MANGALORE UNIVERSITY

DEPARTMENT OF MICROBIOLOGY

M.Sc. MICROBIOLOGY

MBH- 502: Industrial Microbiology

56h

OBJECTIVES:

1. Microbial characteristics for industrial applications
2. Mass culturing of microbes for biomolecules productions
3. Isolation techniques, maintenance of important microbial cultures
4. Types of Fermentation techniques, advantages and disadvantages

COURSE OUTCOME

CO1: To make students understand the potentials of microorganisms in industries
CO2: To create awareness on the processes and production of important biomolecules such as Antibiotics, organic acids, enzymes using microbes
CO3: To learn techniques of downstream processing and purification of biological compounds
CO4: Fermentation optimization techniques for microbial products
CO5: Isolation, maintenance and preservation of Industrial important microbes.

UNIT I

Modern era of industrial fermentation technology, Primary and Secondary metabolites. Fermentation: aerobic and anaerobic fermentation processes and their application. Substrate and oxidative phosphorylation and their energy yield, Types of fermentation processes (Surface, submerged, Batch, Continuous, solid-substrate, Dual, Fed batch fermentation and its applications), Fermentation economics and feasibilities.

UNIT II

Industrial Microorganisms: Screening, selection & Isolation. Identification and characterization of industrially important microbes. Strain improvement- mutation, recombination- gene regulation and genetic manipulation. Preservation of industrially important microbes. Culture collection centres and their importance.

UNIT III

Media for Industrial Fermentations: Media formulation, growth factors, carbon, nitrogen, Energy and Mineral sources, buffers, inhibitors, precursors, inducers, Oxygen requirements Antifoam agents and others, Sterilization: Sterilization of bioreactor, media, air and exhaust air and filter sterilization. Downstream processing: Steps in recovery and purification of fermented products.

UNIT IV

Production of amino acid, Enzymes, Biopolymers- Xanthans, chitin and pullulan. Production of beer, wine, alcohol. Production of organic acids- Citric acid, Lactic acid, vinegar and gluconic acid. Biopesticides- Production and formulation, Production of Biofertilizers, Bioethanol production.

Note: Each unit is for 14h