

KAKATIYA UNIVERSITY M.Sc. Microbiology Syllabus For the candidates admitted from the academic year 2021-2022 For University College and affiliated colleges

S. No	Paper Code	Title of Paper	Instruction Hours/week	No. of Credits	Marks					
					Internal Marks	External Marks	Total			
Semester I										
1	MBT 101	General Microbiology	4	4	20	80	100			
2	MBT 102	Virology	4	4	20	80	100			
3	MBT 103	Biological Chemistry	4	4	20	80	100			
4	MBT 104	Cell biology & Enzymology	4	4	20	80	100			
5	MBP 105	General microbiology & Virology	6	4	-	100	100			
6	MBP106	Biological chemistry & Cell Biology &	6	4	-	100	100			
	le e	Enzymology								
7	MBS 107	Seminar	1	1		-	25			
		Total		25			625			
Semester II										
1	MBT 201	Microbial Physiology & Metabolism	4	4	20	80	100			
2	MBT 202	Molecular Biology	4	4	20	80	100			
3	MBT 203	Advanced Immunology	4	4	20	80	100			
4	MBT 204	Biophysical Techniques & Instrumentation	4	4	20	80	100			
5	MBP 205	Microbial Physiology & Molecular Biology	6	4	-	100	100			
6	MBP 206	Adv. Immunol & Biophy. Tech. &	6	4	-	100	100			
	-	Instrumentation								
7	MBS 207	Seminar	1	1		-	25			
		Total		25			625			

that

20

C

Sam

FACULTY OF SCIENCE M.Sc. MICROBIOLOGY Semester-I Practical Syllabus Paper-I MBP- 105: GENERAL MICROBIOLOGY

Experiments

- 1. Preparation of culture media.
- 2. Micrometry-Calibration and measurement of microorganisms using ocular and stage micrometers and calculation of the mean and standard deviation.
- 3. Demonstration of bacterial motility by hanging drop technique
- 4. Gram staining
- 5. Endospore staining
- 6. Flagella staining
- 7. Capsule staining
- 8. Staining of PHB granules
- 9. Demonstration of mycorrhizal association.
- 10. Measurement of bacteria growth by turbidometric methods.
- 11. Cultivation of anaerobic bacteria:
 - i) Shake culture technique ii) Pyrogallic acid iii) Candle method iv) Liquid paraffin method v) Gaspak jar method
- 12. Identification of bacterial cultures by performing biochemical tests
 - a. Indole test
 - b. Methyl red test
 - c. VogesProskauer test
 - d. Citrate test
 - e. Oxidase test
 - f. Carbohydrate fermentation and Gas production
 - g. Catalase test
 - h. Gelatinase test
 - i. Caseinase test
 - j. Amylase test
 - k. H_2S production test
 - 1. Nitrate reduction test
 - m. Urease test

- 1. Fungi: Rhizopus, Mucor, Penicillium, Aspergillus, Alternaria, Curvularia,
- 2. Algae: Nostoc, Scytonema, Oscillatoria, Anabaena, Spirulina,
- 3. Protozoa: Trypanosoma, Giardia, Leishmania, Entamoeba histolytica, Plasmodium, (permanent slides),
- 4.Helmithes: Ascaris (round warm), Tape warm (Tenea solinum).

6 the

FACULTY OF SCIENCE M.Sc. MICROBIOLOGY Semester-I Practical Syllabus Paper-II MBP 105: VIROLOGY

Experiments

- 1) Isolation of phages from soil/sewage.
- 2) Cultivation and preservation of phages.
- 3) One step growth curve for determination of virus titer.
- 4) Cultivation of animal viruses in developing chick embryo (Amniotic, allontic, CAM).
- 5) Lysogeny-transduction.
- 6) Demonstration of cytopathological changes (slides/pictures).
- 7) Symptomatic observations of plant viral infections.
- 8) Estimation of chlorophyll content in healthy and viral infected leaves.
- 9) Estimation of protein content in healthy and viral infected leaves.
- 10) Haemagglutination inhibition.

