Course Code: 22BMIA1	Allied – IA	T/P	C	H/W
	GENERAL MICROBIOLOGY	**T**	**3**	**3**
Objectives	➢ To build a strong foundation in fundamentals of microorganisms ➢ To acquire an overall knowledge on the morphology and functions of the structures with the prokaryotes and eukaryotes. ➢ To know the principles of Microscopy and advancements in Microscopy			
Unit I	Definition and scope of Microbiology, History – spontaneous generation – Biogenesis, Contribution of Louis Pasteur, Leewen Hoek, Lazaro Spallanzani, John Tyndall, Joseph Lister, Robert Koch, Edward Jenner & Alexander Fleming.			
Unit II	Characteristic features of Prokaryotes: Prokaryotes – structure and function of cell wall, plasma membrane, flagella, slime, S layer, capsule, pili, cytoplasmic inclusion bodies, spore.			
Unit III	Characteristic features of Eukaryotes – structure & function of cell wall, plasma membrane, cilia, nucleus, mitochondria, chloroplast, lysosome, endoplasmic reticulum and Golgi complex.			
Unit IV	Microscopy – simple, compound, light microscopy. Stains and Staining – principles of staining, types and classification of stains-Acidic and Basic dyes; Simple and differential staining: theories of staining, mordant and its function			
Unit V	Media – Types and preparation – Sterilization – Principle and methods – dry heat, moist heat, filtration, radiation, antiseptics and disinfectants. Types of preservation methods. Culture technique – aerobic, anaerobic and semi aerobic.			

Books for Reference:

Brock TD, Smith DW and Madigan NT, 1987, *Biology of Microorganisms* edn, Eniglcwood Cliffs, NJ Prentice Hall K.

Dubey RC and Maheswari DK, 2012, *A text of Microbiology* (Revised edition). S.Chand and Company Ltd., New Delhi.

Geeta Sumbali and Mehrotra RS, 2009, *Principles of Microbiology*. First edition, Tata Mc Graw Hill P.Ltd., New Delhi.

John L. Ingraham, Catherine A. Ingraham, 2000, *Introduction To Microbiology* – Second Edition. Published by Brooks/Cole.

Nester EW Roberts CV and Nester N7T, 1995, Microbiology A Human Perspectives Iowa USA.

Pelczer J. Chen ECS. Krieg NR, 1986, Microbiology, MC Grow Hill Company.

Powar CB and Daginawala H F 2005, *General Microbiology* volume 1 and 2. Eighth edition, Himalaya publishing house, Mumbai

Prescott, Harley, Klein, 2003, Microbiology International Edition, fifth Edition, Published by McGraw-Hill Education.

Stainer R Y. Ingraham JL Wheels ML. Painter PR, 1999, General Microbiology MacMillan Educational Ltd, London.

Tortora, Funke, Case., Microbiology An Introduction, twelfth Edition, Published by Pearson Education.

Outcomes	➢ Knowledge on historical perspectives of Microbiology ➢ Elaborate the structure and functions of Prokaryotes ➢ Interpret the economically value fresh water and marine microbiology ➢ Innovate the cultivation methods of pigments producing marine algae

Course Code: 22BMIAP1	Allied Practical – IA GENERAL MICROBIOLOGY	T/P P	C 2	H/W 2

Objectives

- To provide practical knowledge and skill in the isolation and handling of microorganisms.
- To know pure culture techniques and methods of culturing

1. Preparation of media and sterilization techniques
2. Preparation of slant, stabs & plating techniques
3. Pure culture techniques – streak, spread & pour plate techniques
4. Motility of bacteria – hanging drop, soft agar methods
5. Staining techniques – Simple, Gram's

Books for Reference:

Atlas R.M., A.E. Brown and L.C. Parks, Mosby, St. Louis , 1995, *Laboratory Manual of Experimental Microbiology*

Cappuccino J.G. and N. Sherman 2002, *Microbiology: A Laboratory Manual*, Addison-Wesley.

Holt J.G, N.R. Krieg, 2000, Bergey's *Manual of Determinative Bacteriology*. Ninth edition, Lippincott Williams & Wilkin Publishers.

Kannan N, 2002, *Laboratory Manual in General Microbiology*, Panima Publishers.

Sundararaj T, 2003, *Microbiology Laboratory Manual*, 2nd Edition, A. Sundararj No.5, I cross street, Thirumalai Nagar, Perungudi, Chennai 600 096.

