

Details	Marks
<b>Unit 1: Fundamentals of Food Chemistry</b> <ul style="list-style-type: none"> <li>Food attributes: colour, texture, flavour, nutritive value</li> <li>Food spoilage: causes, microbial contamination, foodborne illnesses.</li> <li>Water activity and its relation to spoilage.</li> <li>Spoilage of processed foods; detection methods.</li> <li>Carbohydrates; non-enzymatic browning (Maillard reaction, caramelisation).</li> <li>Proteins &amp; amino acids: structure, properties, denaturation.</li> <li>Lipids: fatty acid composition, oxidation, rancidity.</li> <li>Polyphenols &amp; pigments: catechins, flavonols, anthocyanins, chlorophylls, carotenoids.</li> <li>Alkaloids: caffeine, theobromine, theophylline.</li> <li>Organic acids and flavour balance.</li> <li>Enzymes in food processing.</li> </ul>	
<b>Unit 2: Food Preservation Principles &amp; Methods</b> <ul style="list-style-type: none"> <li>Heat processing, dehydration, freezing, canning, pasteurization.</li> <li>Refrigerated and modified atmosphere storage.</li> <li>Fermentation, microwave processing, irradiation, chemical preservatives.</li> <li>Aseptic preservation, hurdle technology, hydrostatic pressure.</li> <li>Non-thermal technologies: microfiltration, PEF, UHV, HPP, thermosonication.</li> <li>Alternate heating: ohmic, dielectric, infrared, induction.</li> <li>Biological preservation: bacteriocins, antibacterial enzymes.</li> <li>Supercritical fluid extraction, cold plasma.</li> </ul>	
<b>Unit 3: Foods of Plant Origin</b> <ul style="list-style-type: none"> <li>Post-harvest handling &amp; storage.</li> <li>Thermal processing, canning, aseptic canning.</li> <li>Dehydration; solar drying; intermediate moisture foods.</li> <li>Juices &amp; beverages: fermented, aerated, health drinks; membrane technology.</li> <li>Convenience foods.</li> <li>Processing of tea, coffee &amp; cocoa.</li> <li>Oleoresins, essential oils; medicinal &amp; aromatic plants.</li> </ul>	75
<b>Unit 4: Milk &amp; Dairy Technology</b> <ul style="list-style-type: none"> <li>Dairy plant equipment &amp; operations.</li> <li>Handling, pasteurization, homogenization.</li> <li>Types of milk: fortified, flavoured, reconstituted, humanized.</li> <li>Fermented milks; dairy products—cream, butter, cheese, condensed/evaporated milk, milk powders, ice cream, cheese spreads, EMC.</li> <li>Enzymes in dairy processing; sanitation; waste disposal.</li> </ul>	
<b>Unit 5: Food Microbiology &amp; Biotechnology</b> <ul style="list-style-type: none"> <li>Fermentation technology &amp; products.</li> <li>Microbial spoilage; bacterial growth curve.</li> <li>Hurdle technology.</li> <li>Fermenters &amp; bioreactors: aeration, agitation, sterilization.</li> <li>Continuous &amp; solid-state fermentation.</li> <li>Biotechnology for improved nutrition &amp; quality.</li> <li>Microbial production of additives: preservatives, colourants, flavours.</li> <li>Enzymes in food industry.</li> <li>SCP; biomass from waste.</li> <li>Food contaminants: aflatoxins, botulism, intoxications &amp; infections.</li> <li>Consumer concerns: safety, risks, values.</li> </ul>	
<b>Unit 6: Flavour Chemistry &amp; Technology</b> <ul style="list-style-type: none"> <li>Flavour composition: identification &amp; quantification.</li> <li>Flavour development: maturation, microbial activity, processing.</li> <li>Odour-active compound analysis (Charm analysis).</li> <li>Microbial &amp; plant-based flavour synthesis.</li> <li>Lipid-derived flavours; antioxidant contributions.</li> <li>Flavour emulsions, composites, essential oils &amp; oleoresins.</li> <li>Flavour encapsulation &amp; stabilization.</li> </ul>	

**Unit 7: Food Quality Management**

- Objectives & functions of quality control.
- Quality systems: control charts, acceptance sampling, auditing, CCPs, recall.
- Food plant sanitation & hygiene.
- Waste management & environmental safety.
- TQM, GMP, HACCP, Codex.
- National & international laws: FSSAI, US-FDA, ISO-9000.
- Food adulteration & food safety.
- Sensory evaluation: panel methods, sensory & instrumental analysis.

**Unit 8: Food Engineering / Packaging & Labelling**

- Unit operations: grading, sorting, peeling, size reduction, energy balance.
- Automation: mixing, thermal processing, dehydration, CIP, QC.
- Packaging materials: properties, testing, shelf-life studies.
- Packaging methods: aseptic, MAP, vacuum, gas packaging.
- Nutritional labelling & container design.
- Recent trends in packaging.
- Time-Temperature Indicators (TTI), intelligent labels.

**Unit 9: Consumer Sciences & Food Product Development**

- Socio-cultural, psychological & economic aspects of consumers.
- Consumer trends & impact on product development.
- Product development stages.
- Food & nutrition; nutritional disorders.
- Functional properties: gelatinization, crystallization, gelation, foaming, emulsification.
- Therapeutic, engineered, organic, nutraceutical & functional foods.
- Nutrigenomics & personalized nutrition.
- Nanotechnology in functional foods.

**Unit 10: Tea Science & Technology**

## Tea Biochemistry

- Amino acids (theanine, glutamic acid), carbohydrates, lipids.
- Polyphenols (catechins → theaflavins & thearubigins), pigments, alkaloids.
- Organic acids; enzymes (PPO, peroxidase, lipoxygenase).

## Processing Operations

- Withering, Rolling/CTC, Fermentation, Drying.
- Sorting & grading.

## Tea Blending

- Blending with food ingredients and plant-based products.

## Tea Storage &amp; Packaging

- Moisture control, flavour retention.
- Vacuum, nitrogen flushing, barrier films.

## Sensory Evaluation

- Colour, flavour, briskness, aroma, astringency.
- Chemical markers related to tea quality.

**Unit 11: Analytical Facilities**

- UV-Visible Spectroscopy
- High Performance Liquid Chromatography (HPLC)
- Gas Chromatography-Mass Spectrometry (GC-MS)
- Infrared Spectroscopy (IR)
- Near-Infrared Spectroscopy (NIR)
- Nuclear Magnetic Resonance (NMR)
- Fluorescence Spectroscopy
- Optical sorting systems
- Sensory panels and sensory instrumentation

**Unit 12: General Studies**

- General Reasoning
- General English
- General Awareness
- Innovative Knowledge

25

**Total Marks****100**