- 1. Beijrinick.
- 2. W.M Stanely.
- 3. Tobacco mosaic virus (TMV).
- 4. Adenovirus.
- 5. T4 phage.
- 6. HIV.
- 7. SARS CoV.
- 8. Symptoms of plant viral diseases.
- 9. Symptomsof animal viral diseases.
- 10. Prions.
- 11. Density-gradient centrifugation.
- 12. Genome of Øx174.
- 13. Plates showing plaques.
- 14. Latex droplet method.
- 15. ELISA.
- 16. E. coli infected with T4 phage.

FACULTY OF SCIENCE M.Sc. MICROBIOLOGY Semester - I Practical Syllabus Paper - II MBP 106: BIOLOGICAL CHEMISTRY

Experiments

- 1. Quantitative estimation of glucose by Anthrone method
- 2. Quantitative estimation of reducing sugars by 3, 5, DNS method
- 3. Quantitative estimation of fructose
- 4. Quantitative estimation of proteins by Lowry's method
- 5. Quantitative estimation of Indole Acetic Acid
- 6. Quantitative estimation of Ascorbic acid
- 7. Quantitative estimation of Amino acid
- 8. Qualitative test of carbohydrates: Glucose, Xylose, Starch, Lactose, Maltose, Sucrose
- 9. Qualitative test of amino acids: Tryptophan, Tyrosine, Methionine, Arginine, Proline,
- 10. Qualitative test of proteins: Gelatin, Globulin, Albumin, Peptone, Casein
- 11. Determination of iodine number of fat
- 12. Qualitative test of lipids: Cholesterol

Spotters

35

- 1. Structure of monosaccharides
- 2. Structure of Oligosaccharides
- 3. Structure of Polysaccharides
- 4. Structure of Amino acids
- 5. Structure of Proteins
- 6. Structure of Phospholipids
- 7. Structure of Cholestrol
- 8. Structure of nucleotides
- 9. Structure of DNA
- 10. Structure of t-RNA
- 11. Structure of Cyanocobalamine (Vit B12)
- 12. Structure of Porphyrin

tha 12

FACULTY OF SCIENCE M.Sc. MICROBIOLOGY Semester – I Practical Syllabus Paper- IV MBP 106: CELL BIOLOGY AND ENZYMOLOGY

Experiments

- 1. Demonstration of mitotic cell division stages
- 2. Demonstration of meiotic cell division stages
- 3. Evaluation of kinetic constant of the purified enzyme.
- 4. Effect of PH on enzyme activity
- 5. Effect of temperature on enzyme activity
- 6. Effect of time on enzyme activity
- 7. Effect of enzyme concentration on enzyme activity
- 8. Effect of enzyme inhibitors on enzyme activity.
- 9. Immobilization of Enzymes
- 10. Enzyme purification
- 11. Estimation of arginase activity
- 12. Estimation of catalase activity.

- 1. Giant chromosomes
- 2. Polytene chromosome
- 3. Lampbrush chromosome
- 4. Cell cycle
- 5. Metaphase
- 6. Anaphase
- 7. Lock and key model
- 8. Allosteric inhibitors
- 9. Un- Competitive enzyme activity
- 10. Non-Competitive enzyme activity
- 11. Competitive enzyme activity
- 12. Lineweaver-Burk plots.



FACULTY OF SCIENCE M.Sc. MICROBIOLOGY

Semester – II

Practical Syllabus Paper – I

MBP 205: MICROBIAL PHYSIOLOGY & METABOLISM

Experiments

- 1. Growth of the bacteria at different P^{H} .
- 2. Effect of different temperatures on bacterial growth.
- 3. Effect of osmotic pressure.
- 4. Isolation of photosynthetic bacteria from sewage water.
- 5. Estimation & characterization of bacterial chlorophylls.
- 6. Enrichment cultivation of photosynthetic bacteria Winogradsky column.
- 7. Determination of Thermal death time.
- 8. Carbohydrate catabolism by microorganisms through oxidation and fermentation of glucose.
- 9. Estimation of ethanol in fermentation broth.
- 10. Estimation of lactic acid in fermentation broth.

