

Annexure – 10

PERIYAR UNIVERISTY

SALEM – 11



PERIYAR INSTITUTE OF DISTANCE EDUCATION (PRIDE)

SYLLABUS

NON-SEMESTER PATTERN

B.Sc., Microbiology

(Candidates admitted from 2007-2008)

PERIYAR INSTITUTE OF DISTANCE EDUCATION

SALEM – 11

Non-Semester Pattern

B.Sc., MICROBIOLOGY

(Candidates admitted from 2007-2008)

REGULATIONS

1. Condition for Admission

A candidate who has passed Higher Secondary examination in any one of the **biological sciences (Academic / Vocational stream)** under higher secondary board of examination, Tamil Nadu or as per norms set by the Government of Tamil Nadu or an examination accepted as Equivalent thereto by the Syndicate subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the B.Sc., Microbiology degree examination of this University after a course of study of three academic years.

2. Duration of the Course

The course for the degree of Bachelor of Microbiology shall consist of three academic years.

3. Course of Study

The course of study shall comprise instruction in the following subjects according to the syllabus and books prescribed from time to time.

I – Year

Part I	-	Language 1
Part II	-	English 1

Main Paper 1 - Fundamentals of Microbiology

Allied Paper 1 - Biochemistry

Main Practical I

Allied Practical I

II - Year

Part I - Language 2

Part II - English 2

Main Paper 2 - Microbial Genetics & Immunology

Allied Paper 2 - Biostatistics and Computer in Biology

Main Practical II

Allied Practical II

III - Year

Main Paper 3 - Medical Microbiology

Main Paper 4 - Food and Industrial Microbiology

Main Paper 5 - Soil and Environmental Microbiology

Main Paper 6 - Microbial Biotechnology

Main Practical III

Main Practical IV

4. Examinations

The theory examination shall be three hours duration to each paper at the end of the each year. The candidate failing in any subject(s) will be permitted to appear for each failed subject(s) in the subsequent examinations. The practical examinations for UG course should be conducted at the end of the year.

5. Scheme of Examinations

S. No.	Paper	Title of the Paper	Exam Duration	Max. Marks
I Year				
1	Part I	Language 1	3 hrs	100
2	Part II	English 1	3 hrs	100
3	Main Paper 1	Fundamentals of Microbiology	3 hrs	100
4	Allied Paper 1	Biochemistry	3 hrs	100
		Main Practical - I	3 hrs	100
		Allied Practical - I	3 hrs	100
II Year				
5	Part I	Language 2	3 hrs	100
6	Part II	English 2	3 hrs	100
7	Main paper 2	Microbial Genetics & Immunology	3 hrs	100
8	Allied Paper 2	Biostatistics and Computer in Biology	3 hrs	100
		Main Practical - II	3 hrs	100
		Allied Practical - II	3 hrs	100
III Year				
9	Main Paper 3	Medical Microbiology	3 hrs	100
10	Main Paper 4	Food and Industrial Microbiology	3 hrs	100
11	Main Paper 5	Soil and Environmental Microbiology	3 hrs	100
12	Main paper 6	Microbial Biotechnology	3 hrs	100
		Main practical - III	3 hrs	100
		Main Practical - IV	3 hrs	100
Total				1800

6. Question paper model for theory and practical		
(Major Theory Paper)		
Time 3 Hours		Max. Marks : 100
Part – A	10 x 2 = 20 Answer all questions (Two questions from each unit)	
Part – B	5 x 4 = 20 Answer all questions (One question from each unit with internal choice)	
Part – C	5 x 12 = 60 Answer all questions (One question from each unit with internal choice)	
QUESTION APPER PATTERN		
(Allied Theory Paper)		
Time 3 Hours		Max. Marks : 100
Part – A	10 x 2 = 20 Answer all questions (Two questions from each unit)	
Part – B	5 x 4 = 20 Answer all questions (One question from each unit with internal choice)	
Part – C	5 x 12 = 60 Answer all questions (One question from each unit with internal choice)	
QUESTION MODEL FOR MAIN PRACTICAL		
Time 3 Hours		Max. Marks : 100
<ul style="list-style-type: none"> • 3 Major questions, each carry 20 marks • Spotters • Record 		(3 x 20 = 60) (4 x 05 = 20) (20 Marks)
QUESTION MODEL FOR ALLIED PRACTICAL – I & II		
Time 3 Hours		Max. Marks : 100
<ul style="list-style-type: none"> • 2 Major questions, each carry 40 marks • Record 		(2 x 40 = 80) (20 Marks)

7. Passing Maximum

The candidate shall be declared to have passed the examination if the candidate secure not less than 40 marks in the University examination in each theory paper without practical and 30 marks in the theory paper with practical.

