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PAPER-5: INDUSTRIAL MICROBIOLOGY

UNIT-I

Microbiology of foods - Microbial flora of fresh foods, grains, fruits, vegetables, milk, meat, eggs, shellfish and finfish, edible crustaceans and their infestation by parasites - Fungi, viruses. Microbiological examination of foods - Microscopic techniques and cultural techniques. Direct microscopic examination, total colony counts and differential enumeration, identification of specific groups - bacteria, viruses, fungi and protozoa. Physiological types and metabolic types. Microbial spoilage of milk, food, canned - food, types of spoilage organisms, food poisoning.

UNIT-II

Methods of food preservation - Aseptic handling: HTST - steam under pressure, sterilization, pasteurization of milk; refrigeration and freezing, dehydration; osmotic pressure; Chemicals - organic acids, nitrates and nitrites, cresols; Radiation - UV light, microradiation. Fermented foods - Preparation of yoghurt, *Streptococcus thermophilus*, *Lactobacillus bulgaricus*, Manufacture of cheese, *Penicillium roqueforti*. Fermented soybean products. Microorganisms as a food - Single cell protein - use of yeast (*Candida utilis*, *Saccharomyces cerevisiae*), bacteria (*Bacillus megaterium*), fungi (*penicillium* spp and *Agaricus* spp) and algae (*Spirulina maxima*, *Chlorella* spp). Bacterial and Fungal biomass production.

UNIT-III

Microorganisms used in industrial processes. Media and materials for industrial microbiological processes, types of fermenters. Fermentation methods, inoculum preparation, batch and continuous fermentations. Purification, recovery and effluent treatment procedures. Isolation, preservation and improvement of industrial microorganisms. Industrial products produced by microorganisms - enzymes (amylase, proteases) organic acids (lactic acid, citric acid, vinegar), amino acids (L-lysine, L-glutamic acid), bioinsecticides, food supplement, and hormones. Economic aspects of food and industrial microbiology.

UNIT-IV

Industrial Production of important antibiotics - Penicillin Streptomycin, Erythromycin, Bacitracin and Tetracyclines. Production of vitamins - Riboflavin, Vitamin B₁₂ Industrial uses of yeasts - Production of ethyl alcohol, Commercial production of bakers' yeast, cultivation of food yeasts. Commercial production of extracellular polysaccharides - Dextrans and Xanthans, their application. Enzyme probes, biosensors. Production and recovery of interferon.

UNIT-V

Petroleum microbiology. Microbiology and mining - microbial leaching - role of microorganisms in the recovery of minerals (uranium, copper) from ores. Deterioration of materials - Paper, textiles, painted surfaces, prevention of microbial deterioration. Analytical microbiology - Microbiological assays of vitamins (B₁₂, riboflavin), amino acids (lysine, tryptophan), and antibiotics (penicillin and streptomycin)