- 1. Passive diffusion.
- 2. Facilitated diffusion.
- 3. PSI.
- 4. PSII.
- 5. Halobacterial photosynthesis.
- 6. Electron transport.
- 7. Biotransformation.
- 8. Bioluminescence.
- 9. Quorum sensing.
- 10. Phospholipids.
- 11. Steroids.
- 12. Ribonucleotide reductase.



18

FACULTY OF SCIENCE M.Sc. MICROBIOLOGY

Semester - II

Practical Syllabus Paper – II MBP 205: MOLECULAR BIOLOGY

Experiments

- 1. Estimation of DNA by DPA method.
- 2. Estimation of RNA by orcinol method
- 3. Isolation of DNA from sheep Liver / yeast/ E.coli
- 4. Determination of purity of DNA
- 5. Isolation of RNA from plant sample
- 6. Isolation of RNA from viral infected plant sample
- 7. Problems on DNA characteristics
- 8. Problems related to Transcription, Genetic code,
- 9. Problems related to Translation and Gene regulation.

- 1. ATPase
- 2. Semiconservative model of DNA replication
- 3. Rolling circle replication
- 4. Replication fork
- 5. Nucleosomes
- 6. DNA damages
- 7. Action of topoisomarases
- 8. Okazaki fragments
- 9. RNA splicing & spliceosome
- 10. Structure of lac operon
- 11. Structure of *Trp* operon
- 12. Structure of Ara operon
- 13. Structure of CAMP.
- 14. Structure of PPPPGTP.
- 15. Molecular Chaperons
- 16. Ribosomes.

21

FACULTY OF SCIENCE M.Sc. MICROBIOLOGY Semester – II Practical Syllabus Paper- III MBP 206: ADVANCED IMMUNOLOGY

Experiments

- 1. Typing of human blood groups. (Haemagglutination).
- 2. Differential staining of WBC by Leishman's stain.
- 3. Enumeration of RBC and WBC.
- 4. Estimation of hemoglobin count in blood.
- 5. Widal tests: i) Slide agglutination ii) Tube agglutination methods.
- 6. VDRL test (Venereal disease research laboratory).
- 7. Hepatitis-B Surface antigen test.
- 8. HCG test (Agglutination inhibition test).
- 9. ELISA test.
- 10. Detection of rheumatoid factor (RF factor).
- 11. ASO Test- Anti streptolysin 'O" test.
- 12. Immuno diffusion test: i) Single radial immuno diffusion ii) Double immuno diffusion.
- 13. Immunoblotting for detection of proteins by staining.
- 14. Immuno electrophoresis.
- 15. Isolation of lymphocytes.

- 1. Lymph node.
- 2. Spleen.
- 3. Thymus gland.
- 4. Structure of IgG, IgM, IgA, IgE.
- 5. Monoclonal antibodies.
- 6. ELISA plate.
- 7. Immuno precipitation.
- 8. Flow cytometry.
- 9. Immunofluoresecence.
- 10. RIA.
- 11. Hypersensitive reactions Type-I,II,II,IV
- 12. Systemic lupus erythematosus (SLE).
- 13. Myasthenia gravis disease.

24

FACULTY OF SCIENCE M.Sc. MICROBIOLOGY Semester –II Practical Syllabus Paper- IV MBP 206: BIOPHYSICAL TECHNIQUES & INSTRUMENTATION

Experiments

- 1. Determination of Pka value of amino acid
- 2. Determination of y max of a given solution
- 3. Separation of Carbohydrates by Paper Chromatography
- 4. Separation of Amino Acids by Paper Chromatography
- 5. Separation of Lipids by Thin Layer Chromatography
- 6. Demonstration of Column Chromatography
- 7. Verification of Lambert-Beers Law By UV-VIS Spectrophotometer
- 8. Separation of Proteins by Electrophoresis
- 9. Separation of DNA by Electrophoresis
- 10. Ultraviolet Spectroscopy of Proteins
- 11. Membrane separation-Dialysis.

