



JAIN
DEEMED-TO-BE UNIVERSITY

FACULTY OF
ENGINEERING
AND TECHNOLOGY

DEPARTMENT OF FOOD TECHNOLOGY

Syllabus for PG JET – 2020

Section 1: Basics of Food Chemistry

➤ **Carbohydrates**

Classification & structure of carbohydrates, Hygroscopicity & solubility, optical rotation, Chemical reactions of carbohydrates (Maillard reaction, caramelization), Methods to estimate carbohydrates.

➤ **Proteins**

Importance of Proteins, Classification, Structure and chemistry of amino acids, Peptides & proteins.

➤ **Vitamins**

Summary of vitamin stability, Toxicity and sources of vitamins, Bioavailability of vitamins.

➤ **Lipids and Fat**

Hydrogenated fats, shortening agents, confectionary fats - Rancidity of fats & oils and its prevention, antioxidants. Ingredients, Taste, Aroma, Undesirable flavors. Classification, Alliaceous flavors, Bittering agents.

Section 2: Food Microbiology

➤ **General Microbiology**

Classification of micro-organism, GRAS, Microbial safety, Factors that Influence microbial growth, Survival and decline in foods, Intrinsic factors, Extrinsic factors, Bacterial spores and their significance, Indicator microorganisms, Quality and safety indicators and microbiological Gram positive and negative bacteria- gram's staining principle.

➤ **Fungi and Molds**

Toxigenic molds, Molds that causes mycotoxicosis, Contamination and spoilage of meat, poultry, Seafood, Milk and dairy products, Fruits, Vegetables and grains, Stress of toxicity, Antimicrobial residue in agricultural products.

➤ **Fermentation and food**

Lactic acid bacteria and fermented foods, Yeast based fermentations, Effect of fermentations on the properties of foods, Elimination of harmful components- micro organisms responsible for and mechanism associated with elimination of harmful components, Probiotic and prebiotic foods, Application of microbes in industry

Section 3: Food Packaging Technology

➤ **Introduction to packaging**

Objectives and functions of packaging and packaging materials; Packaging requirements and selection of packaging materials.

➤ **Packaging Materials**

Types of packaging materials, Paper, Pulping, Fibrillation and beating, Types of papers and their testing methods, Glass; composition, properties, types of closures, methods of bottle making, Metals; Tinplate containers, tinning process, components of tinplate, tin free steel (TFS), types of cans, aluminum containers, lacquers, Plastics; types of plastic films, laminated plastic materials, co-extrusion, edible films, biodegradable plastics.

➤ **Advanced packaging systems**

Concept of food grade packaging, Material rigid and semi rigid plastic packaging – Fabrication methods in brief – Thermos forming, Blow molding, Injection molding, Extrusion Blow molding, Safety precautions during extrusion, Post production safety aspects

Section 4: Food Engineering

➤ **Raw material preparation**

Procurement of raw material, Cleaning and types Sorting and grading, Peeling, Size reduction, Size reduction of solid and liquid foods, Mixing and forming, Separation and concentration of food components, Centrifugation, Filtration, Extraction, Membrane concentration

➤ **Irradiation**

Dose distribution, Equipment, Application, Effect on food, microorganism and packing, High pressure processing: Theory, equipment. Effect on microorganism, enzymes and hurdle technology, PEF, UV and X-ray.

➤ **Processing by application of heat**

Heat processing, Blanching, Pasteurization, Extrusion, Dehydration, Smoking and frying; Theory, Equipment, Effect on food and microorganism

➤ **Processing by removal of heat**

Chilling modified atmosphere, Freezing, Freeze drying, Dielectric, Ohmic and infrared operations, Theory, Equipment, Effect on food, Effect on microorganisms

Section 5: Food Safety and Quality

➤ **Basic Food safety**

Types of hazard-physical, Chemical and biological, Factors affecting food safety, Quality control concepts as applied to the food industry. General concepts of quality control and quality control, Major quality control functions, Good manufacturing practices, ISO 22000 regulations, FSSAI, Regulations and rules in other countries, Basics and differences with HACCP, Implementing HACCP & ISO 22000 for foods.

➤ **Parameter analysis**

Moisture analysis- Oven drying method, Distillation method, Karl-Fischer Titration method. Fibre analysis: - Crude fibre analysis, Dietary fibre analysis by AOAC method, Protein analysis- Kjeldahl method, Biuret method, Lowry method

➤ **Basics of Instruments**

Principles and concepts of HPLC, GC, GC-MS, NIR, Atomic Spectrophotometry and pH meter, Viscometer, Rheometer, Barometers, Moisture meters, Texture analyzer, Nondestructive analytical equipment

Reference Books:

1. Robertson, G.L. "Food Packaging: Principles and Practice". 2nd Edition. Taylor & Francis, 2006.
2. Food Regulation : Law, Science, Policy, and Practice". John Wiley, 2009.
3. Arthey, David and Ashwat P.R. "Fruit Processing: Nutrition, Products, and Quality Management", 2nd Edition, Springer, 2005.

4. Eckles, C.H., W.B. Combs and H. Macy “Milk and Milk Products”, 4th Edition, Tata McGraw-Hill, 1973.
5. Singh, I.S. “Post-Harvest Handling and Processing of Fruits and Vegetables” Westville Publishing, 2009.
6. The Fundamentals of Food Engineering; Charm SE; 1963, AVI Pub
7. Nielsen, S. S. (Ed.). (1998). Food analysis (Vol. 86). Gaithersburg, MD: Aspen Publishers.
8. Fellows, P. J. (2009). Food processing technology: principles and practice. Elsevier.
9. Mahadeviah M & Gowramma RV. 1996. Food Packaging Materials. Tata McGraw Hill.