MICROBIOLOGY SEMESTER VI

PAPER 6 S: (INDUSTRIAL FERMENTATION, FOOD MICROBIOLOGY, AND METABOLISM)

Unit- I : Fermentation in General.

a) Definition and scope of Industrial microbiology and biotechnology.
b) Important classes of industrial microorganisms.
c) Fermentation: - Definition and types (batch and continuous, aerobic and anaerobic, surface and submerged fermentations)
d) Production strains
e) Screening: - Definition, Primary screening (crowded plate technique, auxonography, enrichment culture technique, use of indicator dyes), secondary screening.
f) Scale up process: - Definition and significance.
g) Inoculum buildup: Spore and vegetative inoculum.
h) General layout of fermentation plant: - Fermentation equipment and its uses.
i) Raw materials: - Composition and uses. Saccharine, starchy, cellulose raw materials, hydrocarbon and vegetable oils, nitrogenous material (corn steep liquor).
j) Antifoam agents.
k) Sterilization of media: - Batch and continous sterilization.
l) Detection and assay of fermentation products.

Unit- II : Industrial Productions I:

Microorganisms, raw material, inoculums buildup, fermentation conditions, recovery, uses and mechanism of the following products.
a) Ethyl-alcohol : From molasses and waste sulphite liquor.
b) Beer.
c) Wine (Red table and White table).
d) Acetone- Butanol from corn.
e) Citric acid
f) Vinegar- Fring's process

Unit- III : Industrial Productions II:

a) Baker 's yeast : From molasses, Definition of compressed and active dry yeast.
b) Single cell protein : From bacteria.
c) Penicillin.
d) Amylase : Bacterial and fungal.
e) Vitamin B12.

Unit-IV : Microbiology of Milk

a) Definition
b) Composition and types of milk.
c) Sources of microorganisms in Milk.
d) Types of microorganisms in milk.
e) Pasteurization of milk : LHT, HTST, UHT. Phosphatase test.
f) Grades of milk.
g) Concentrated milk and milk powder.
h) Preparation of fermented milk products, butter and cheese.

Unit-V : Food Microbiology

a) Sources of contamination of fresh food.
b) Microbial spoilage of foods.
c) Preservation of foods :- Low and high temperature, dehydration, high osmotic pressure, chemical preservation, radiations and canning.
d) Fermented foods : Idli, pickles and sauerkraut.
e) Food poisoning : Food infection and food intoxication.
f) Indicators of food contamination as per WHO.

Unit VI : Enzymology and Metabolism
A Enzymology :
a) Nature and Definition. b) Classification and nomenclature of enzymes.
c) Terminologies used in enzymology :- Enzyme, active site,substrate, co-enyme, cofactors, prosthetic group,
poloenzyme, apoenzyme, activation energy, isoenzyme, allosteric enzyme, inhibitors, immobilized enzymes.
B Metabolism :
a) General strategies of metabolism.
b) EMP pathway, TCA cycle.
c) Oxidative phosphorylation and Electron transport chain.

Microbiology Practicals:
1. A) Microbiological Examination of milk:
a) Plate count
b) Methylene blue reduction test (MBRT)
c) Phosphatses test
d) Test for coliform bacteria
e) Estimation of fats in milk
f) Milk testing for Adulteration
B) Demonstration of microbes in Curd.
2. A) Laboratory scale production, recovery and quantitative estimation of following products:
a) Ethyl alcohol. b) Citric Acid c) Amylase
B) Immobilisation of Yeast.
C) Production of Curd/ Pickle/ Cheese by microorganisms
D) Production of wine from grapes/ other raw material
4. Microbiological Examination of Vegetables, fruits and Fast Foods by
a) Plate Count
b) Test for Coliform bacteria.
c) Yeast & Molds.