- 1. Gas Liquid Chromatography
- 2. Gel filtration Chromatography
- 3. Column Chromatography
- 4. HPLC
- 5. Ion Exchange Chromatography
- 6. Affinity Chromatography
- 7. Electrophoretic Unit
- 8. Banding pattern of Proteins (Gel image)
- 9. Banding patterns of DNA (Gel image)
- 10. Southern blotting
- 11. Northern blotting
- 12. Western bolting.
- 13. Centrifuge.
- 14. U.V spectrophotometer.
- 15. Fluorescence spectrophotometer.
- 16. Raman spectroscopy.

Sim 27



KAKATIYA UNIVERSITY M.Sc. Microbiology Syllabus For the candidates admitted from the academic year 2021-2022 For University College and affiliated colleges

S. No	Paper Code	Title of Paper	Instruction Hours/week	No. of Credits	Marks								
					Internal Marks	External Marks	Total						
Semester III													
1	MBT 301	Microbial Genetics & Genetic Engineering	4	4	20	80	100						
2	MBT 302	Bioinformatics & Computational Methods	4	4	20	80	100						
3	MBT 303	Bioprocess Technology	4	4	20	80	100						
4	MBT 304	Agricultural Microbiology	4	4	20	80	100						
5	MBP 305	Micro. and Gen. Engi. & Bioin. and Comp. Meth.	6	4	-	100	100						
6	MBP 306	Bioprocess Technology & Agri. Microbiology	6	4	-	100	100						
7	MBS 307	Seminar/Tutorials	1	1		-	25						
		Total		25			625						
Semester IV													
1	MBT 401	Environmental Microbiology	4	4	20	80	100						
2	MBT 402	Medical Microbiology	4	4	20	80	100						
3	MBT 403	Microbial Technology	4	4	20	80	100						
4	MBT 404	Pharmaceutical Microbiology	4	4	20	80	100						
5	MBP 405	Environmental Microbiol. & Medical Microbiol.	6	4	-	100	100						
6	MBP 406	Microbial Technology & Pharmaceutical Micbio.	6	4	-	100	100						
7	MBS 407	Seminar/Tutorials	1	1		-	25						
		Total		25			625						

Recommended Books

- 1. Brown, T.A. 1999 Gene Cloning. 3rd edition. Chapman and Hall Publications, USA.
- 2. Burrel, M.M. 1993. Enzymes of Molecular Biology, Humana Press.
- 3. Glick, B.R. and Pasternak, J.J. 1998 Molecular Biotechnology Principles and Applications of Recombinant DNA, ASM Press, Washington D.C.
- 4. Lewin, B. 2008 Genes IX. Oxford University Press, Oxford.
- 5. Winnacker, E.L. 1987 From genes to Clones. VCH Publications, Germany.
- 6. Antony JF, Griffiths, Gilbert, W.M., Lewontin, R.C. and Miller, J.H. 2002 Modern Genetic Analysis,
- 7. Integrating Genes and Genomes, 2nd edition, WH Freeman and Company, New York.
- 8. Molecular Biology of cell. Albert et al., 4th Edition Garland Publishing Inc.
- 9. Maloy, S.R., Cronan, J.R. Freifelder, D. 1994 Microbial Genetics, Jones and Bartlett Publishers.
- 10. Gene, 4th edition, Benjamin/Cummings publishing company.
- 11. Freifelder, D. 1997 Essentials of Molecular Biology. Narosa Publishing House, New Delhi.
- 12. Twynan, R.M. 2003 Advanced Molecular Biology. Viva books Pvt. Ltd. New Delhi.

Semester- III Practical Paper – I

MBP 305: MICROBIAL GENETICS & GENETIC ENGINEERING

- 1. Isolation of auxotrophic mutants by Replica plate technique
- 2. Mutagenesis and UV survival curve
- 3. Isolation of petite mutants
- 4. Restriction analysis of DNA and agarose gel electrophoresis
- 5. Diauxic growth experiment
- 6. Preparation of competent cells
- 7. Transformation- selection of recombinants-Blue and white selection(X-gal method)
- 8. Amplification of DNA by PCR
- 9. Problems related to

(a) Mutation (b) Recombination(Conjugation, transformation, transduction), (c) Gene mapping (d) Restriction mapping (e) Primer design and PCR amplifications (f) DNA libraries.