For the Practical paper, a minimum of 40 marks out of 100 marks in the University examination and the record notebook taken together is required to pass the examination. In the case of practical paper with 25 as maximum marks a minimum of 10 marks in the University practical examination and the record notebook taken together is required to pass the examination there is no passing minimum for the record notebook. However submission of a record notebook is a must.

8. Classification or successful Candidates

Candidates who secure not less than **60%** of the aggregate marks in the whole examination shall be declared to have passed the examination in **First Class**.

All other successful candidates shall be declared to have passed in the **Second Class**.

Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed the examination in **First Class with Distinction** provided they pass all the examinations prescribed of the course at the first appearance.

Candidates who pass all the examinations prescribed for the course in the first instance and within a period of three academic years from the year of admission to the course only are eligible for **University Ranking**.

9. Maximum duration for the completion of the UG programme

The maximum duration for completion of the UG programme shall not exceed six years.

10. Commencement of the Regulation

These regulations shall take effect from the academic year 2007-08, i.e., for students who are to be admitted to the first year of the course during the academic year 2007-08 and thereafter.

MAIN PAPER I – FUNDAMENTALS OF MICROBIOLOGY

(End of the First Year)

Unit – I – Definition and scope of microbiology – History of microbiology – Spontaneous generation, Germ theory of fermentation – Antiseptic surgery and surgical infection – Germ theory of disease. Diversity of microbial world – Principles of classification – Three Kingdom and Five Kingdom approach – Classification of bacteria, fungi and viruses.

Unit – II – Microscopic Techniques Light microscopes – Simple and compound microscopes – Dark field Microscopes – Phase contrast microscope – Electron microscopes – Transmission and Scanning electron Microscope. Stains and Staining techniques – Simple, Gram's, Acid fast, Capsular, Endospore and Granular staining.

Unit – III – Cultivation techniques – Nutritional requirements – components and preparation of media – Inoculation and transfer techniques – Pure culture techniques – Preservation of cultures, Bacterial growth curve – Determination of bacterial growth – Factors affecting growth.

Unit –IV – Metabolism – ATP and its production – Carbohydrates – metals – Biosynthetic (Anabolic) Pathway – Photosynthesis – light reaction and dark reaction – gluconeogenesis – Catabolic pathways – glycolysis – pathway – TCA cycle and electron transport systems – Fermentation.

Unit – V – Control of microorganisms – Physical methods – Sterilization – Radiation – Filtration – Chemical Methods of sterilization. Antimicrobial chemotherapy – principles of chemotherapy – Antimicrobial drugs – Mode of action – Antimicrobial resistance – Antibiotic sensitivity test.

Text Books

1. Dubey RC & Maheswari DK (2005). A text book of Microbiology, Revised Multicolour Edition, Published by S. Chand & Company Limited, New Delhi Rs.415/-.
2. Purohit SS (2005). Microbiology – Fundamentals and Applications. Reprinted & Published by Student Edition, Behind Nasrani Cinema, Chopasani Road, Jodhpur, Rs.330/-
3. Pelczar TR, Chan ECS & Kreig NR (2006) Microbiology. 5th Edition, Tata McGraw – Hill, New Delhi. Rs.395/-.
4. Powar CB & Daginawala HF (2005). General Microbiology – Volume I & II. 8th Edition, Himalaya Publishing House, Mumbai.
5. Hans G Schlegel (2003). General Microbiology. Low Price 7th Edition, Cambridge University Press Rs.250/-
6. Meenakumari S (2006) Microbiology Physiology. 1st Edition, MJP Publishers, A unit of Tamil Nadu Book House, Chennai Rs.220/-.

Reference Book

1. Prescott M (2005) Microbiology. 6th Edition, Tata McGraw – Hill, New Delhi Rs. 1729/-.
2. Albert G Moat & John W Foster (2004). Microbial Physiology. 4th Edition, John Wiley & Sons, New York.
3. Robert F Boyd (1984). General Microbiology. Times Mirror / Mosby College Publishers.