Outcomes

- Expertise in basic techniques of microbiology
- Demonstrate the types of culture media and sterilization technique
- Able to perform aseptic and pure culture techniques, preparation and viewing of sample under the microscope

Course code: 22BMIA2	ALLIED-IB MEDICAL MICROBIOLOGY	T/P T	C 3	H/W 3
Objectives	➢ To inculcate on the role of normal flora and pathogenic microbes ➢ To understand the pathogenesis of various diseases ➢ To understand the various clinical microbiological techniques.			
Unit- I	General approach to clinical specimen – collection and transport, microbiological examination, transport media for isolation. General principle – isolation techniques involved for anaerobic bacteria, normal micro flora of the human body.			
Unit -II	Bacteriology – general characteristics – pathogenecity, lab diagnosis, epidemiology and prevention of pneumonia, tuberculosis, cholera, typhoid and anthrax			
Unit -III	Virology: History of virology – General properties of viruses, Classification of viruses, Reproduction of bacterial phages. Epidemiology and prevention of chicken pox, hepatitis, mumps, AIDS, dengue and SARS.			
Unit -IV	Parasitology: general characteristics, pathogenesis, Lab diagnosis – prevention of Amoebiasis, Leishmaniasis, Malaria. Mycology: general characteristics, mechanism of pathogenesis, Lab diagnosis and prevention of superficial, subcutaneous, systemic and opportunistic Mycoses			
Unit -V	Antimicrobial chemotherapy – General Character – mechanism of action of drugs, Antimicrobial susceptibility test – Anti bacterial drug (B lactum), Anti viral drug (amantadine) and Antifungal drug (ketoconazole), Drug resistance – mechanism, origin and transmission of drug resistance.			

Books for Reference:

Anathanarayan R and Jeyaram Panikers C.K. 2013. *Text Book of Microbiology*. Ninth Edition. Jain book depot, New Delhi.

Baron EJ, Peterson LR and Finegold SM, 1994, *Bailey and Scotts diagnostic microbiology*. 9th edition, Mosby publications.

Chakraborty P ,2003, A Text book of Microbiology. Second edition, Published by New Central Agency (P) Ltd., Kolkata.

Chatterjee KD, 1980, parasitology, Protozoology and Helmmthology – l2nd Edn Chatterjee Medical Publisher

Cruickshnak R. 1975, Medical Microbiology. VoL I & II ELBS, Churchill Livingston

Elen JO Baron Lance R. Peterson, Bailey & Scotts, Diagnostic Microbiology, Sydney

M.Fine Gold 9th Edn., Pub Mosby.

Jewetz and Melnich, 1986, Review of Medical Microbiology, Lenge Medical Publications, Maurzon Go. Ltd.

Mackie & Mcpartney, 1997, Medical Microbiology – Vol. – I, Microbial – infection, 7th Edn. Ed,–Jg. Collee A.G. Fraser B.P. Marimion, A. Simmons Churchill-Livingston

Rajan S, 2009, Medical Microbiology. First edition, MJP Publishers, Chennai. 6.

Satish Gupte ,2000,The Short Textbook of Medical Microbiology.Eighth edition, Jaypee Brothers, Medical publishers (P) Ltd., New Delhi.

Outcomes	➢ Get information about various mechanisms of infection ➢ Knowledge on clinical lab techniques ➢ Acquire knowledge on control measures of diseases

Course code: 22BMIAP2	Allied Practical-IB	T/P	C	H/W
	PRACTICAL-MEDICAL MICROBIOLOGY	**P**	**2**	**2**

Objectives

- To develop students' understanding of medical microbiology with hand on experience in the isolation of the bacteria from different sources
- To prepare them to work in clinical laboratory

1. Examination of clinical samples – throat swab, pus, urine sample
2. Enumeration of bacteria in Urine, quantitative Urine culture
3. Antimicrobial sensitive testing and determination of MIC & quality control.
4. KOH Lacto phenol cotton blue preparation for skin scrapping for fungi.
5. Stain for Malarial parasites –Giemsa stain.
6. Identify bacteria (*E. coli, Bacillus*) using laboratory strains on the basis of cultural, morphological and biochemical characteristics: IMViC, urease and catalase tests

Books for Reference:

Anathanarayana and Paniker, *Text Book of Microbiology Orient and Longman*, New Delhi.

Bailey and Scott's Diagnostic Microbiology by Baron et al.

Jawetz Me hick, Adel berg Brooks, Butel and Orston, *Medical Microbiology*, Prentice Hail Incorporated London.