- 1. Bacterial conjugation
- 2. Holiday model
- 3. Thymine dimers
- 4. Ames Test
- 5. Cassette mutagenesis
- 6. Sticky ends
- 7. pBR322
- 8. X-gal plate
- 9. Replica plating technique
- 10. PCR
- 11. rDNA production of human growth hormone
- 12. Viral vectors
- 13. Real-Time PCR
- 14. Liposomes
- 15. Restriction endonucleases
- 16. In vivo gene therapy

- 9. Jean-Michel claverie, Cedric Notredme Bioinformatics A Beginner's Guide, Wliiey Publication
- 10. Jonathan Pevsner. 2004 Bioinformatics and Functional Genomics
- 11. Stephen Misener and Stephen A. Krawetz. Bioinformatics methods and protocols
- 12. Wardlaw, AC 1985 Practical statistics for experimental Biologists.
- 13. Rastogi VB. Fundamentals of Biostatistics, Ane Books, New Delhi
- 14. Khan and Khanum Fundamentals of Biostatistics, Ukaaz Publications, Hyderabad

Semester- III Practical Paper – I

MBP 305 BIOINFORMATICS & COMPUTATIONAL METHODS

- 1. Aligning sequences using Clustal-X
- 2. Sequence data retrieval in FASTA format from NCBI database.
- 3. Similarity search in BLAST for protein or nucleotide sequence.
- 4. Prediction of secondary structure of protein
- 5. Viewing the Protein Data Box (PDB) files using Rasmol software.
- 6. Conversion of raw sequences into different sequence format by using Read Seq Tool.
- 7. Problems on mean, median, mode, standard deviation and standard error
- 8. Problems on probability distributions
- 9. Problems on Chi-square test
- 10. Problems on one way and two-way ANOVA and F-test analysis
- 11. Problems on Karl Pearson's Correlation coefficient and Rank Correlation coefficient
- 12. Problems on Regression analysis

- 1. Gene banks
- 2. Phylogenetic tree
- 3. DNA microarrays
- 4. Protein structure
- 5. Proteome analysis
- 6. K-mer frequency diagram
- 7. Clustal-x alignment map
- 8. Graphical presentation of Data
- 9. Histogram
- 10. Frequency polygon
- 11. Frequency curve
- 12. Pie chart
- 13. Cartogram
- 14. Scatter Diagram of correlation
- 15. Regression analysis

- 10. Prescott & Dunn, Industrial microbiology,
- 11. Prescott & Dunn's Fundamentals of Applied Microbiology (2nd edition)
- 12. Rao. D.J. 2005 Intriducion to Biochemical Engineering McGraw-Hill
- 13. Reed, G. Industrial Microbiology, CBS Publishers

Semester- III Practical Paper- II MBP 306: BIOPROCESS TECHNOLOGY

- 1. The use of Logarithms in microbial growth study and fermentation process.
- 2. Determination of the midpoint of the Logarithmic phase of microbial growth in fermentation process.
- 3. Harvesting the microbial cells and determination of the yield of fermentation products.
- 4. Manometric study in fermentation process.
- 5. Isolation and identification of secondary metabolites in the fermentation process.
- 6. Design and construction of microbial fermentor.
- 7. Screening of microorganisms through war cup method in strain improvement.
- 8. Production and estimation of Streptomycin.
- 9. Production and estimation of Lactic acid.
- 10. Production and estimation of Ethyl alcohol.
- 11. Production and estimation of Penicillin.
- 12. Production and estimation of Indole Acetic Acid (IAA).
- 13. Estimation of Cynacobalamine (Vitamin B12).

