

**ELECTIVES / NON CREDIT COURSES**  
**(Each student to register for any three elective courses)**  
(As per 5th Dean's Committee Report)

## 1. Organic Chemistry 3(2+1)

### Theory

Hydrogen bonding: Concepts of hydrogen bonding inter and intra molecular hydrogen bonding in alcohol, carboxylic acids and other molecule. Hydrophobic interactions: Elementary idea of hydrophobicity and its importance in the structure of proteins. Alcohols: Important properties of mono, di and trihydric alcohols (Glycol and Glycerol). Aldehydes and Ketone: Reactions of aldehydes and ketones. Importance of carbonyl compounds in food flavors. Carboxylic acids: Ionization constant and strength of carboxylic acids. Important reactions of carboxylic acid, Derivatives: Esters, Amides, Lactones their preparation and reactions. Amines: Basic character of amines, important reactions. Phenols: Acidic character of phenols and effect of nuclear substituents on it. Reactions in phenols. Substituted carboxylic acid: important reactions of halogen substituted, Keto and Hydroxy acids. Zwitter-ion forms, its properties viz. melting point and volatility. Amino Acids and Peptides: Synthetic and natural amino acids General properties of amino acids. Definition and classification of proteins. Primary, secondary, tertiary and quaternary structure of Proteins. Carbohydrates: Definition, Classification and isomerism. Derivation of structure of Glucose, open chain and ring structure, evidences for ring structure stereochemistry and stability of anomers. Reactions of monosaccharides. Fatty acids and Lipids: Definition and classification. Important reaction of fatty acids (saturated and unsaturated) Structure and properties of Neutral lipids, phospholipids and cholesterol.

### Practical

Systematic identification of Organic Compounds: Aliphatic and Aromatic character, Instauration, Detection of elements (Nitrogen, Sulphur and Halogens), Detection of functional groups (Alcoholic, Phenolic, Carboxylic, Carbonyl, Aldehyde, Ketonic esters, Amino, Amide, Nitro etc.). Preparation of derivatives: Dinitrophenylhydrazone, Oxime and Osazone. Qualitative test for Amino Acids and Proteins: Biuret test, Million's test, Nitroprusside Test, Ninhydrin test, Xantho proteic test, Hopkin's cole reaction. Detection of Carbohydrates (reducing & non reducing sugars) by: Molisch/Orcinol/ Resoreinol/ Silvermirror test. Detection of lipids and phospholipids.

## 2. Nutraceuticals and Functional Foods 2(2+0)

### Theory

Introduction The definition of Functional Foods will be outlined. Students will explore both the industry and the consumer roles involved in this growing field. Antioxidants Students will learn the chemical makeup, free radicals and biochemical functions of antioxidants. Foods explored in this unit will include cranberries, tomatoes, garlic, pomegranate and different iced teas. Dietary Fiber Students will learn about soluble and insoluble fiber, resistant starch, and how important these are to human health. The biochemical functions of dietary fiber will be explored, and oats and oats products will

be the main example used in the classroom. Prebiotics and Probiotics Students will learn the definition of both pre-and probiotics, and their biological functions. How to develop prebiotics and probiotics. Pre- and probiotics will be used together as symbiotics. Lipids and health Students will learn the structure and function of essential fatty acids. Chemistry and health benefits of W-3 fatty acids, phytosterols, and CLA , Olive oil. Functions and sources of vitamins and minerals with proposed functional claims.Sports Drink - functional qualities of sports drinks. Electrolytes and sugar level will be a large part of the discussion. . Infant Formula - ingredients and formulation techniques of infant formula, and all aspects of the product that make it a functional food. Consumer trends surrounding infant formula will also be outlined.

### **3. Food Safety Regulations 2(2+0)**

#### **Theory**

Food Laws and Regulations, Introduction to food acts laws and standards, National food safety and standard act. International standards, regulatory agencies Consumer protection act. Food Quality Management ,Characteristics of quality, Introduction to Food Safety and Hygiene , Food hygiene Factors affecting food safety · Food spoilage, Food handling, Special requirements for high-risk foods, Safe food cooking temperature and storage techniques. Cleaning and disinfection Personal hygiene, Pest control , Waste disposal

### **4. Technology Management 2(2+0)**

#### **Theory**

Introduction to Technology Management: Concept and Meaning of Technology and Technology Management- Technology; Technology management, Evolution and Growth of Technology, Role and Significance of Technology Management, Impact of Technology on Society and Business- Technology and competition; Key issues in managing technological innovation, Forms of Technology- Process technology; Product technology. Technology Forecasting Process, Need and Role of Technology Forecasting, Forecasting Methods and Techniques, Planning and Forecasting. Technology Adoption, Technology Diffusion- of technology diffusion; Perspectives of innovation diffusion process; Activities necessary for diffusion process, Technology Absorption- Role of technology absorption; Benefits of technology absorption; Constraints in technology absorption. Integration of People and Technology, Factors Considered in Technology Management- Organisational factors; Psychological factors, Organizational Structure and Technology

### **5. Emerging Dairy Processing Technologies 2(2+0)**

#### **Theroy**

High Pressure Processing: Principles of high pressure processing, use of high pressure to improve food safety and stability. Effects of high pressure on food quality: Pressure effects on microorganisms, enzyme, texture and nutrients of food. Modelling HP processes. Other applications of high pressure processing. Pulsed electric fields processing: Historical background, PEF treatment systems, main processing parameters.

Mechanisms of action: mechanisms of microbial and enzyme inactivation. PEF for processing of liquid foods and beverages, PEF Processing for solid foods. Food safety aspects of pulsed electric fields. Pulsed electric field and high pressure processing. A thermal membrane concentration of liquid foods and colours: osmotic membrane distillation, direct osmosis, membrane modules, Applications of membrane concentration. Processing by radio frequency electric fields: radio frequency electric fields equipments, RFEF non-thermal inactivation of yeasts, bacteria and spores, electrical costs. Ultrasound processing: fundamentals of ultrasound, ultrasound as a food preservation and processing aid, effects of ultrasound on food properties. Alternate thermal processing: Microwave heating: dielectric properties of foods, heat and mass transfer in microwave processing, application of microwave processing for foods; Radio frequency processing: dielectric heating, material properties, radio-frequency heating and drying applications; Ohmic heating: Fundamentals of ohmic heating, electrical conductivity, modeling, treatment of products. Hybrid drying technologies: combined microwave vacuum drying, combining microwave vacuum drying with other processes, equipment for microwave vacuum drying, product quality degradation during dehydration.