



GATE Syllabus

Part II – LIFE SCIENCE (XL)

Section–XL-U Food Technology



tutorialspoint

SIMPLY EASY LEARNING

www.tutorialspoint.com



<https://www.facebook.com/tutorialspointindia>



<https://twitter.com/tutorialspoint>

SECTION – XL-U: FOOD TECHNOLOGY

Course Syllabus

Unit 1: Food Chemistry and Nutrition

- **Carbohydrates:**
 - Structure and functional properties of mono-, oligo-, & polysaccharides including starch, cellulose, pectic substances and dietary fibre
 - Gelatinization and retrogradation of starch
- **Proteins:**
 - Classification and structure of proteins in food
 - Biochemical changes in post mortem and tenderization of muscles
- **Lipids:**
 - Classification and structure of lipids, rancidity, polymerization and polymorphism
- **Pigments:**
 - Carotenoids
 - Chlorophylls
 - Anthocyanins
 - Tannins
 - Myoglobin
- **Food flavours:**
 - Terpenes
 - Esters
 - Aldehydes
 - Ketones
 - Quinines
- **Enzymes:**
 - Specificity
 - Simple and inhibition kinetics
 - Coenzymes
 - Enzymatic and nonenzymatic browning
- **Nutrition:**
 - Balanced diet
 - Essential amino acids and essential fatty acids
 - Protein efficiency ratio
 - Water soluble and fat soluble vitamins
 - Role of minerals in nutrition
 - Co-factors
 - Anti-nutrients
 - Nutraceuticals
 - Nutrient deficiency diseases

- **Chemical and biochemical changes:**
 - changes occur in foods during different processing

Unit 2: Food Microbiology

- **Characteristics of microorganisms:**
 - Morphology of bacteria, yeast, mold and actinomycetes
 - Spores and vegetative cells
 - Gram-staining
- **Microbial growth:**
 - Growth and death kinetics
 - Serial dilution technique
- **Food spoilage:**
 - Spoilage microorganisms in different food products including milk, fish, meat, egg, cereals and their products
- **Toxins from microbes:**
 - Pathogens and non-pathogens including Staphylococcus, Salmonella, Shigella, Escherichia, Bacillus, Clostridium, and Aspergillus genera
- **Fermented foods and beverages:**
 - Curd, yoghurt, cheese, pickles, soya-sauce, sauerkraut, idli, dosa, vinegar, alcoholic beverages and sausage

Unit 3: Food Products Technology

- **Processing principles:** thermal processing, chilling, freezing, dehydration, addition of preservatives and food additives, irradiation, fermentation, hurdle technology, intermediate moisture foods
- **Food pack aging and storage:** packaging materials, aseptic packaging, controlled and modified atmosphere storage
- **Cereal processing and products:** milling of rice, wheat, and maize, parboiling of paddy, bread, biscuits, extruded products and ready to eat breakfast cereals
- **Oil processing:** expelling, solvent extraction, refining and hydrogenation
- **Fruits and vegetables processing:** extraction, clarification, concentration and packaging of fruit juice, jam, jelly, marmalade, squash, candies, tomato sauce, ketchup, and puree, potato chips, pickles
- **Plantation crops processing and products:** tea, coffee, cocoa, spice, extraction of essential oils and oleoresins from spices
- **Milk and milk products processing:** pasteurization and sterilization, cream, butter, ghee, ice-cream, cheese and milk powder
- **Processing of animal products:** drying, canning, and freezing of fish and meat; production of egg powder

- **Waste utilization:** pectin from fruit wastes, uses of by-products from rice milling.
- **Food standards and quality maintenance:** FPO, PFA, Agmark, ISI, HACCP, food plant sanitation and cleaning in place (CIP)

Unit 4: Food Engineering

- **Mass and energy balance; Momentum transfer:** Flow rate and pressure drop relationships for Newtonian fluids flowing through pipe, Reynolds number
- **Heat transfer:** heat transfer by conduction, convection, radiation, heat exchangers
- **Mass transfer:** molecular diffusion and Fick's law, conduction and convective mass transfer, permeability through single and multilayer films
- **Mechanical operations:** size reduction of solids, high pressure homogenization, filtration, centrifugation, settling, sieving, mixing & agitation of liquid
- **Thermal operations:** thermal sterilization, evaporation of liquid foods, hot air drying of solids, spray and freeze-drying, freezing and crystallization
- **Mass transfer operations:** psychrometry, humidification and dehumidification operations.