D.K.(AUTONOMOUS) GOVERNMENT DEGREE COLLEGE FOR WOMEN NELLORE

BOARD OF STUDIES MEETING

DEPARTMENT OF MICROBIOLOGY

2017-2018

12-06-2017

D.K. Govt.College (Autonomous), Nellore

B.Sc Microbiology (CBCS) Syllabus

First Year- SEMESTER-I

INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY

TOTAL HOURS: 48 **CREDITS:4**

UNIT-I **No.of hours :10**

History and mile stones in Microbiology

Contributions of Antony Von Leewenhock, Edward Jenner, Louis Pasteur, Robert Koch, Ivanowsky, Beijerinck, Winogradsky

Importance and applications of microbiology

Classification of Microorganisms_ Haeckel's three ki9ngdom concept, Whittaker's five kingdom concept, three domain concept of Carl woese

Outline classification of bacteria as per the second edition fo Bergey's manual of systematic Bacteriology(up to classes only)

UNIT-II **No.of hours: 10**

General characteristics of Bacteria, Archea, mycoplasmas, Cyanobacteria, Algae, Fungi & Protozoa.

Ultra structure of Prokaryotic cell- Variant components and invariant components.

Composition and detailed structure of gram positive and gram negative cell wall, Endospore.

UNIT-III **No.of hours: 10**

Principles of microscopy – Bright field phase contrast and E lectron microscopy.

General Characteristics of viruses.

Morphology, Structure and replication of TMV and HIV.

Replications of Bacteriophage (T4).

UNIT-IV No.of hours: 8

Isolation of Microorganisms from natural habitats

Pure culture techniques- dilution-plating, streak –plate, Spread-plate, Pour-plate and Enrichment culturing

Preservation of microbial cultures- subculturing, overlaying cultures with mineral oils, lyophilisation, sand cultures, storage at low temperature.

Cultivation of viruses- Tissue culture and embryonated egg.

UNIT - V No.of hours: 10

Staining Techniques-simple and differential (Gram staining and Spore staining) Hanging drop method

Sterilization and disinfection techniques- Physical methods- autoclave, hot-air oven, Radiation methods-UV rays, Gamma rays

Chemical methods- alcohols, phenols, Aldehydes, fumigants; Filtration methods HEPA Filters- Laminar Airflow Micropore filtration.

D.K. Govt.College (Autonomous), Nellore

B.Sc Microbiology (CBCS) Syllabus

First Year- SEMESTER-II

MICROB IAL BIOCHEMISTRY & METABOLISM

TOTAL HOURS: 48 **CREDITS : 4**

UNIT- I

No.of.Hours: 10

Out line classification and general characteristics of Carbohydrates (monosaccharides, disaccharides and polysaccharides).

General characteristic of amino acids and proteins

Structure of nitrogenous bases, nucleotides , nucleic acids

Fatty acids(saturated and unsaturated), Lipids(Spingo lipids, sterols and phospholipids)

UNIT- II

No.of.Hours: 10

Principle and applications of colorimetry , Spectrophoptometry (UV, Visible)

Chromatography(paper, thin-layer and Column)

Principle and applications of Centrifugation

Electrophoresis (Agarose , SDS, Native Gel).

UNIT- III

No.of Hours:10

Properties of enzymes- Simple, Conjugated; Coenzymes, Cofactors,

IUB system of enzyme classification

Mechanism of enzyme action

Factors effecting catalytic activity

Inhibition of enzyme activity- Competetive, non competitive, incompetitive and allosteric

No.of.Hours: 8

UNIT- IV

Microbial Nutrition-Nutritional requirements and uptake of nutrients by cells

Nutritional groups of microorganisms- autotrophs, heterotrophs, mixotrophs and methylotrophs

Growth media- synthetic, complex, selective, enrichment and differential media.

Microbial Growth- different phases of growth in batch cultures, Synchronous, continuous, biphasic growth ; Factors influencing microbial growth.

Methods for measuring microbial growth- direct microscopy, Viable count estimates, turbidometry and biomass.

Anaplerotic reactions.

