I BSc FND - I Semester
PLANT FOOD SCIENCE
THEORY

48 hours
4 hrs / week

OBJECTIVES:

This course will enable the students to

1. Understand factors to be considered during selection of basic commodities, raw and processed and various aspects of their products and distribution
2. Understand the principles underlying changes in food characteristics during cooking.
3. Be familiar with evaluation of food products for their quality characteristics

UNIT 1: FOOD GROUPS 12 hours

- Introduction to food science
  - Food as a source of nutrients
- Food groups
  - ICMR Five Food Group System
  - Eleven Food Group System
- Nutritional Classification of foods
- Advantages of cooking
- Methods of cooking
  - Moist head method – Boiling, simmering, poaching, stewing, steaming and pressure cooking
  - Dry heat method – grilling, roasting and baking
  - Fat as media of cooking – sautéing, shallow and deep fat frying
  - Its merits and demerits
- Microwave cooking

UNIT 2: CEREALS 12 hours

- Structure of a cereal grain
- Nutritive value and milling of rice and wheat
- Parboiling – its merits and demerits
- Characteristics of starch – Amylose and Amylopectin
- Gelatinization of starch
- Modified starch

UNIT 3: PULSES, NUTS, OILSEEDS, FATS AND OILS 12 hours

- Nutritive value
- Processing of pulses – effects of decortication, soaking, germination and fermentation
- Types of fats and oils
  - Vegetable oil – coconut, groundnut, sunflower and soybean
  - Animal fats – lard, margarine and butter
- Processing of fats and oils – rendering, pressing, solvent extraction, hydrogenation and refining
- Changes during cooking and storage

UNIT 4: FRUITS AND VEGETABLES 12 hours

FRUITS

- Classification and nutritive value
- Post harvest changes and storage

- Pectin substances
- Ripening of fruits

VEGETABLES

- Classification, nutritive value
- Vegetable cookery

a. Preliminary preparation – washing, peeling and blanching
b. Changes during cooking – oxidation, chemical composition, water content and cellulose
c. Role of nutrients – mechanical losses, solvent action of water, oxidation and chemical composition
    - Enzymes and non enzymatic browning, its prevention
    - Flavor compounds

PRACTICALS 36 HOURS 3 HRS/WEEK

1. Food groups
2. Methods of measuring ingreditens
3. Determination of the percentage of edible portion
4. Cereal cookery
    a. Methods of cooking fine and coarse cereals
    b. Prepartion of selection Indian cereal recipes
5. Pulses cookery
    a. Cooking of soaked and raw pulses
    b. Effects of adding salt, acid and alkali on cooking
    c. Preparation of selected common recipes
6. Vegetables and fruits
    a. Browning reaction
    b. Effect of acid and alkali
    c. Preparation of selected common recipe

REFERENCES

- Levies (1988): Food commodities, Heinemann Ltd., London
- Hughes and Benniion M (1970) Introductory Foods, Macmillan and Co, New York
- Dowell P, Bailey A (1980) The Book of ingredients, Dorking Kinderley Ltd., London
- Roseville LJ, Viera ER (1992) Elementary food science, 3rd Edition, Chapman and Hall, New York
- Charley H. (1982) Food Science, 2nd Edn, John Wiley and Sons.
- Potter NN, Hotchkiss JH (1966) Food Science, Edn 5, CBS Publisher and Distributors, Delhi

I BSc FND - I Semester
HUMAN PHYSIOLOGY - I
THEORY

48 hours
4 hrs / week

OBJECTIVES:
This course will enable the students to:
1. To understand the homoeostatic status of the human body
2. To understand the physiological processes and functions as applicable to human nutrition

UNIT I:
i) INTRODUCTION 4 HOURS
Cell – structure and organs, nucleus, chromosomes, genes, cell division, types of cell tissue transport, homoeostasis and body fluids
Cell junctions

ii) BLOOD 12 HOURS
- Red blood cells – Erythropoiesis, stages of differentiation function, count, physiological variation
- Hemoglobin – structure, function, concentration, physiological variation
- White blood cells – production, function, life span, count, differential count
- Platelets – origin, normal count, morphology, functions
- Plasma proteins – production, concentration, types, albumin, globulin, fibrinogen
- Haemostasis and blood coagulation
- Haemostasis – definition, normal haemostasis, clotting factors, mechanism of clotting, disorders of clotting factors