MAIN PAPER II – MICROBIAL GENETICS AND IMMUNOLOGY

(End of the Second Year)

Unit – I – Nucleic acids (DNA & RNA) – structure, chemical composition and types – Evidence to prove DNA & RNA as genetic materials. Replication of DNA – mechanism – Enzymology of DNA replication – Types and models of replication.

Unit – II – Genetic code – Gene expression – Transcription – Translation. Gene regulation in bacteria – lac and trp operons. Gene transfer mechanism – Transformation, conjugation and transduction. Mutation – types – mutagens – detection of mutation. DNA repair – mechanism and types.

Unit – III – History of immunology – Immunity – Innate immunity and acquired immunity – Active and passive immunity – Humoral and cell mediated immunity. Organs and cells of the immune system. Antigens – types and properties. Immunoglobulin – structure, function and classes of Immunoglobulins. Monoclonal antibodies – production and applications.

Unit – IV – Antigen and antibody reactions – Agglutination, precipitation, complement fixation, Immunofluorescence, ELISA, and RIA. Complement activation – classical and alternative pathways. Hypersensitivity reactions – Type I, II, III and IV, Vaccines – types – Immunization schedule.

Unit V – Transplantation immunology – Mechanism of graft rejection, Clinical manifestation, HLA tissue typing and immunosuppressive therapy. Auto immune diseases – Organ specific and systemic autoimmune diseases – proposed mechanism – treatment. Introduction to tumor immunology – tumor antigens, tumor evasion of the immune system Immunohaematology – Major and minor blood groups – ABO & Rh incompatibility.

Text Books

1. David Frifielder (2005). Molecular Biology. 2nd Edition. Narosa Publishers, New Delhi Rs.465/-
2. Robert H Tamarin (2004). Principles of Genetics. 7th Edition. Tata McGraw – Hill Publishing House, New Delhi. Rs.325/-.
3. Benjamin Lewin (2004). Genes VIII. Pearson Prentice Hall, USA. Rs. 1494/-
4. Peter J Russel (2002). Genetics. Benjamin Cummings.
5. Richard A Goldsby, Thomas J. Kindt, Barbara A Osborne & Janis Kuby (2004). Immunology. 5th Edition, W.H. Freeman and Company, New York. Rs.3511/-.
6. Ivan Roitt, Jonathan Brostolf & David Male (2004). Immunology, 6th Edition, reprinted, Mosby Publications, Edinburgh.
7. Tizard K (1983). Immunology – An introduction. Published by Saunders College, Philadelphia Rs.3102.

MAIN PAPER III – MEDICAL MICROBIOLOGY

(End of the Third Year)

Unit – I – Collection and transport of clinical specimens for microbiological examinations. Virulence factors of bacteria causing human infections - Normal flora of human body.

Unit – II – Bacteriology – Morphology, Culture, biochemical, pathogenicity, Lab diagnosis and prevention of bacterial diseases – *Staphylococcus aureus*, *Streptococcus pyogenes*, *Neisseriae*, *Mycobacterium tuberculosis*, *Corynebacterium diphtheriae* - *Salmonella typhi*, *Vibrio cholerae*, *Escherichia coli* – Spirocheates.

Unit – III – Mycology – Superficial Mycosis – Pityriasis versicolor, cutaneous mycosis – dermatophytosis, subcutaneous mycosis – sporotrichosis, systemic mycosis – Histoplasmosis, opportunistic mycosis. Candidosis, Cryptococcosis.

Unit – IV - Parasitology – *Entamoeba histolytica*, *Giardia intestinalis*, *Trichomonas vaginalis*, *Leishmania donovani*, *Plasmodium vivax*, *Toxoplasma gondii*, *Taenia solium*, *Ancylostoma duodenale*, *Ascaris lumbricoides* and *Wuchereria bancrofti*.

Unit - V – Medical virology – DNA viruses – Pox, Herpes, Hepatitis Viruses – RNA viruses – Picorna, Arbo viruses – Rhabdo, HIV and oncogenic viruses.

Text Books

1. Satish Gupte (2006). The Short Text books of Medical Microbiology. 9th Edition, Jaype Brothers, Medical Publishers (P) Ltd., New Delhi. Rs.295/-.
2. Ananthanarayan R & CK Jayaram Paniker (2005). Text Book of Microbiology. 7th Edition, Orient Longman Private Limited. Rs.395/-.

