

OBJECTIVES:

1. To understand the history and evolution of food processing.
2. To study the structure, composition, nutritional quality and post harvest changes of various plant foods.

COMPOSITIONAL, NUTRITIONAL AND TECHNOLOGICAL ASPECTS OF PLANT FOODS

UNIT - I: CEREALS MILLETS AND PULSES (22 LECTURES)

1. Introduction, structure, composition and uses and by-products of cereals and coarse cereals.
2. Wheat- Structure and composition of wheat, types (hard, soft/ strong, weak)
Diagrammatic representation of longitudinal structure of wheat grain and process of malting, Gelatinization of starch, types of browning.
3. Rice- Composition of rice obtained by different dehusking methods, parboiling of rice advantages and disadvantages.
4. Millets -Varieties, composition and uses of maize, sorghum, barley, rye, oats, triticale, pearl millet and finger millet.
5. Introduction, common names and scientific names of different pulses. □ Chemical composition of pulses, processing of pulses- soaking, germination, decortications, cooking and fermentation. Toxic constituents in pulses and its Detoxification processes.

UNIT – II: FATS AND OILS (6 LECTURES)

1. Classification of lipids, types of fatty acids - saturated fatty acids, unsaturated fatty acids, essential fatty acids, trans fatty acids
2. Refining of oils, types- steam refining, alkali refining, bleaching, steam deodorization, hydrogenation.
3. Rancidity - hydrolytic and oxidative rancidity and its prevention.
4. Define - margarine, butter, hydrogenated vegetable oil, lard. .

UNIT – III: FRUITS AND VEGETABLES (8 LECTURES)

Classification of fruits and vegetables, general composition, enzymatic browning, names and sources of pigments, Dietary fibre)

Post harvest changes in fruits and vegetables – Climacteric rise, horticultural maturity, physiological maturity, physiological changes, physical changes, chemical changes, pathological changes during the storage of fruits and vegetables. (Ch-8, Srilakshmi)

Compositional, Nutritional and Technological aspects of animal foods**UNIT – IV: FLESH FOODS - MEAT, FISH, POULTRY (12 LECTURES)**

1. Meat - Definition of carcass, concept of red meat and white meat, composition of meat, marbling, post-mortem changes in meat- rigor mortis, tenderization of meat, ageing of meat.
2. Fish - Classification of fish (fresh water and marine), aquaculture, composition of fish, characteristics of fresh fish, spoilage of fish- microbiological, physiological, biochemical.
3. Poultry - Structure of hen's egg, composition and nutritive value, egg proteins, characteristics of fresh egg, deterioration of egg quality, difference between broiler and layers.

UNIT – V: MILK AND MILK PRODUCTS (8 lectures)

1. PFA definition of milk, typical chemical composition of milk of different species i.e. buffalo, cow, goat. Composition of milk, its constituents, various steps in processing of milk. An overview of types of market milk and milk productscheese, paneer, ice cream, ghee, butter, butter oil, flavoured milk, imitation milk.

RECOMMENDED READINGS :

1. Manay, S. & Shadaksharaswami, M., Foods: Facts and Principles, New Age Publishers, 2004
2. B. Srilakshmi, Food science, New Age Publishers,2002
3. Meyer, Food Chemistry, New Age,2004
4. Kenneth F. etal, edited-Vol-1, 2, The Cambridge World History of Food,Cambridge Univ.Press, 2000.
5. Martin Eastwood, Second edition, Principles of Human Nutrition,Blackwell publishng, 2003
6. Potter, Norman. M., Food Science, CBS Publication, 1996
7. Manay, S. & Shadaksharaswami, M., Foods: Facts and Principles, New Age Publishers, 2004
8. De Sukumar. , Outlines of Dairy Technology, Oxford University Press, 2007
9. Frazier William C and Westhoff, Dennis C. Food Microbiology, TMH, New Delhi, 2004

1. Methods of sampling.
2. Identification of different non-perishable commodities-cereals, millets and their by-products.
3. Quality evaluation/inspection of different foods.
 - i. Spices and Condiments
 - ii. Pulses
 - iii. Nuts and oilseeds
 - iv. Tea and coffee
4. Identification of pigments and concept of post harvest changes in fruits and vegetables-climacteric, non climacteric and senescence
5. Estimation of pH of different foods
6. Adulteration tests for different foods:
 - i. Milk and milk products
 - ii. Tea and coffee etc
7. To give the concept of shelf life of different foods.(processed and unprocessed)
8. To perform pasteurization and sterilization of foods.