Methods for General and Molecular Bacteriology (1997). Murray, R.G.F., Wood , W.A. and Krieg, N.B.

Outcomes

- Discuss the basics of clinical laboratory and highlight the importance about various techniques
- Explain and justify the common accidents and their causes in the laboratory
- Recommend various diagnostic methods to find the basic blood analytics

Course code: 22BMIA3	ALLIED-IIA	T/P	C	H/W
	MOLECULAR BIOLOGY	T	3	3
Objectives	➢ To extend the knowledge on the structure and functions of genetic materials ➢ To focus on genome organization, transcription and translation process inprokaryotes.			
Unit -I	DNA as genetic material (Griffith and Chase experiments), RNA as a genetic material (Frannenkel and Conrat experiments), Nucleic acids – definition and structure. Nucleoside, nucleotide: definition and structure. DNA: Double helical structure. General structure and types of RNA (tRNA, mRNA, rRNA).			
Unit -II	DNA Replication – conservative and semi conservative. Experimental proof for semi conservatives (Meselson-Stahl experiment), Mechanism of replication-Rolling-circle model. Enzymes involved in DNA replication, Process of prokaryotic transcription and translation.			
Unit -III	**Transcription:** Mechanism of Initiation - promotors, upstream and downstream sequences, transcription factors; **Elongation** - RNA polymerase, sub units; **Termination** - Rho dependent and Rho independent; nus A protein and antitermination.			
Unit -IV	**Genetic code:** Elucidation of triplet code, code characteristics and codon dictionary. Reading frames, sense and nonsense code. **Degeneracy -** wobble hypothesis, universality of genetic code.			
Unit -V	**Translation in prokaryotes:** Initiation and Termination. Role of rRNA in protein synthesis. **Post translational modifications** - Protein modification, folding, chaperones, transportation; signal hypothesis, protein degradation.			

Books for Reference:

David R Hyde, 2010, *Genetics and Molecular biology*. Special Indian edition, Tata Mc Graw Hill P.Ltd., New Delhi.

Friefelder David (Reprint), 2007, *Molecular Biology*, 2nd Edition, MacMillan Pvt India Ltd, New Delhi.

Hancock J.T, 2008, *Molecular Genetics*, Viva books Pvt Ltd.

Lodish Berk, Matsudaira, Kaiser, Kreiger, Zipursky & Darnell, 2007, *Molecular cell biology*, 5th Edition, W.H. Freeman & company, New York.

Peter Paolella, 2010, *Introduction to Molecular Biology*. First edition, Tata Mc Graw-Hill P. Ltd., New Delhi.

Ramawat and Shaily Goyal, 2010, *Molecular biology and Biotechnology*. First edition S.Chand & Co.Ltd., New Delhi.

Turner P.C, Mc Lennan A.G, Bates A.D & White M.R.H, 2002, Instant Notes Molecular Biology, Viva books Pvt Ltd.

Outcomes	➢ Receive elaborate knowledge on nucleic acids ➢ Better understanding of gene expressions ➢ Identify the process of central dogma

Course code: 22BMIAP3	Allied Practical-II A	T/P	C	H/W
	MOLECULAR BIOLOGY	**P**	**2**	**2**

Objectives	➢ To impart knowledge on the isolation and estimation of nucleic acids ➢ To practice the students in manipulate DNA, amplify DNA

1. Isolation of antibiotic resistance mutant by replica plating
2. Isolation of DNA from bacteria and yeast
3. Estimation of DNA – diphenyl method
4. Electrophoretic separation of DNA
5. Isolation of RNA

Books for Reference:

Atlas R.M., A.E.Brown and L.C. Parks, Mosby, St. Louis, 1995, Laboratory Manual of Experimental Microbiology

Cappuccino J.G and N. Sherman, 2002, Microbiology: A Laboratory Manual, Addison-Wesley.

Kannan N, 2002, Laboratory Manual in General Microbiology, Panima Publishers.

Murray, R.G.F., Wood, W.A. and Krieg, N.B, 1997, Methods for General and Molecular Bacteriology.

Sundararaj. T, Microbiology Laboratory Manual, 2003, Published by A. Sundararaj No.5, I cross street, Thirumalai Nagar, Perungudi, Chennai 600 096 2nd Edition.