- 1. Design of fermenter
- 2. Seed Flask
- 3. Seed fermenter
- 4. Production fermenter
- 5. Air sparger
- 6. Foam breaker
- 7. Stirrer gland
- 8. Baffles
- 9. Impellers
- 10. Bread
- 11. Monometric fermenter
- 12. Strain improvement
- 13. Immobilized beads

Recommended Books

- 1. Agrio, G.N. Plant pathology
- 2. Alexander, M Soil Microbiology
- 3. Bilgrami,K.S. and H.C. Dube Modern Plant pathology
- 4. Biofertilizedrs by N.S. Subba Rao
- 5. Mehrotra, R.S. Plant Pathology
- 6. Microbial ecology: Principles, methods & applications & Biological nitrogen fixation.
- 7. R.S. Singh An introduction to principles of plant pathology
- 8. Rangaswami, G. and A. Mahadevan Diseases of crop plants
- 9. Rangaswamy, G and. Bhagyaraj D.J . Agricultural Microbiology
- 10. Singh,R.S. Plant diseases resistance
- 11. Rander Plank Plant disease resistance
- 12. Vidyasekaran Molecular plant pathology

Semester- III Practical Paper- II MBP 306: AGRICULTURAL MICROBIOLOGY

- 1. Isolation of phosphate solubilizing microorganisms
- 2. Estimation or organic matter in agricultural soils to assess the soil-fertility
- 3. Estimation of cell wall degrading enzymes: cellulases (exo-and endo-glucanases), polymethyl esterase, poly galacturunase, pectic lyase in host-pathogen interactions
- 4. Estimation of accumulated soil enzymes : catalase/peroxidase, phosphatase, urease,
- 5. Isolation and identification of cyanobacteria used as biofertilizers-Nostoc, Anabaena, Scytonema
- 6. Isolation of *Rhizobium* from root nodules
- 7. Classification and symptomology of plant diseases covered in theory (unit III)
- 8. Determination of Disease Tolerance Index (DTI) in crop plants
- 9. Enumeration of Rhizosphere microflora and comparison with normal soil microflora (Rhizosphere effect)
- 10. Enumeration of ammonifiers, nitrifiers and denitrifiers in soil samples
- 11. Assay of fungicides by humid chamber technique and calculation of LD50 value
- 12. Section cutting of infected plant parts.

- 1. Downy mildew of peas
- 2. Downy mildew of bajra
- 3. White rust of crucifers
- 4. Powdery mildew of cucurbits
- 5. Whip smut of sugarcane
- 6. Wilt of pigeon pea
- 7. Wilt of cotton
- 8. Root rot of cotton
- 9. Stem rot of rice
- 10. Brown spot diseases of rice
- 11. Blast diseases of rice
- 12. Bacterial blight of paddy
- 13. Angular leaf spot of cotton
- 14. Stalic rot of maize
- 15. Sesamum phylloidy
- 16. Yellow vein mosaic of bhendi

Recommended Books

- 1. Alexander M.
- 2. Atlas & Batra
- 3. Burns R.G & J.H.Slater
- 4. Gabriel Bitton
- 5. Gilbert S. Omen
- 6. Gray T.R.G.&S.T.Williams
- 7. Gregory P.H.
- 8. Lautit M.W&C.M.Eds.Keuin
- 9. Lynch J.M and N.J. Poole
- 10. Michael S.Switzenbaury(Ed)
- 11. Mishra R.R
- 12. Ralph Mitchell
- 13. Ratledge C.
- 14. Subba Rao N.S.

Soil Microbiology Microbial Ecology Experimental Microbial Ecology Wastewater Microbiology Environmental Biotechnology Soil Microorganisms The Microbiology of Atmosphere Microbial Ecology Proc. Microbial Ecology: A conceptual approach Anaerobic Treatment of Sewage Soil Microbiology Environmental Microbiology Biochemistry of Microbial degradation Soil Microbiology