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OBJECTIVES: To impart basic knowledge of:

1. Cold Preservation and freezers
2. Dehydration
3. Irradiation
4. Food Packaging
5. Thermal Processing

FOOD PROCESSING OPERATIONS:

UNIT – I: A. Cold preservation (4 Lectures)

1. Freezing: requirements of refrigerated storage - controlled low temperature, air circulation and humidity, changes in food during refrigerated storage, progressive freezing, changes during freezing –concentration effect and ice crystal damage, freezer burn. Refrigeration load, factors determining freezing rate-food composition and non compositional influences

B. Freezing- Mechanism and freezers (6 Lectures)

2. Freezing methods -direct and indirect, still air sharp freezer, blast freezer,fluidized freezer, plate freezer, spiral freezer and cryogenic freezing.(Ch 9, Potter)

UNIT – II: Dehydration (10 Lectures)

1. Normal drying curve , effect of food properties on dehydration , change in food during drying ,drying methods and equipments air convection dryer, tray dryer, tunnel dryer ,continuous belt dryer , fluidized bed dryer, dryer, drum dryer, vacuum dryer ,freeze drying ,foam mat drying.

UNIT – III: Food Irradiation and Microwave Heating (7 Lectures)

1. Ionizing radiation and sources, unit of radiations, direct and indirect radiation effects, safety and wholesomeness of irradiated food. Microwave heating and application.

UNIT – IV: Packaging of foods and Material handling (11 Lectures)

1. Packaging: Properties of packaging material, factors determining the packaging requirements of various foods and brief description of packaging of frozen products, dried products, fats and oils and thermally processed foods contaminants formed during processing – nitrosamines, acrylamide etc natural food contaminants and contaminants from packaging material.
2. Elementary concept of material handling in food industry, equipment and functioning of belt conveyor, screw conveyor, bucket elevator and pneumatic conveyor.

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UNIT – V: Thermal processing and Separation processes (10 Lectures)

1. Introduction, classification of Thermal Processes, Principles of thermal processing, Thermal resistance of microorganisms, Thermal Death Time, Lethality concept, characterization of heat penetration data, Thermal process Calculations
2. Principles and methods of: distillation, extraction, washing, filtration, sedimentation, sieving and centrifugation **(Ch 13, 14 Toledo)**

RECOMMENDED READINGS :

1. Desrosier NW and Desrosier JN, The Technology of Food Preservation, CBS Publication, New Delhi, 1998
2. Paine FA and Paine HY, Handbook of Food Packaging, Thomson Press India Pvt Ltd, New Delhi- 1992
3. Potter NH, Food Science, CBS Publication, New Delhi, 1998
4. Ramaswamy H and Marcott M, Food Processing Principles and Applications CRC Press, 2006
5. Rao PG, Fundamentals of Food Engineering, PHI Learning Pvt Ltd, New Delhi, 2010
6. Toledo Romeo T, Fundamentals of Food Process Engineering, AspenPublishers, 1999

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
VI SEMESTER **BIOCHEMISTRY** TIME: 2 Hrs/Week
BCH-A2-6851 (2) **FOOD PROCESSING AND ENGINEERING** Max.Marks:50
w.e.f. 2015-2018('15AC' batch) **PRACTICALS SYLLABUS – IV A2**

1. Comparison of conventional and microwave processing of food
2. Preservation of food by the process of freezing
3. Drying of food using Tray dryer/other dryers
4. Preservation of food by canning(Fruit/Vegetable/meat)
5. Cut-out analysis of canned food
6. Osmotic dehydration
7. Minimal Processing
8. Testing of Packaging material

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OBJECTIVES: To understand the following:

1. Food safety and hygiene
2. Types of hazards associated with food
3. Food regulations (national as well as international)
4. Design and implementation of food safety management systems such as ISO series, HACCP and its prerequisites such as GMP, GHP etc.
5. Emerging concerns

UNIT – I: A. INTRODUCTION TO FOOD SAFETY (3 Lectures)

Definition, Types of hazards, biological, chemical, physical hazards, Factors affecting Food Safety, Importance of Safe Foods

