MB - 303 Omics, Inter Phase Microbiology and Recent Advances in Microbiology

Section - I

Unit 1 Proteomics: Microbiology 15 hours

1. Holistic Biology of Microorganisms: Genomics, Transcriptomics and Proteomics; Understanding genes, genomes, "otheromes"; Introduction and basic concept of systems biology
2. Tools and technique for proteomics
3. Exploring and Exploiting Bacterial Proteomes; Strategies for Measuring Dynamics: The Temporal Component of Proteomics; Quest for Complete Proteome Coverage
4. Proteomics of Corynebacterium glutamicum: Essential Industrial Bacterium; Analyzing Bacterial Pathogenesis at Level of Proteome; Structural Proteomics and Computational Analysis of a Deadly Pathogen: Combating Mycobacterium tuberculosis from Multiple Fronts

Unit 2 Genomics: Microbiology 15 hours

1. Tools and technique for Genomics
2. Bacterial Genomes for the Masses
3. Comparative Genomics for Microorganisms; Microbial Genome Sequencing and Annotation
4. Pharmacogenomics : Overview, concept and application of Individualized Therapy; RNA Interference: Targeted Medicine

Section - II

Unit 3 Metagenomics 15 hours

1. Metagenomics: What and Why for metagenomics
2. Metagenomics: a new light on biology
3. Metagenomics: From Genomics to Metagenomics
4. Designing a successful metagenomics project

Unit 4 Recent Advances in Microbiology 15 hours

1. Overview of clinical laboratory diagnosis (Hematology, Cardiac, Renal, Liver testing's) ; Culturing of pathogens; Immunological Diagnostic Procedure; Monoclonal Antibodies; DNA diagnosis systems; Molecular Diagnosis of genetic disease.
2. Overview and Current status of Anti HIV, Anti Malaria, Anti Tuberculosis and Anti Cancer treatment; Multidrug resistance : Introduction, development, detection and treatment
3. Discovering New Pathogens; New disease: SARS, bird flu , swine flu etc.; Pharmacogenomics : Overview, concept and application of Individualized Therapy; RNA Interference: Targeted Medicine; Introduction to synthetic biology; Overview of Artificial Cells
4. Study of Selected recent review/ research paper in field of Microbiology (Minimum four)

List of Experiments

1. DNA extraction from Soil
2. DNA extraction from water
3. Library creation from metagenome
4. Isolation of m RNA
5. RT PCR
6. Immunological testing : Widal test; VDRL test; Enzyme Linked Immuno Sorbent assay (ELISA)
7. Hematology : RBC Count; Total WBC Count; Differential WBC Count; E.S.R. determination; Hb estimation;
8. Bleeding time and clotting time
9. Blood Grouping: Slide technique; Tube technique; Reverse and forward grouping/ Cross matching: Major and Minor/Coombs test: Direct coomb's; Indirect coomb's
10. Isolation and identification of Pathogens
11. Biochemistry : Cardiac Profile testing; Live Profile testing; Renal Profile testing
12. Study of genome database and tools
13. Study of Metagenomics database and tools
14. Study of proteomics database and tools

List of Reference Books

1. Woodford, Genomics, Proteomics and clinical bacteriology
2. Andreas, Computing for Comparative Microbial Genomics
3. Humphery-Smith, Microbial Proteomics
4. Rehm, Protein Biochemistry and Proteomics
5. Daniel, Introduction to Proteomics
6. Heinrich, Industrial Pharmaceutical Biotechnology
7. Richmond, Bio safety in Microbiological and Biomedical Laboratories
8. Rick, Drugs: From Discovery to Approval
9. Gad, Handbook of Pharmaceutical Biotechnology
10. Walsh, Biopharmaceuticals Biochemistry and Biotechnology
11. Hugo, Pharmaceutical Microbiology, Blackwell scientific Publications
12. Glick, Molecular Biotechnology