3. Rajesh Bhatia & Rattan Lal Ichhpujani (2004) Essentials of Medical Microbiology. 3rd Edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi. Rs.425/-.
4. Subhash Chandra Parija (2004). Text book of Medical Parasitology – Protozoology and Helminthology. 2nd Edition, Published by All India Publishers & Distributors, Medical Books Publishers, New Delhi. Rs.299/-.

Reference Book

1. Baron EJ, Peterson LR and Finegold SM (1994). Bailey and Scott's – Diagnostic Microbiology. 9th Edition, Mosby Publications.
2. Topley & Wilsons (1995). Principles of Bacteriology, Virology and Immunology, Edward Arnold, London.
3. Morag C & MC Timbury (1994). Medical virology. 10th Edition, Churchill Livingstone, London.
4. Patric R Murray (1990). Medical Microbiology. Mosby Publications.

MAIN PAPER IV – FOOD & INDUSTRIAL MICROBIOLOGY

(End of the Third Year)

Unit – I – Microorganisms in food – bacteria, yeast & mold. Factors affecting microbial growth – extrinsic & intrinsic. Food preservation – Principles, Asepsis (anaerobic condition, high temperature, low temperature & drying), Food additives, Canning.

Unit – II – Contamination & spoilage – cereals, vegetables & fruits, Meat & meat products, milk & milk products, fish & sea foods, Egg & Poultry products. Spoilage of canned foods. Detection of spoilage & Characterization.

Unit – III – Food borne disease – Bacterial (*Brucella*, *Bacillus*, *Clostridium*, *Escherichia*, *Salmonella*, *Staphylococcus*, *Vibrio*) and Non bacterial (fungi). Fermented foods – Dairy products (Cheese, Bread, butter) Vegetable (Sauerkraut) Oriental fermented foods (Soy Sauce) Bioconversion – Vinegar, mushroom cultivation, single cell protein.

Unit – IV – Isolation, screening and preservation of industrially important microorganisms – strain development, development of inoculums and media for industrial fermentation and sterilization. Fermentation types and cultures – Down stream processing, Fermentation systems and control.

Unit – V – Microbial production of wine, organic acids – citric acid, Antibiotics – penicillin, vitamin – B12, Enzyme - α amylase, Amino acids – Glutamic acid, Biotransformations – Steroids and Non steroid compounds.

Text Books

1. Adams MR & MO Moss (2005). Food Microbiology. 1st Edition. Reprinted, Published by New Age International (P) Limited. Publishers, New Delhi Rs. 195/-.
2. James M Jay (2004). Modern Food Microbiology. 4th Edition, CBS Publishers & Distributors, New Delhi Rs.260/-
3. Agarwal AK & Pradeep Parihar (2006). Industrial Microbiology. Published by Student Edition, Behind Nasrani Cinema, Chopasani Road, Jodhpur. Rs.330/-.
4. Patel AH (2005). Industrial Microbiology. Published by Macmillan India Ltd., New Delhi. Rs.246/-.
5. Purohit SS, AK Saluja, HN Kakrani (2004). Pharmaceutical Biotechnology. 1st Edition, Agrobios (India) Rs.990/-.

MAIN PAPER V – SOIL AND ENVIRONMENTAL MICROBIOLOGY

(End of the Third Year)

Unit – I – Introduction to soil microbiology – Types and significance of soil microbes – Bacteria, fungi, actinomycetes, algae, protozoa, nematodes and viruses. Factors affecting microbial population.

Unit – II – Biochemical cycle – carbon, phosphorus, nitrogen – Biological nitrogen fixation. Biofertilizer – *Rhizobium* and *Azotobacter*, Cyanobacteria – Mass multiplication.

Unit – III – Microbial interaction between microbes – neutralism, comensalism, synergism, mutualism, ammensalism, competition, parasitism and predation. Interaction of microbes with plants – Rhizosphere.

Unit – IV – Conventional and molecular methods of studying microbial diversity Microbiology of air and water – Aeromicrobial pathways – Enumeration of bacteria from air – Air sampling devices – Air sanitation. Potability of water quality – Indicator organisms – Water purification – Waterborne and their control measures. Positive and negative roles of microbes in environment.

Unit – V – Microbiology of sewage – chemical and biochemical characters of sewage – BOD, COD- Sewage treatment – physical, chemical and biological treatment.

