S.V.K.P & Dr K.S.RAJU ARTS & SCIENCE COLLEGE (A), PENUGONDA
I Semester Syllabus (w.e.f. 2020-21 Admitted Batch)
MICROBIOLOGY
20MB1: INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY

UNIT-I :
History of Microbiology & Place of Microorganisms in the living world :
History of Microbiology in the context of contributions of Anton von Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch, Ivanowsky,Martinus Beijerinck and Sergei Winogradsky
Importance and applications of microbiology.
Place of Microorganisms in the Living World Haeckel's three Kingdom concept, Whittaker's five kingdom concept, three domain concept of Carl Woese

UNIT-II: Prokaryotic microorganisms and Viruses.
Ultra-structure of Prokaryotic cell- Cell Wall, Cell Membrane, Cytoplasm, Nucleoid,Plasmid, Inclusion Bodies, Flagella Pili, Capsule, Endospore.General characteristics of Bacteria (Size, shape, arrangement, reproduction)
General characteristics of Rickettsia, Mycoplasmas, Cyanobacteria, Archaea
General characteristics of viruses, Cultivation of Viruses (in brief)
Morphology, Structure and replication of TMV and Lambda Bacteriophage

UNIT-III: Eukaryotic microorganisms Fungi –
Habitat, nutrition, vegetative structure and modes of reproduction; outline classification
Algae - Habitat, thallus organization, photosynthetic pigments, storage forms of food, reproduction.
Protozoa – Habitat, cell structure, nutrition, locomotion, excretion, reproduction, encystment, outline classification

UNIT-IV: Isolation and Culture of Bacteria and Fungi
Growth media- Natural, synthetic and semi synthetic media. Selective, Enrichment, and Differential media
Pure culture techniques - dilution-plating, Streak-plate, Spread-plate, Pour-Plate and micromanipulator.
Preservation of microbial cultures - sub culturing, overlaying cultures with mineral oils, lyophilization, sand cultures, storage at low temperature.

UNIT-V: Principles of Microscopy, Sterilization and Disinfection
Principles of microscopy - Bright field and Electron microscopy (SEM and TEM).
Staining Techniques - Simple and Differential staining techniques (Gram staining, Spore staining).
Sterilization and disinfection techniques –
Physical methods - autoclave, hot- air oven, pressure cooker, laminar air flow, filter sterilization, Radiation methods - UV rays, Gamma rays.
Chemical methods - alcohols, aldehydes, fumigants, phenols, halogens and hypochlorites.

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S.V.K.P & Dr K.S.RAJU ARTS & SCIENCE COLLEGE (A), PENUGONDA
II Semester Syllabus (w.e.f. 2020-21 Admitted Batch)
MICROBIOLOGY

20MB2- MICROBIAL PHYSIOLOGY AND BIOCHEMISTRY

UNIT-I: Biomolecules **No. of hours: 12**

General characters and outline classification of Carbohydrates (Monosaccharides-Glucose, Fructose, Ribose, Disaccharides- Sucrose, Lactose, Polysaccharides- Starch, glycogen, Cellulose)
General characters and outline classification of fatty acids (Saturated & Unsaturated Fatty Acids) Lipids (Simple & complex lipids)
General characteristics of Amino Acids and Proteins.
Structure of Nucleic acids.

UNIT-II: Enzymes **No. of hours: 12**

Properties and classification of Enzymes.
Biocatalysis- induced fit and lock and key models.
Coenzymes and Cofactors.
Inhibition of enzyme activity- competitive, noncompetitive, uncompetitive and allosteric.
Factors effecting enzyme activity

UNIT – III: Analytical Techniques **No. of hours: 12**

Principle and applications of -
Colorimetry
Chromatography (paper, thin-layer, and column),
Spectrophotometry (UV & visible),
Centrifugation and
Gel Electrophoresis (Agarose and SDS).

UNIT – IV: Microbial Nutrition and growth **No. of hours: 12**

Nutritional requirements of Microorganisms
Nutritional groups of microorganisms- autotrophs, heterotrophs, lithotrophs, organotrophs, phototrophs, chemotrophs
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.

UNIT- V : Microbial metabolism **No. of hours: 12**

Aerobic respiration - Glycolysis, TCA cycle, ED Pathway, Electron transport
Oxidative and substrate level phosphorylations.
Anaerobic respiration (Nitrate and sulphate respiration)
Fermentation- lacticacid and ethanol fermentations
Outlines of oxygenic and anoxygenic photosynthesis in bacteria

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PENUGONDA-534 320, West Godavari District., (A.P.)

III Semester Syllabus (w.e.f. 2019-20 Admitted Batch)

B.Sc. MICROBIOLOGY

19MB3 MICROBIAL GENETICS AND MOLECULAR BIOLOGY

UNIT-I

DNA and RNA as genetic material. Structure and organization of prokaryotic DNA. Extrachromosomal genetic elements – Plasmids and transposons in bacteria. Replication of DNA – Semi conservative mechanism, Enzymes involved in replication.

UNIT-II

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

Types of RNA and their functions. Genetic code. Structure of ribosomes.

UNIT-IV

Types of genes – structural, constitutive, regulatory Protein synthesis – Transcription and translation. Regulation of gene expression in bacteria – lac operon.

UNIT-V

Basic principles of genetic engineering. Restriction endonucleases, DNA polymerases and ligases. Vectors like PBR 322, M13. Outlines of gene cloning methods. Polymerase chain reaction. Genomic and cDNA libraries. General account on application of genetic engineering in industry, agriculture and medicine

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SEMESTER – IV (w.e.f. 2019-20 Admitted Batch)

B.Sc. MICROBIOLOGY

19MB4 IMMUNOLOGY AND MEDICAL MICROBIOLOGY

UNIT – I:

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. Identiification and function of B and T lymphocytes, null cells, monocytes, macrophages, neutrophils, basophils and eosinophils.

UNIT-II

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

UNIT-III

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

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.

UNIT-V

General account on microbial diseases – causal organism, pathogenesis, epidemiology, diagnosis, prevention and control Bacterial diseases – Tuberculosis and Typhoid Fungal diseases – Candidiasis. Protozoal diseases – Malaria. Viral Diseases - Hepatitis- A , AIDS and COVID19.

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