**BIOTECHNOLOGY**

**MID-1 SYLLABUS(2019-2020)**

**SEMESTER – I**

**BTT- 101 MICROBIOLOGY AND CELL BIOLOGY**

**UNIT I**

**History, Development and Microscopy**

History and development of microbiology: contributions of Louis Pasteur, Robert Koch and

Edward Jenner. Microscopy: Compound microscopy: Numerical aperture and its importance,

resolving power, oil immersion objectives and their significance, principles and applications of

dark field, phase contrast, fluorescent microscopy. Electron microscopy: Principle, ray diagram

and applications, TEM and SEM, comparison between optical and electron microscope,

limitations of electron microscopy.

Stains and staining procedures: Acidic, basic and neutral stains, Gram staining, Acid fast

staining, Flagella staining, Endospore staining.

**UNIT II**

**Bacteria:** Bacterial morphology and subcellular structures, general morphology of bacteria,

shapes and sizes, generalized diagram of typical bacterial cell. Slime layer and capsule,

difference between the structure, function and the position of the two structures. Cell wall of

gram +ve and Gram -ve cells, Prokrayotic classification. General account of flagella and

fimbriae. Chromatin material, plasmids; definition and kind of plasmids (conjugative and nonconjugative)

F, R, and Col plasmids. Endospores: Detailed study of endospore structure and its

formation, germination, basis of resistance. A brief idea Bergey’s manual. Morphology of

archaea, archaeal cell membrane (differences between bacterial and archaeal cell membrane),

other cell structures, concept of the three distinct archaea groups.

**Viruses**: General characteristics of viruses, difference between virus and typical microbial

cell, structure, different shapes and symmetries with one example of each type, classification

of viruses on the basis of nucleic acids, phage and animal cell viruses, example of each and

their importance. Brief idea of lytic cycle and lysogeny.

**UNIT III**

**Microbial Nutrition:** Basic nutritional requirements: Basic idea of such nutrients as water,

carbon, nitrogen, sulfur and vitamins etc., natural and synthetic media, nutritional classification

of bacteria. Selective and Differential media, Enriched media, Enrichment media.

**SEMESTER – III**

**BTT- 301: BIOPHYSICAL** T**ECHNIQUES**

**UNIT – I:**

**Spectrophotometry:** Spectrum of light, absorption of electromagnetic radiations, B e e r ’ s

law - derivation and deviations, extinction coefficient. Instrumentation of UV and visible

spectrophotometry, Double beam spectrometer; dual-wavelength spectrometer, Applications of

UV and visible spectrophotometry. Coloriemetry principles and its applications.

**UNIT II:**

**Chromatography:** Partition principle, partition coefficient, nature of partition forces, brief

account of paper chromatography.Thin layer chromatography and column chromatography. Gel

filtration: Concept of distribution coefficient, types of gels and glass beads, applications. Ionexchange

chromatography: Principle, types of resins, choice of buffers, applications including

amino acid analyzer. Affinity chromatography: Principle, selection of ligand, brief idea of ligand

attachment, specific and non-specific elution, applications.

**UNIT III**

**Electrophoresis**: Migration of ions in electric field, Factors affecting electrophoretic mobility.

Paper electrophoresis, Gel electrophoresis: - Types of gels, Solubilizers, Procedure, Column &

slab gels Detection, Recovery & Estimation of macromolecules.

**V SEMESTER**

**GENETICS AND MOLECULAR BIOLOGY**

**UNIT – I**

**Mendels Laws and Inheritance**

**Mendel experiments. Mendel Law and deviations : incomplete dominance and Co dominance**

**penetration and pleiotropism. Recessive and Dominant epistatic gene interactions. Concept**

 **multiple alleles**

**UNIT – II**

**Genes and their variations**

**Stucture of gene, gene and environment , gene copies and heterogeneity. Meiotic nondisjunction**

 **of chromosomes. Chromosomes abnormalities in animals and plants . Linkage, recombination,**

**gene maps, interference and coincidence. Sex determination. Genetic population studies and**

**Hardy Weinberg Equations.**

**UNIT – III**

**DNA Replication**

**Enzymology of replication - detailed treatment of DNA polymerase I, brief treatment of pol II and**

**III , helicases,topoismerases , single strand binding proteins. DNA melting proteins, primase and**

**RNA primers, distributive and processive properties of DNA polymerase I and III, importance**

**Of the P – Subunit in polymerase III**

**GENE EXPRESSION & r DNA TECHNOLOGY**

**UNIT – I**

**Genetic Code**

**Genetic code ; Codon and its characteristics, experimental elucidation of codons, identification**

**of start and stop codons, universality, degeneracy and commaless nature of codons.**

**The decoding system : aminoacyl synthetases , the adaptor hypothesis , attachment of amino acids**

**to t RNA Codon –anticodon interacton- the wobble hypothesis.**

**Selection of initiation codon – Shine and Dalgarno Sequence and the 16 S r RNA.**

**UNIT – II**

**Protein synthesis :**

**Initiation elongation, termination and post translational modification.**

**Regulation of translation: phage T4 Protein , p32 translational regulation. Antibiotics affecting translation**

**UNIT – III**

**Gene Expression and regulation**

**Details of initation, elongation , and termination (intrinsic and rho factor mediated termination)**

**Regulation of Transcription in prokaryotes**