Text Books

1. Subba Rao NS (2004). Soil Microbiology. 4th Edition, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. Rs.295/-.
2. Subba Rao NS (1995). Biofertilizers in Agriculture and Forestry. 3rd Edition, Oxford and IBH Pub. Co. Pvt. Ltd., New Delhi.
3. Robert L Tate (1995). Soil Microbiology. 1st Edition, John Wiley & Sons, Inc. New York.

4. Singh DP & SK Dwivedi (2005). Environmental Microbiology and Biotechnology. 1st Edition, New Age International (P) Ltd., Publishers, New Delhi.
5. Vijaya Ramesh K (2004). Environmental Microbiology. 1st Edition, MJP Publishers (A Unit of Tamil Nadu Book House) Chennai, Price Rs.160/-.
6. Joseph C Daniel (1999) Environment Aspects of Microbiology. 1st Edition, Bright sun Publications, Chennai.

MAIN PAPER VI – MICROBIAL BIOTECHNOLOGY

(End of the Third Year)

Unit – I – Biotechnology – Definition – concepts – history and achievements – Introduction to gene manipulation – plasmids – types of plasmids, episomes – plasmid banks – Phasmids, phagemids – cosmids – transposons – Yeast vectors – Properties and general characterization.

Unit – II – Enzymes – restriction endo nucleases – nomenclature, classification and application – nucleases, methylases, ligases – Definition of a gene, structures, cloning techniques – genomic library – cDNA expression systems.

Unit – III – Nucleic acid and protein hybridization techniques – Southern – northern and Western blottings – PCR – DNA sequencing.

Unit – IV – Principles and application of genetic recombinant technology and strain improvement (Mutational, rDNA). Production of biotechnological products – SCP (algae, yeast, mushroom). Biofertilizer (BGA, VAM) Biopesticides – *Bacillus thuringiensis* – Fuel – ethanol – Microbial algal technology.

Unit – V – Microbial synthesis of commercial production – pharmaceutical products – Interferon – Growth hormone and antibodies – Gene therapy methods.

References

1. Mitra (2005) Genetic Engineering, Published by Macmillan India Ltd. Chennai.
2. Jogdand SN (2005) Gene Biotechnology, Himalaya Publishing House. Mumbai.
3. Satyanarayana U (2005) Biotechnology 1st Edition Books and Allied Publication Pvt. Ltd. Kolkata.

4. Singh BD (2005) Biotechnology 2nd revised and enlarged Edition Kalyane Publishers, Chennai.
5. Kumarasan V (2001) Biotechnology, Published by Saras Publication, Nagercoil, Tamil Nadu.
6. Dubey RC (2005) A Text book of biotechnology. Multicolor illustrative edition. S. Chand Company Ltd.
7. S.S. Purohit (2005) Biotechnology. Fundamental and applications 3rd Edition, Published by student edition. Behind Nasrani Cinema, Chopasani Road, Jodhpur.

ALLIED PAPER I – BIOCHEMISTRY

(End of the First Year)

Unit – I – Carbohydrates – definition classification. Monosaccharides structure, properties and biological significance, disaccharides, Polysaccharides – types and biological importance carbohydrate Metabolism - Glycolysis, TCA cycle, HMP shunt, Glycogenesis and Glycogenolysis.

Unit – II - Amino acids classification, essential and non – essential amino acids, structure and properties. Proteins – definition, classification and functions – structural levels of organization denaturation and renaturation. Protein metabolism - Deamination, transamination and decarboxylation of aminoacids. Urea cycle.

Unit – III – Enzymes – definition, classification with example active site, lock and key model, induced fit hypothesis, enzyme units – kinetics – factors affecting enzymes activity, MM equation, LB Plot – Enzyme inhibition. Hormones – Definition, Classification of hormones.

Unit – IV – Lipids classifications of lipids physical and chemical properties, saturated and unsaturated fatty acids. Structure of cell membrane and transpose. Lipid metabolism. β -oxidation, biosynthesis of saturated fatty acid.

Unit – V - Vitamins, classification, occurrence, deficiency symptoms, biochemical functions of fat soluble and water soluble vitamins. pH – definition and determination. Buffers – definition important buffers in blood.

Text Books

1. Practical Biochemistry by Keith Wilson and Jon Walker, Cambridge University Press.
2. Murray RK, DK Granner, PA Mayes and VW Rodwell (1999). Harper's Biochemistry. 24th Edition, Large Medical Publication.
3. Jain JL (2003). Fundamentals of Biochemistry. S. Chand and Company Ltd., New Delhi.
4. Deb AC (2004) Concepts of Biochemistry, (Theory and Practical) Books and Allied (P) Ltd., Kolkata. Price Rs. 235/-
5. Satyanarayana U (2005). Essentials of Biochemistry, Books and Allied (P) Ltd., Kolkata. Price Rs.245/-.
6. Veerakumari L (2004). Biochemistry. MJP Pubilshers, A Unit of Tamil Nadu Book House, Chennai. Price Rs.180/-.