B. Food Hazards of Physical Chemical and Biological Origin (5 Lectures)

Introduction, Physical Hazards with common examples, Chemical Hazards(naturally occurring ,environmental and intentionally added) Impact on health Control measures, Indicator Organisms, Food borne pathogens: bacteria, Food borne pathogens: viruses, Food borne pathogens: eukaryotes, Seafood and Shell fish poisoning, Mycotoxins

UNIT – II: A. Management of hazards 5 Lectures

Need, Control of parameters, Temperature control, Food storage

B. Hygiene and Sanitation in Food Service Establishments 8 Lectures

Introduction, Sources of contamination, Control methods using physical and chemical agents, Waste Disposal, Pest and Rodent Control Personnel Hygiene Food Safety Measures.

UNIT – III: Food laws, Food Standards and Recent concerns 4 Lectures

Indian Food Regulatory Regime, Global Scenario History, National and International laws & Regulations:USFDA, EU, Codex alimentarius, World Trade Organization (Sanitary and Phyto Sanitary agreement, Technical Barriers in Trade), -Standards of Identity, Standards of Quality, Standards of fill of the container. Packaging ,Product labelling and Nutritional labeling, Organic foods, Newer approaches to food safety

UNIT – IV: Food Quality (8 Lectures)

1. Introduction to food quality management – Definition, quality concepts, quality, quality perception, quality attributes, safety, health, sensory, shelf life, convenience, extrinsic attributes, factors affecting food behavior.
2. Quality in the Agri- food production chain-Techno- managerial approach, food quality relationship and food quality management functions. Dynamics on the agri- food production chain, core developments in food quality management.

UNIT – V: Food Additives (12 Lectures)

1. Chemical, technological and toxicological aspects
2. Risk assessment studies- Safety and quality evaluation of additives and contaminants, Acute and chronic studies, NOEL, ADI, LD50
3. Introduction, need of food additives in food processing and preservation.Characteristics and classification of food additives.
4. Antimicrobial agents. -Nitrites, sulphides, sulphur di oxide, sodium chloride, hydrogen peroxide.
5. Antioxidants - Introduction, mechanism of action, natural and synthetic anti-oxidants, technological aspect of antioxidants.
6. Sweeteners- Introduction, importance, classification- natural and artificial, chemistry, technology and toxicology, consideration for choosing sweetening agents.
7. Colors- Introduction, importance, classification- natural, artificial, and natural identical, FD&C Dyes and Lakes. Use of plant tissue culture, polymeric colors etc for color

RECOMMENDED READINGS:

1. Lawley, R., Curtis L. and Davis,J. The Food Safety Hazard Guidebook , RSC publishing, 2004
2. De Vries. Food Safety and Toxicity, CRC, New York, 1997
3. Marriott, Norman G. Principles of Food Sanitation, AVI, New York, 1985
4. Forsythe, S J. Microbiology of Safe Food, Blackwell Science, Oxford, 2000 & Sons; USA, 1987
5. Pieterneel A, Luning, Willem J. Marcelis, Food Quality Management Technological and Managerial principles and practices, Wageningen,2009.
6. Brannen and etal,Food Additives, Marcel Dekker,New York,1990
7. Shalton , Principles and Practices for the safe processing of Foods.
8. DeMan, 3rd edition, Principles of Food Chemistry, Springer, 2007.

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1. Microbiological Examination of different food sample
- 2.. Bacteriological Analysis of Water
3. Assessment of surface sanitation by swab/rinse method
4. Biochemical tests for identification of bacteria
5. Scheme for the detection of food borne pathogens
6. Qualitative tests for fats and oils, spices and condiments.
7. Inspection of quality as per National and International standards for various food
stuffs- pulses, spices,etc
8. Estimation of residual sulphur dioxide in beverages.
9. Estimation of pesticide residues in food/water.
10. Estimation of benzoic acid in foods.

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OBJECTIVES: The students will be enabled to

- Define and understand the scope of clinical biochemistry in diagnosis.
- Apply theory – based tools to chemical analysis of biological fluids.
- Identify and classify the concept of immunity and integrate various aspects related to Immunity.
- Display knowledge of antigen, formation of antibodies, antigen-antibody reaction.

