**BACHELORS WITH MICROBIOLOGY AS MAJOR (CT – II)**

**6th SEMESTER**

**MBY622J2 MICROBIOLOGY _** MICROBIAL PHYSIOLOGY & METABOLISM

**CREDITS: THEORY: 4; PRACTICAL: 2**

***COURSE OBJECTIVES:***

- *To develop basic understanding about nutritional requirements and effect of different environmental parameters on microbial growth*
- *The course has been designed to provide students sound knowledge about nutrient transport and respiration in microorganisms*
- *The students will get equipped with fundamental knowledge of macromolecules and metabolism*

***LEARNING OUTCOME:***

- *Students will be familiarized with nutritional requirements and class of microorganisms on basic of nutrient demand*
- *The students will develop basic as well as advanced understanding about respiration, fermentation, nutrient transport, macromolecules and much more*

**UNIT - I: MICROBIAL GROWTH AND NUTRITIONAL REQUIREMENTS**

- Microbial growth, nutritional requirements, macro and micronutrients
- Classification of organisms based on nutritional requirements
- Factors affecting microbial growth (temperature, pH, solute, water activity and oxygen concentration)
- Chemotrophs and Methanotrops: Characteristics, types and importance
- Sulphur oxidizing microbes

**UNIT -: NUTRIENT TRANSPORT AND RESPIRATION**

- Types of cellular transport: passive, facilitated, active transport
- Primary and secondary active transport, group translocation
- Membrane bound protein transport system, carrier models
- Concept of aerobic and anaerobic respiration and IIFermentation (types) and Pasteur effect

**UNIT - III: AEROBIC RESPIRATION AND PHOTOTROPIC METABOLISM**

- Glycolysis and TCA cycle.
- Electron transport chain
- Oxidative photophosphorylation
- Groups of phototrophic microorganisms, anoxygenic and oxygenic photosynthesis
- Photosynthetic pigments, photophosphorylation, Calvin cycle

**UNIT - IV: MACROMOLECULES**

- Carbohydrates and classification
- Lipids: definition, classification and structure
- Amino acids: General formula, classification, structure
- Proteins: structures of proteins, functions of proteins
- Enzymes: classification, nomenclature and application of enzymes

**PRACTICAL (2 CREDITS)**

- Demonstration of nutritional requirements of microorganisms (bacteria) by charts and models
- To study the effect of temperature on growth of bacterial isolates (qualitative assay)
- To study the effect of pH on growth of bacterial isolates (qualitative assay)
- To study the fermentation of carbohydrates (qualitative assay)
- Demonstration of TCA cycle by charts and models
- Demonstration of Electron transport chain using charts and models
- Estimation of photosynthetic pigments (Chlorophyll)
- Qualitative tests for carbohydrates
- Estimation of proteins by Lowry/Biuret method
- Qualitative tests for lipids

***Note: Those experiments which can't be performed in laboratory, should be conducted via Virtual lab***

**RECOMMENDED BOOKS:**


- Lehninger Principles of Biochemistry by Lehninger by David L. Nelson and Michael M Cox, W.H Freeman and company.
- Biochemistry by Stryer WH et al., W.H Freeman and company.
- Physiology and Biochemistry of Prokaryotes by White David, Oxford University Press.
- Brock Biology of Microorganisms by Madigan and Martinko, 14th edition, Pearson Education International.
- Prescott's Microbiology by Joanne Willey, Linda Sherwood and Christopher J. Woolverton, 11th edition, McGraw Hill Publisher Companies, Inc