ALLIED PAPER II – BIOSTATISTICS & COMPUTER IN BIOLOGY

(End of the Second Year)

Unit – I – Biostatistics definition – types of data sources of data in life science – Limitations and uses of statistics – collection of data – Primary data – Secondary data – classification of data – Tabulation and presentation of data.

Unit – II – Measures of central tendency – Mean, median. Mode – measures of dispersion – standard deviation – correlation – Regression, Sampling methods – standard error – chi – square test.

Unit – III – Introduction to computers – classification – generations Low, medium and high level languages – software and hardware – Input / output and storage devices. Fortran programming – basics – representation of integer and real constants – variable – expression – assignment – statement – I/O statements. Control statements – loops, subscripted variables and files.

Unit – IV – Introduction to data processing – records, fields, data collection preparation, verification, editing and checking – backup and file recovery procedure – Sorting – searching and merging – Microsoft excel – data entry graphs – aggregate functions, formulas and functions. Different number systems and conversion.

Unit – V – Foxpro fundamental and programming. Introduction to Foxpro environment – data base creation and use of data insertion, deletion and modification – Sorting and indexing – Managing multiple data base display of data – Foxpro programming. Memory variables data time, math functions – report generation.

REFERENCE

Biostatistics

1. Gurumani N (2005) An introduction to Biostatistics 2nd Revised Edition, MJP Publishers, Chennai.
2. Daniel WW (1987) Biostatistics, John Wiley and Sons New york
3. Sundar Rao PSS Richard J. An introduction of biostatistics – 3rd Edition Christian Medical College, Vellore.

COMPUTER APPLICATION IN BIOLOGY

1. Alexis Leon & Mathews Leon – Fundamentals of Computer Science and Communication Engineering, Vikas Publishing house Pvt. Ltd.
2. Rajaraman V. Computer Programming in Fortran 77. PHI Pvt. New Delhi.
3. Robert Granillo, Illustrated Foxpro 2.0, BPB Publications, New Delhi.

MAIN PRACTICAL I

(End of the First Year)

Max. Marks : 100

Exam Duration : 3 Hrs

1. Handling and maintenance of compound microscope
2. Cleaning of glasswares
3. Staining techniques – Simple, Gram's, Ziehl – Neelsen, Spore and Capsular staining methods.
4. Microscopic Examinations of
Algae – Oscillatoria
Fungi – Mucor spp., Aspergillus spp., Alternaria spp.
Protozoa – Entamoeba spp., Ascaris spp.
Bacteria – Staphylococcus spp. Escherichia coli
5. Motility determination – Hanging drop method
6. Media Preparation
Liquid Media - Peptone water, Nutrient broth
Solid Media – Nutrient agar (Agar slant, Agar plate)
Differential medium – Mac Conkey agar
7. Demonstration of pigment production on Nutrient agar medium
(Staphylococcus aureus, Pseudomonas aeruginosa & Serratia spp.)
8. Pure culture techniques – Pour plate, Streak plate
9. Antibiotic sensitivity test – Kirby – bauer disc diffusion method

MAIN PRACTICAL II
(End of the Second Year)

Max. Marks : 100

Exam Duration : 3 Hrs

1. Isolation of Genomic DNA (Crude method)
2. Isolation of Auxotrophic mutant by replica plate method
3. Isolation of drug resistant mutants by gradient plate method
4. Blood grouping
5. RPR card test / VDRL test
6. Ouchterlony's double immunodiffusion test
7. Widal test
8. ASO test
9. RA test
10. CRP test
11. ELISA – HBs Ag / HIV & 2 test (Demonstration Only)

MAIN PRACTICAL III
(End of the Third Year)

Max. Marks : 100

Exam. Duration : 3 Hours

1. Staining techniques – Gram's, Ziehl – Neelsen, Capsular, Spore staining.
2. Biochemical identification of bacterial pathogens.