COURSE: A. Immunology

UNIT – I: Concept of immunity, classification – Humoral and cellular immunity . Cells and organs of immune system. Antigens – Nature of antigens, histocompatible antigens – elementary knowledge on Haptens. Immunoglobullins – Structure and function. Types of antibodies, formation of antibodies in the body.

UNIT – II: Clonal selection theory , cooperation of T-Cell with B cell. Secretion of antibody. Genetic basis of antibody diversity. Antigen – Antibody reaction in vivo and in vitro. Components of complement, Complement fixation reaction. Monoclonal antibody – preparation and application in biology. Immunodiagnosics. ELISA, RIA. Vaccines and their classification . Immunological tolerance and Immunosuppression, Hypersensitivity and allergy. Autoimmune diseases.

B. Clinical Biochemistry

UNIT – III: Basic Concepts of Clinical Biochemistry

- a. Definition and scope of clinical biochemistry in diagnosis, Quality control manual versus – automation in clinical laboratory.
- b. Collection and preservation of biological fluids (blood, serum, plasma, urine and CSF) Chemical analysis of blood, urine and CSF. Normal values for important constituents (In SI units) in blood (plasma/serum), CSF and urine, clearance test for urea.

UNIT – IV: Clinical Enzymology

- a. Definition of functional and non-functional plasma enzymes. Isozymes and diagnostic tests. Enzyme pattern in health and disease with special mention of plasma lipase, amylase, cholinesterase, alkaline and acid phosphatase, SGOT, SGPT, LDH and CPK.
- b. Functional tests of kidney, liver and gastric fluids.

UNIT – V: Disorders related to metabolism

Plasma proteins in health and diseases. Disorders of blood coagulation (Haemophilia) Haemoglobinopathies – Sickle Cell Anaemia (SCA), Beta – Thalessemiae.

Disorders of Carbohydrate Metabolism: Hypoglycemia & Hyperglycemia, Diabetes mellitus & its classification, GTT, diabetic ketoacidosis.

Disorders of Lipid Metabolism: Plasma lipoproteins, lipoproteins, hypercholestolemia, Artherosclerosis.

REFERENCES:

1. Goodhart, R.S., & Shils M.E. (1980) – Modern Nutrition in Health and Disease – K.M.Varghese & Co., New Delhi.
2. Davidson, S., and Passmore, R. (1977) – Human Nutrition and Dietetics – E & S., Livingstone Ltd., London.
3. Plummer, D.T. (1979) An Introduction to Practical Biochemistry, Tata MC Graw Hill Book Co., Bombay.
4. Oser, B.L. (1961) Hawk's Physiological Chemistry, Tata MC Graw Hill Book Co. Bombay.
5. Burits, C.A & Ashwood, E.R (Eds)(V Edn) Tietz Fundamentals of Clinical Biochemistry. WBSaunders & Co. New York.

OBJECTIVES: To enable the students to -

- Conduct experiments designed for study of nutritional/environmental biochemistry.
- Interpret experimental/investigative data and distinguish between normal and abnormal data derived as a result of test performed and observed in the laboratory.
- Apply theory based tools to solve simple biochemical problems related to subject areas.
- Work in a laboratory with selected experimental techniques and methods which are applied in biochemical experiments.
- Communicate knowledge about problem areas within biochemical subject areas in writing.

Immunology & Clinical Biochemistry

COURSE:

1. Techniques of immunization and bleeding.
2. Visualization of antigen – antibody reaction by Ouchterlony technique .
3. Immunoprecipitation and precipitin curve.
4. Radial Immuno Diffusion
5. Pregnancy test
6. Estimation of urinary creatine .
7. Estimation of serum bilirubin
8. Determination of serum alkaline phosphatase activity .
9. Qualitative test for albumin, glucose, ketone bodies in Urine.

REFERENCES:

1. Plummer, D.T.(1979) An Introduction to Practical Biochemistry, Tata MC Graw Hill Book Co., Bombay.
2. Oser, B.L.(1961) Hawk's Physiological Chemistry, Tata MC Graw Hill Book Co. Bombay.
3. Burtis, C.A.&Ashwood, E.R(Eds)(V Edn) Tietz Fundamentals of Clinical Biochemistry. W.B.Saunders &Co. New York.
4. Human Physiology – Guyton
5. Clinical Biochemistry – VARLEY (Practicals)