Outcomes	➢ Interpret and perform the isolation of Chromosomal DNA from *E. coli* and yeast ➢ Focus on and understand the molecular technique

Course code: 22BMIA4	ALLIED-II B APPLIED MICROBIOLOGY	T/P T	C 3	H/W 3

Objectives	➢ To acquire knowledge on probiotics and food preservation ➢ To enable them to know about preservation of pharmaceutical products ➢ Learn to assess the microbial quality of marine foods.
Unit -I	**Probiotics** Definition and history of probiotics. Microbial probiotics-characteristics and maintenance of probiotic microorganism, Lactic acid bacteria, *Bacillus* and yeast. Health benefits of probiotics. Guidelines, legislation and safety for prebiotics. **Prebiotics**: sources, types, mechanism and clinical applications.
Unit -II	**Microbiology of Food technology**: Bio- safety concepts in handling of dairy/ food pathogens and setting up microbiological / pathogen lab in a dairy / food plant. Enumeration principles and procedure for rapid detection of predominant hygiene indicator organisms and pathogens like *E. coli*, *Salmonella*, and *Shigella*.
Unit -III	**Pharmaceutical Microbiology:** The role of the Qualified Person in microbiological quality assurance, safety in microbiology. Measurement of biocide effectiveness, International disinfectant testing protocols. Personal qualification procedure for clean area entry –clean-in-Place, sterilization in-place, Clean room design, operation and regulatory standards.
Unit -IV	**Microbial nanotechnology:** Definition and terminologies- microbial nanotechnology, nanomedicine, nanowires, quantum Dots, nanocomposite, nanoparticles. Synthesis of nanomaterial using microbes. Properties and characterization- imaging and Size and composition.
Unit -V	**Bio remediation Technology:** Bioremediation, bio augmentation and bio stimulation**.** Microbial interactions with heavy metals and metalloids. Microbial interactions with plastics. Microbially enhanced recovery of oil and mining of ores.

Reference and Textbooks:-

Kenji Sonomoto and Atsushi Yokota (2011), Lactic acid bacteria and Bifidobacteria, Caister Academic Press Publisher.

Charalampopoulos, Dimitris, Rastall and Robert (2009), Prebiotics and Probiotics Science and Technology, Springer Publication

Ashutosh, K. (2008). Pharmaceutical Microbiology. New Delhi: New Age International Publishers.

Kevin, W. (2007). Endotoxins – Pyrogens, LAL Testing and Depyrogenation (3rd ed). Informa Press.

Doyle M. P. and Beuchat L. R. (2007). Food Microbiology- Fundamentals and Frontiers, ASM Press.

Manivasakam, N. (2001). Chemical and Microbial analysis of mineral and packaged drinking waters. Coimbatore: Sakthi Book Service.

Trivedy, R.K., Goel, P.K. and Trishal, C.L. (1987). Practical methods in Ecology and Environmental science. Environmental publishers.

Rajendran, P and P. Gunasekaran. (2007). Microbial Bioremediation. MJP. Publishers.

Outcomes	➢ Acquire Knowledge on probiotics and food preservation ➢ Impart knowledge of preservation technology. ➢ Knowledge on quality analysis of marine food products

Course code: 22BMIAP4	Allied Practical-II B APPLIED MICROBIOLOGY	T/P P	C 2	H/W 2

Objectives	➢ To provide practical knowledge in the isolation and characterization and to understand the soil microbs. ➢ To provide practical knowledge in the antibiotic producing microbes in soil

1. Assay of amylase from microbes.
2. Assay of protease from microbes
3. Cell immobilzation in calcium alginate gel
4. Isolation of Probiotics from Yoghurt
5. Antibiotic Production of Actinomycetes and Kirby Bauer Method

Books for Reference:

Demain, A.L, and Davis, J.E. (1999). *Manual of Industrial Microbiology and Biotechnology* (2nd ed). Washington: American Society for Microbiology.

Abbas Abul K. Lightman Andrew K. and Pober Jordan S. *Cellular and Molecular immunology* W.B Saunders Company, Philadelphia.

Gold by Richard A. KindtThomas J and Osborne Barbara A. Kuby *Immunology,* W.H.Freeman and Company, New York.

Jawetz Me hick, Adel berg Brooks, Butel and Orston, *Medical Microbiology*, Prentice Hail Incorporated London.

Monica Cheesbrough, 2000. *District Laboratory Practice in Tropical Countries,* Part – 2, Cambridge University Press, Cambridge, U.K.

Rastogi S.C.1996. *Immunodiagnostics Principles and Practice*, New Age International (P) Ltd., New Delhi.

Outcomes	➢ Trained in practical knowledge to understand the soil microbs. ➢ Become familiar in practical knowledge in isolation of antibiotic producing microbes in soil