Following tests to be performed : Carbohydrate fermentation, TSI, Indole, MR, VP, Citrate, Urease, Catalase & Oxidase test for

i) Staphylococcus aureus *iv) Salmonella typhi*

ii) Escherichia coli *v) Proteus vulgaris*

iii) Klebsiella pneumoniae *vi) Pseudomonas aeruginosa*

3. Normal saline / Lugol's iodine preparation for parasitic Ova / cyst examination.
4. Stool examination by Zinc – sulphate floatation method.
5. Examination of fungi by KOH and Lactophenol cotton blue stain – Dermatophytes and other fungi.
6. Examination of *Candida albicans* by gram's stain, Germ tube and Sugar assimilation test.
7. Examination of *Cryptococcus neoformans* by Negative staining.
8. Isolation of *Lactobacilli* and *Streptococci* from curd.
9. Methylene blue reductase test.
10. AST – Kirby – Bauer disc diffusion method.

MAIN PRACTICAL IV

(End of the Third Year)

1. Examination of Plant Disease
 - Blast disease in paddy
 - Blight of rice
 - Citrus canker
 - Tikka leaf spot
2. Isolation of Nitrogen fixing bacteria from root nodules of legumes
3. Isolation and enumeration of micro – organisms from soil by the serial dilution agar plating method.
4. Determination of total bacterial population by standard plate count technique
5. Bacteriological examination of water by multiple tube fermentation test.
 - Presumptive coliforms test
 - Confirmed test
 - Completed test
6. Enumeration of microbes from air by settle plate method.
7. Isolation of bacteriophage from Sewage
8. Paper and thin layer chromatography
9. Cultivation of oyster mushroom (*Pleurotus* spp.) (Demonstration)
10. Batch Fermentation using Erlenmeyer flask (Demonstration)

PRACTICAL REFERENCES
(For Main Practical I, II, III & IV)

1. Aneja KR (2005). Experiments in Microbiology, Plant pathology and Biotechnology. 4th Edition, New Age International Publishers, Chennai. Rs.225/-
2. James G Cappuccino & Natalie Sherman (2004) Microbiology : A Laboratory manual. 6th Edition, Published by Pearson Education.
3. Dubey RC and Maheswari DK (2004). Practical Microbiology 1st Edition, S. Chand & Company Ltd., New Delhi.
4. Myer's and Koshi's Manual of Diagnostic Procedures in Medical Microbiology and Immunology / Serology (2001). Published by Department of Clinical Microbiology, CMC and Hospital, Vellore, Tamil Nadu.
5. Sundararaj T. Microbiology – Laboratory Manual. Revised and Published by Aswathy Sundararaj, No.5. 1st Cross Street, Thirumalai Nagar, Perungudi, Chennai.
6. Kannan N (1996) Laboratory Manual in General Microbiology. 1st Edition, Palani Paramount Publications, Palani, Tamilnadu.
7. The HiMedia Manual (2003). For Microbiology and Cell Culture Laboratory Practice. Published by HiMedia Laboratories Pvt. Ltd., Mumbai.

ALLIED PRACTICAL – I BIOCHEMISTRY

(End of the First Year)

1. Qualitative analysis
 - i) Analysis of carbohydrates – Glucose, Fructose, Ribose, Sucrose, Lactose and Starch
 - ii) Analysis of Amino acids – Tyrosine, Tryptophan, Arginine, Methionine, Cystine & Phenylalanine.

2. Estimation
 - i) Estimation of Glycine by formal titration method.
 - ii) Estimation of Ascorbic acid by 2,6 dichlorophenol indophenol dye
 - iii) Determination of acid number
 - iv) Determination of saponification value
 - v) Estimation of urea by DAM colorimetric method.
 - vi) Estimation of glucose by Ortho – Toluidine method.

3. Techniques
 - i) Separation of amino acid and sugars by Ascending Paper chromatography.
 - ii) Separation of Lipid by TLC.

REFERENCES

1. An introduction to practical biochemistry by David T Plummer.
2. Laboratory Manual in Biochemistry by Pattabiraman and Acharya.
3. Practical Biochemistry by Jayaraman.

ALLIED PRACTICAL – II
BIostatistics & Computer in Biology
(FORTRAN AND FOXPRO)
(End of the Second Year)

1. Finding, Mean, Standard deviation and mean deviation for a given problem.
2. Calculating the correlation co-efficient
3. finding regression co-efficients and regression lines.
4. Calculating chi-square test for a given problem
5. Sorting
6. Indexing
7. Multiple database
8. Reports generation