Semester - IV Practical Paper- I

MBP 405: ENVIRONMENTAL MICROBIOLOGY

- 1. Determination of Biochemical Oxygen Demand (BOD) of sewage water
- 2. Determination of Chemical Oxygen Demand (COD) of industrial wastewater
- 3. Bacteriological examination of water using multiple tube fermentation test: presumptive test, confirmed test and completed coli form test.
- 4. Estimation of Gross primary productivity (GPP), Net Primary Productivity (NPP), and Respiratory Consumption (RC) to determine the autotrophic/heterotrophic status of aquatic bodies
- 5. Estimation of phosphates, sulphates and nitrates (eutrophication factors) in polluted and unpolluted water bodies
- 6. Disinfection of potable water by chlorine (bleaching power method) determination of chlorine demand and residual chlorine
- 7. Biomonitoring of water quality by algal indices: Nyagaard's index, Palmer's index, Kothe's index, Margalef's index.
- 8. Bioremediation of heavy metals : chromium/cadmium/lead
- 9. Phytoremediation of toxic metals by cyanobacterial species
- 10. Assay of lignolytic enzymes (lignin peroxidase and laccase) by white rot fungi
- 11. Decolourization of dye effluents by immobilized bacteria and fungi
- 12. Biodesulphurization of coal by Thiobacillus ferrooxidans
- 13. Air sampling by Petri plate method/gravity slide method/tilak air sampler
- 14. Estimation of xylanase enzyme: Role in biopulping

- 1. Multiple tube fermenter

- Winogradsky column
 Aeroflora agar plate
 Dye effluent treatment
- 5. Decomposed litter Humus
- 6. Bioleaching rayon pulp
- 7. Desulphurised coal (Clean coal)
- 8. Drug sensitivity
- 9. Anderson air samplers
- 10. Water cycle
- 11. Burkard trap
- 12. Air quality index (AQI)
- 13. AAFEB
- 14. Impingers
- 15. HEPA filter

- Molecular Microbiology: Diagnostic Principles and Practice. 3rd Edition. David H. Persing, et al. Practices of Sequencing Quality Assurance, Chapter53. American Society of Microbiology Press. 2016
- 8. Jayaram Paniker. Text book of Medical parasitology (8th edition).
- 9. Panjarathinam R Orient Longman. Text book of Medical Parasitology, Kindle edition, Orient Blackswan Private Limited (16 December 2020).
- 10. Sumeeta Khurana and Abhishek Mewara, Textbook of Medical Parasitology, Universities Press India Pvt. Ltd.29 June 2021.
- 11. Clinical Virology, (ASM books) 4th Edition by Douglas D. Richman, Richard J. Whitley and Frederick G. Hayden, ASM Press, Wiley.American Society for Microbiology, 2016.
- 12. Ryan & Sherris Medical Microbiology, Eighth Edition, McGraw Hill.

Semester - IV Practical Paper - I

MBP 405: MEDICAL MICROBIOLOGY

- 1. Preparation of different types of culture media for identification of pathogens: Blood Agar, Chocolate Agar, Mannitol Salt Agar, Wilson Blair Agar, Bismuth sulfite Agar, TSI Agar etc.
- 2. Different types of staining techniques for identification of pathogens: Gram's staining, Acid Fast staining, Albert staining, Capsular staining, Endospore staining, etc.
- 3. Identification of various pathogenic bacteria by biochemical, enzymatic and serological methods.
- 4. Bacteriological examination of urine, blood, pus, sputum, stool specimens. from patients for diagnosis of disease
- 5. Animal inoculation technique.
- 6. Microscopic studies of virus-infected materials.
- 7. Handling of lab animals.
- 8. Examination of pathogenic fungi under microscope (Dermatophytes, *Candida* spp.)
- 9. Isolation of Cryptococcus neoformans from bird fecal matter
- 10. Examination of stool for helminthes & Entamoeba.
- 11. Examination of blood smears to identify malarial parasites.
- 12. Isolation, observation and identification of normal microbial flora of human body.

