending order.
11. Program to arrange numbers in alphabetic.

SEMESTER III

MB3C11. Biostatistics – I
2. Measures of Central Tendency and Measures of Dispersion – Arithmetic mean, Median, Mode, Geometric mean. Range, Mean deviation, Variance, Standard deviation, Quartile deviation, semi interquartile range, coefficient of variation, indices of diversity.
4. Probability distributions. Bernoulli’s distribution, Binomial distribution, Poisson distribution, and normal distribution. Parameters of these distributions, mean and variance (no derivations expected). Fitting of these distributions to real data sets.
5. Distributions derived from normal distribution – t-distribution, chi-square distribution, and F-distributions and their applications.
Reference Books

**MB3C12 (P) Biostatistics Practical I**
Students are expected to do practical problems as directed below using computer and scientific calculator. Use of statistical software SPSS is also advised.
1. For a given data set construct histogram, and draw ogives and frequency polygon to the given data.
2. Calculate Arithmetic mean, median, Mode, Quartiles, Variance and standard deviation for given discrete data and frequency distribution.
3. Calculate Geometric mean and harmonic mean to raw data.
4. Fitting of Binomial, Poisson and Normal distribution to given data sets.

**SEMESTER IV**

**MB4C15 Biostatistics II**
5. **Partial and Multiple correlations**: The concept of partial and multiple correlations - its applications. Calculating partial correlation of order one from simple correlations.

Reference Books

**MB4C16 (P) Biostatistics Practical II**
Students are expected to do practical problems as directed below using computer and scientific calculator. Use of statistical software SPSS is also advised.
1. For a given data to test independence of attributes and test of goodness of fit.
2. Analysis of variance for one – way and two –way classified data.

**B.SC. MICROBIOLOGY**
(COMPLEMENTARY)

For other B.Sc. Programmes

2

B.SC. MICROBIOLOGY (Complementary)

SEMESTER I
MB1C01. GENERAL MICROBIOLOGY
MB1C02 (P). Practical I

SEMESTER II
MB2C03 MICROBIAL METABOLISM AND GENETICS.
MB2C04 (P). Practical II

SEMESTER III
MB3C05 APPLIED MICROBIOLOGY
MB3C06 (P). Practical III

SEMESTER IV
MB4C07 MEDICAL MICROBIOLOGY AND IMMUNOLOGY
MB4C08 (P). Practical IV

3

SEMESTER 1
MB1C01. GENERAL MICROBIOLOGY
3. Bacterial Taxonomy- Haeckel’s three kingdom concept, Whittaker’s five kingdom concept, Bergey’s manual-brief account, Classification systems- Numerical taxonomy or Adansonian classification, phenetic and phylogenetic classification, DNA hybridization and base composition.

MB1C02 (P). Microbiology Practical I
1. Cleaning and sterilization of glassware.
2. Introduction to hot air oven, autoclave and incubator.
4. Simple Staining.
5. Grams staining.
7. Spore Staining.
8. Preparation of media (Nutrient broth, Nutrient agar).
9. Isolation of pure culture.
10. Enumeration of microbial cells (pour plate method).
11. Fungal staining.
12. Fungal Culture.

SEMESTER II

MB2C03. MICROBIAL METABOLISM AND GENETICS
1. Enzymes-characteristics and properties of enzyme, nomenclature, mechanism of enzyme action, factors influencing enzyme activity, inhibition of enzyme action.
4. Gene transfer methods –transformation, conjugation, transduction. Plasmids, transposons, Restriction and modification of DNA, Recombinant DNA.

MB2C04 (P) Microbiology Practical II
1. Preparation buffers.
2. Protein Estimation using Lowry’s method
3. Folin - Ciocalteau estimation of unknown protein using Std. graph
4. Carbohydrate estimation
5. Estimation of ascorbic acid in plant matter
6. Paper chromatography
7. TLC
8. Column separation of plant pigments
10. Extraction and estimation of DNA.
11. Electrophoresis.
13. Separation of plant pigments

SEMESTER III

MB3C05. APPLIED MICROBIOLOGY
2. Soil Microbiology: Microflora of soil, sources of soil organisms, Rhizosphere and rhizosphere effect, Interaction among soil microorganisms-positive, neutral,
negative associations, Role of microorganisms in biogeochemical cycles-Carbon and nitrogen. Nitrogen fixation.


6. Industrial Microbiology: Advantages of microbial process over chemical process, Fermentor—basic functions of a fermentor, structure and working. Batch culture, continuous culture, fed-batch culture. Production of penicillin, citric acid, vitamin B-12, alcohol, and bakers yeast, SCP, Down stream process.

MB3C06 (P). Microbiology Practical III

1. Examination of microflora of soil
2. Determination of BOD of water
3. Air sampling
4. Aerobic mesophilic count of fish samples and milk
5. Methylene blue reductase test
6. Isolation of rhizobium
7. Pellicle formation
8. Cell disruption techniques
9. Isoelectric focusing
10. Salting out
11. Bioassay
12. Demonstration of antibiosis

SEMESTER IV

MB4C07. MEDICAL MICROBIOLOGY AND IMMUNOLOGY

1. Types of infection, Source of infection, Modes of transmission. Bacterial diseases caused by—Staphylococcus aureus, Mycobacterium tuberculosis, Clostridium tetani, Clostridium botulinum, Vibrio cholerae, Salmonella typhi.
3. Types of immunity—in innate and acquired. Hematopoiesis, Cells and organs of immune system, humoral and cell mediated immunity.

5. Hypersensitivity and its types, autoimmune diseases—different types and its
mechanisms.

**MB4C08 (P). Microbiology Practical IV**

1. Differential count of leukocytes.
2. Lymphocyte isolation.
4. WIDAL agglutination test.
5. RPR test.
6. AFB staining.
8. Antibiotic sensitivity test.

**References:**

1. Agricultural Micobiology-Rangaswamy
2. Brock biology of Microorganisms-Madigam
3. Environmental Microbiology- Joseph. C. Daniel
7. General Microbiology –Schlegel
8. General Microbiology-Pelczar
9. General Microbiology-Powar & Daginawala.
10. General Microbiology-Stanier, Ingraham
12. Fundamentals of Microbiology-Martin Frobisher
15. Immunology-Janeway.
16. Immunology-Kuby.
17. Immunology-Roitt.
18. Industrial Microbiology –A. H. Patel
19. Industrial microbiology –Casida
20. Industrial Microbiology-Prescott & Dunn.
22. Introductory Mycology-Alexopoulos.
23. Medical Microbiology-Brooks, Butal, Slack.
26. Microbiology- Jaquilini Black
27. Microbiology-Perry, Staley.
28. Microbiology-Prescint
30. Soil Microbiology-Mark Coyne.
31. Text Book of Microbiology –Alcamo