UNIT I

1.1 HYGIENIC DESIGN OF FOOD PLANTS AND EQUIPMENTS

Materials:

Use materials that are smooth, non-toxic, corrosion-resistant, and easy to clean. Stainless steel is commonly used due to its durability and smooth surface.

Smooth Surfaces:

Avoid crevices, pits, and rough surfaces where food residues, bacteria, and other contaminants can accumulate. This includes joints and seams that should be welded smoothly.

Sanitary Design:

Equipment should be designed to be easily cleaned and sanitized. This includes having minimal horizontal surfaces, easily accessible parts, and no dead ends where residues can hide.

Accessibility:

Ensure that all parts of equipment and processing areas are accessible for cleaning and inspection. This includes having removable parts or panels for thorough cleaning.

Drainage:

Design equipment and floors with adequate drainage to prevent pooling of liquids, which can harbor bacteria and contaminants.

Compatibility:

Ensure compatibility of materials with cleaning agents and sanitizers used in the food industry. Some materials may react with certain chemicals, affecting hygiene.

Hygienic Seals:

Use hygienic seals and gaskets that are resistant to bacteria growth and easy to clean or replace when necessary.

Design for Inspection:

Design equipment to facilitate inspection and maintenance. This includes clear labeling of parts, transparent covers for inspection, and easy disassembly for internal inspections.

FOOD CONTAMINANTS (MICROBIAL, CHEMICAL, PHYSICAL)

Microbial Contaminants:

Microbial contaminants include bacteria, viruses, fungi, and parasites that can cause foodborne illnesses. These contaminants can multiply rapidly under favorable conditions, such as improper storage temperatures or inadequate cooking.

Common microbial contaminants include:

Salmonella:

Found in raw meats, poultry, eggs, and unpasteurized dairy products.

Escherichia coli (E. coli):

Often associated with undercooked ground beef, unpasteurized milk, and contaminated water.

Listeria:

Found in ready-to-eat foods like deli meats, soft cheeses, and smoked seafood.

Norovirus:

A highly contagious virus often spread through contaminated food or water.

Clostridium botulinum:

Produces a toxin in improperly canned or preserved foods.

Preventive measures for microbial contamination include proper cooking temperatures, thorough washing of fruits and vegetables, maintaining hygiene in food preparation areas, and ensuring proper storage and handling practices.

Chemical Contaminants:

Chemical contaminants can enter food at various stages of production, processing, and packaging. They include agricultural chemicals, food additives, environmental pollutants, and naturally occurring toxins. Examples include:

Pesticides and Herbicides: Residues from agricultural practices.

Heavy Metals: Such as lead, mercury, and cadmium from environmental sources.

Food Additives: Such as preservatives, colorants, and flavor enhancers.

Environmental Pollutants: Like dioxins, PCBs (polychlorinated biphenyls), and aflatoxins.

Preventive measures for chemical contamination include monitoring and controlling the use of agricultural chemicals, selecting safe food additives, ensuring proper waste disposal to prevent environmental contamination, and conducting regular testing for chemical residues.

Physical Contaminants:

Physical contaminants are foreign objects that inadvertently get into food products. They can include:

Metal fragments: From equipment breakage or wear.

Glass or plastic shards: From packaging materials.

Wood, stones, or bones: In raw ingredients.

Insects or rodent droppings: From improper storage or handling.

Preventive measures for physical contamination include using proper screening and filtering equipment during processing, maintaining equipment in good condition to prevent breakage, implementing good hygiene practices to keep pests out, and conducting regular inspections of raw materials.