- 1. Smallpox
- 2. HSV infection
- 3. Staphylococcal skin Infection
- 4. Tetanus infection
- 5. Corynebacterium infection
- 6. EMB plate
- 7. Measles
- 8. Mumps
- 9. Candida albicans infection of the tongue
- 10. Ringworm infection
- 11. Microsporum
- 12. Histoplasma capsulatum
- 13. Cryptococcus neoformans
- 14. Elephantiasis
- 15. Leishmaniasis

Published by:CRC Press

- 6. Frazier, W.C. and Werthaff, D.C. 1998 Food Microbiology 4th edition. Tata Mc Grow Hill New Delhi
- 7. Hui Y H 2006 Food Biochemistry and Food Processing Blackwell
- 8. Joshi, V.K. Ashok Pondey 1999 Biotechnology and Food fermentation Vol. I & II.
- 9. Katherine Smart 2003 Brewing Yeast Fermentation Performance John Wiley & Sons Inc
- 10. Prescott and Dunn's, Industrial Microbiology 4th edution.
- 11. Robison, R.K. 1990 Dairy Microbiology.
- 12. Thomas J. Montville, Karl Matthews, 2005 Food Microbiology: An Introduction: Amer Society for Microbiology

Semester – IV Practical Paper - II

MBP 406: MICROBIAL TECHNOLOGY

- 1. Enumeration of microorganisms from food, feed, vegetable and fruits.
- 2. Methylene blue reductase test for milk quality.
- 3. Microbial reactions in litmus milk.
- 4. Assay of cellobiohydrolase.
- 5. Assay of endogluconase.
- 6. Production and assay of α amylase.
- 7. Production and assay of β amylase.
- 8. Production and assay of protease.
- 9. Production and assay of lipase.
- 10. Production and assay of asparaginase.
- 11. Production and assay of phosphatase.
- 12. Biotransformation of organic compounds through MOS.

- 1. Infected food
- 2. Infected vegetables
- 3. Infected fruits
- 4. Aflatoxin
- 5. Mushroom spawn
- 6. Croping (Casing)
- 7. Biopesticides
- 8. VAM spores by funnel technique
- 9. Baker's yeast
- 10. Cheese
- 11. Yoghurt
- 12. Curd
- 13. Trichoderma powder
- 14. Antagonistic activity

- 9. Microbiological Assays. Hewitt.
- 10. Antiviral Drugs. Kargor, S.
- 11. Burger's Medicinal chemistry Vol. I III. Ed. Nanfield E. World.
- 12. The control of antibiotic resistant bacteria. Stuart, Harris and Harris.
- 13. Indian Pharmacopea; United States Pharmacopea; British Pharmacopea.

Semester – IV Practical Paper - II

MBP 406: PHARMACEUTICAL MICROBIOLOGY

- 1. Sampling of pharmaceuticals for microbial contamination and load (syrups, suspensions, creams and ointments, ophthalmic preparations)
- 2. Bioassay of chloramphenicol by plate assay method or turbidometric assay method.
- 3. Determination of D value, Z value for heat sterilization in pharmaceuticals.
- 4. Neutralization test Plaque neutralization, Haeme adsorption test.
- 5. Determination of antimicrobial activity of a chemical compound (Phenol, resorcinol, thymol, formaldehyde) to that of phenol under Standardization experimental conditions.
- 6. Sterility testing methods for pharmaceutical and cosmetic products
- 7. Tests for disinfectants (Phenol coefficient/RWC)
- 8. Determination of antibacterial spectrum of drugs/antibiotics
- 9. Chemical assays for antimicrobial drugs
- 10. Testing for antibiotic/drug sensitivity/resistance
- 11. Determination of MIC valued for antimicrobial chemicals
- 12. Microbiological assays for antibiotics (Liquid tube assay, agar tube assay, agar plate assays)
- 13. Efficacy testing of preservatives like parabens

- 1. Syrups
- 2. Creams
- 3. Ointment
- 4. D-value
- 5. Z-value
- 6. Plaque neutralization
- 7. Heame adsorption test
- 8. Antimicrobial activity
- 9. Sterility testing
- 10. Tetracycline
- 11. Minimal inhibitory concentration (MIC)
- 12. Synthetic drugs
- 13. Cosmetic product (any available product)