No.of.Hours:10

UNIT- V

Aerobic respiration- Glycolysis, HMP pathway, ED pathway, TCA Cycle, Electron transport, oxidative and substrate level phosphorylation

Anaerobic respiration, Fermentation- Alcohol and lactic acid fermentations

Outlines of oxygenic and anoxygenic photosynthesis in bacteria (Light reaction, Cyclic & Noncyclic photophosphorylation) Calvin cycle.

B.Sc MICROBIOLOGY (CBCS) SYLLABUS
SECOND YEAR – SEMESTER- III
MBT- 301 MICROBIAL GENETICS AND MOLECULAR BIOLOGY

TOTAL HOURS:48 **CREDITS: 4**

UNIT-I **No. of hours: 10**

Nucleic acids – DNA ,RNA structures and organization of prokaryotic DNA.
Extrachromosomal genetic elements – Plasmids and transposons.
Replication of DNA – Semi conservative mechanism, Enzymes involved in replication.

UNIT-II **No.of hours: 10**

Mutations – spontaneous and induced, base pair changes, frame shifts, deletions, inversions, tandem duplications, insertions.
Mutagens - Physical and Chemical mutagens.
Outlines of DNA damage and repair mechanisms.
Genetic recombination in bacteria – Conjugation, Transformation and Transduction.

UNIT-III **No. of hours: 10**

Concept of gene – Traditional and Modern - Muton, Recon and Cistron. One gene one enzyme and one gene one polypeptide hypotheses.
Types of RNA and their functions.
Genetic code.
Structure of ribosomes.

UNIT-IV **No. of hours: 8**

Structure of prokaryotic promoters, RNA polymerases, Transcription and translation.
Regulation of gene expression in bacteria – lac operon.

UNIT-V **No. of hours: 10**

Basic principles of genetic engineering.
Restriction endonucleases, DNA polymerases and ligases.
Vectors – $P^{BR\ 322}$, $P^{UC\ 101}$ Polymerase chain reaction. Genomic and cDNA libraries.
Outlines of gene cloning methods.
General account on application of genetic engineering in industry, agriculture and medicine.

B.Sc MICROBIOLOGY (CBCS)
SYLLABUS
SECOND YEAR – SEMESTER- IV
MBT- 401 IMMUNOLOGY AND MEDICAL MICROBIOLOGY

TOTAL HOURS: 48 **CREDITS: 4**

UNIT-I **No. of hours: 10**

Types of immunity – innate and acquired; active and passive; humoral and cell-mediated immunity.
Primary and secondary organs of immune system – thymus, bursa fabricus, bone marrow, spleen and lymph nodes.
Cells of immune system. - B and T lymphocytes, null cells, monocytes, macrophages, neutrophils, basophils and eosinophils.

UNIT-II **No. of hours: 10**

Antigens – types, chemical nature, antigenic determinants, haptens.
Factors affecting antigenicity.
immunoglobulin – basic structure, types, properties and functions of immunoglobulins.
Concept of hypersensitivity and Autoimmunity.
Types of antigen-antibody reactions - Agglutinations, Precipitation, Neutralization, complement fixation, blood groups.
Labeled antibody based techniques – ELISA, RIA and Immunoflouroscence.
Polyclonal and monoclonal antibodies production and applications

UNIT-III **No. of hours: 10**

Normal flora of human body.
Host pathogen interactions: infection, invasion, pathogen, pathogenicity, virulence and opportunistic infection.
General account on nosocomial infection.
General principles of diagnostic microbiology- collection, transport and processing of clinical samples.
General methods of laboratory diagnosis - cultural, biochemical, serological and molecular methods.

UNIT-IV **No. of hours: 8**

Antibacterial Agents- Penicillin, Streptomycin and Tetracycline.
Antifungal agents – Amphotericin B, Griseofulvin
Antiviral substances - Amantadine and Acyclovir
Tests for antimicrobial susceptibility.
Brief account on antibiotic resistance in bacteria - Methicillin-resistant Staphylococcus aureus (MRSA).
Vaccines – Natural and recombinant.

No. of hours: 10

UNIT-V

General account of microbial diseases – causal organism, pathogenesis, epidemiology, diagnosis, prevention and treatment
Bacterial diseases – Tuberculosis and Typhoid
Fungal diseases – Candidiasis.
Protozoal diseases – Malaria.
Viral Diseases - Hepatitis- B and AIDS