Phone : 08819 - 246126 / 246926 Website : www.svkpandksrajucollege.org.in

S.V.K.P. & Dr. K.S. RAJU ARTS & SCIENCE COLLEGE
(Autonomous)
Recognized by UGC as "College with Potential for Excellence"
Accredited by NAAC with "A" Grade
(Affiliated to ADIKAVI NANNAYA UNIVERSITY - Recognised by Govt. of Andhra Pradesh)
PENUGONDA-534 320, West Godavari District., (A.P.)

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

BIOTECHNOLOGY

19BT1- MICROBIOLOGY AND CELL BIOLOGY

UNIT I

History, Development and Microscopy

History and development of microbiology: contributions of Louis Pasteur, Edward Jenner and Robert Koch. 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. 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). **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.

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.

UNIT IV

Microbial growth and control: Growth: Growth rate and generation time, details of growth curve and its various phases. Concept of synchronous cultures, continuous and batch cultures (chemostat and turbidostat). Measurement of growth. Physical conditions required for growth: Temperature (classification of microorganisms on the basis of temperature requirements), pH etc. Pure cultures and cultural characteristics. Maintenance of pure culture. Microbial Control: Terminologies - Sterilization, disinfection, antiseptic, sanitization, germicide, microbistasis, preservative and antimicrobial agents. Physicalcontrol: Temperature (moist heat, autoclave, dry heat, hot air oven and incinerators), dessication, surface tension, osmotic pressure, radiation, UV light, electricity, ultrasonic sound waves, filtration. Chemical control: alcohols, fumigation, halogens.

UNIT V

Cell Biology: Eukaryotic Cell - Structure and function of the following: nucleus, nuclear membrane, nucleoplasm, nucleolus, golgi complex, Mitochondria, Chloroplast, endoplasmic reticulum, lysosomes, peroxisomes, glyoxisomes and vacuoles, cell division & its significance, Brief idea of cell cycle.

SEMESTER-1

Practical paper 19BT1P Microbiology & Cell Biology

Minimum of Ten experiments to be done and recorded

1. Demonstration, use and care of microbiological equipments.
2. Preparation of media, sterilization and isolation of bacteria.
3. Isolation of Bacteriophage from sewage / other sources.
4. Demonstration of motility of Bacteria.
5. Simple staining of bacteria
6. Gram staining of Bacteria
7. Acid fast staining of Bacteria
8. Endospore staining.
9. Demonstration of starch hydrolysis by bacterial cultures.
10. Growth of fecal coliforms on selective media.
11. Isolation of pure culture by pour plate method.
12. Isolation of pure culture by streak plate method.
13. Anaerobic cultivation of microorganisms.
14. Cultivation of yeast and moulds.
15. Antibiotic sensitivity assay.
16. Oligodynamic action of metals.
17. To study germicidal effect of UV light on bacterial growth.
18. Stages of mitosis.
19. Stages of meiosis.

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

B.Sc. **BIO-TECHNOLOGY**

SEMESTER II

19BT2- MACROMOLEULES, ENZYMOLOGY AND BIOENERGETICS

UNIT I

Nucleic Acids and Chromosomes: Chemical structure and base composition of nucleic acids, Chargaff's rules, Watson Crick Model (B-DNA), deviations from Watson-Crick model, other forms of DNA (A- and Z-DNA), forces stabilizing nucleic acid structures, (hydrogen bonds and hydrophobic associations, base stacking). RNA and its types.

UNIT II

Amino acids and Proteins: Structure of amino acids occurring in proteins, classification of amino acids (pH based, polarity based and nutrition based physico-chemical properties of amino acids. Primary, Secondary, Tertiary & Quaternary structure of proteins.

UNIT III:

Carbohydrates:Definition, classification, nomenclature of carbohydrates, structures of monosaccharides, disaccharides and polysaccharides. Concept and examples of heteropolysaccharides.

Lipid:Types of lipids, structures of saturated and unsaturated fatty acids, triglycerides, phospholipids, propereties of lipids (acid value, saponification value and iodine value). Sphigolipids and
prostaglandins.Chemistry of Porphyrines, Heme, Cytochromes, and Chlorophylls

UNIT IV

Enzymes: Terminology: Active site, allosteric site, Holoenzyme, apoenzyme, coenzyme, substrate, inhibitor, activator, modulator etc. Classification and nomenclature of enzymes. Substrate Specificity (bond specificity, group specificity, absolute specificity, stereospecificity), lock and key and induced fit models.

Enzyme kinetics: Michaelis-Menten equation, Factors effecting enzyme activity (substrate concentration,
Enzyme concentration,effect of P^H and temperature). Enzyme inhibition kinetics (reversible inhibition types – competitive, uncompetitive and non-competitive), brief idea of irreversible inhibition.

UNIT V

Bioenergetics: Concept of free energy, Entropy, Enthalpy & Redox Potential. Concept of high energy bonds as related to the structure of ATP, Phosphoenolpyruvate, Creatine phosphate etc. Glycolysis and its regulation, Gluconeogenesis, and HMP shunt.

SEMESTER-2

Practical paper- 19BT2P MACROMOLECULES & ENZYMOLOGY

Minimum of Ten Experiments to be done and recorded

1. Qualitative estimation of Carbohydrates
2. Qualitative estimation of Amino acids
3. Quantitative Estimation of proteins by Biuret method
4. Estimation of DNA by Diphenylamine method
5. Estimation of RNA by Orcinol method
6. Quantitative estimation of sugars (Dinitrosalicylic acid method).
7. Estimation of glucose by Benedict's quantitative method
8. Quantitative estimation of proteins by Lowry's method.
9. Determination of saponification value of Fats
10. Determination of Acid Value of Fats
11. Immobilization of enzymes / cells by entrapment in alginate gel
12. Assay of protease activity.
13. Assay of alkaline phosphatase
14. Preparation of starch from Potato and its hydrolysis by salivary amylase
15. Isolation of urease and demonstration of its activity
16. Effect of temperature/ pH on enzyme activity