Blood Bank
- Blood groups – ABO system, Rh system, Blood grouping and typing, cross matching
- Rh system – Rh factor, Rh incompatibility
- Blood transfusion – Indication, universal donor and recipient concept. Complications of blood transfusion and cross matching
- Selection criteria of a blood donor, transfusion reactions
- Anticoagulants – classification, examples and uses
- Anaemia – classification – morphological and etiological effects of anaemia on body
- Blood indices – colour index, MCH, MCV, MCHC
- Erythrocyte sedimentation rate (ESR) and packed cell volume
- Blood volume – normal value, determination of blood volume and regulation of blood volume
  - Lymph – lymphoid tissue formation, circulation, composition and function of lymph
  - Types of immunity

UNIT III: CARDIOVASCULAR SYSTEM 10 HOURS
- Heart – physiological anatomy, nerve supply, properties of cardiac muscle, cardiac cycle – systole, diastole, conduction system
- Cardiac output
- Heart sounds: Normal heart sounds, areas of auscultation
- Blood pressure – Definition, normal value, clinical measurement of blood pressure
- Physiological variations, regulation of heart rate, cardiac shock, hypotension, hypertension, radial pulse

- Heart Sounds – Normal heart sounds, characteristics and signification (significance), heart rate
- Electrocardiogram (ECG) – significance, coronary, cerebral circulation and capillary circulation

UNIT IV: DIGESTIVE SYSTEM 10 HOURS

- Physiological anatomy of gastro-intestinal tract, functions of digestive system
- Salivary glands – structure and functions, deglutition, mastication – stages and regulation of saliva, functions of saliva
- Stomach – structure and functions
- Gastric secretion – composition, function, regulation of gastric juice secretion
- Pancreas – structure, function, composition and regulation of pancreatic juice
- Liver – functions of liver
- Bile secretion - composition, function, regulation of bile secretion, bilirubin metabolism, types of bilirubin, jaundice – types, significance
- Gall bladder – functions
- Intestine – small intestine and large intestine
- Small intestine - functions, digestion, absorption, movements
- Large intestine – functions, digestion and absorption of carbohydrates, proteins, fats, lipids
- Defecation

UNIT V: RESPIRATORY SYSTEM 12 HOURS

- Function of respiratory system physiological anatomy of respiratory system, respiratory tract, respiratory muscles, respiratory organs – lungs, alveoli, respiratory membrane, stages of respiration
- Mechanism of normal and rigorous respiration, forces opposing and favouring expansion of the lungs, intra pulmonary pleural pressure, surface tension, recoil tendency of the wall
- Transportation of the respiratory gases: Transportation of oxygen: direction, pressure gradient, forms of transportation, oxygenation of haemoglobin, quantity of Oxygen transported
- Lung volumes and capacities
- Regulation of respiration, mechanisms of regulation, nervous and chemical regulation, respiratory centre
- Hypoxia, cyanosis, asphyxia, dyspnoea, dysbarism, artificial respiration, apnoea

PRACTICALS 36 HOURS 3 HRS/WEEK

1. Spotters (tissue slide)
   Cartilage, bone, adipose tissue, skin, muscle – Identify and write description
2. Record of blood pressure – Sphygmomanometer, palpatory method, auscultatory method, variation of BP
3. Haemoglobin estimation
4. Blood grouping

REFERENCES

1. Guyton AC, Hall JE (1996): Textbook of Medical Physiology, 9th Edn, Prism Books Pvt Ltd., Bangalore
2. Chatterjee Chandi Charan (1988) London, WB
3. Wilson (1989) Anatomy and Physiology in Health and Illness, Edinburgh Churchill Livingstone
4. Textbook of medical physiology by Sembulingam

I BSc FND - I Semester

PRINCIPLES OF NUTRITION

THEORY

48 hours

4 hrs / week

OBJECTIVES:

This course will enable the students to

1. Understand the functions and sources of nutrients
2. Apply the knowledge in maintenance of good health for the individual and the community
3. Be familiar with factors affecting availability and requirements

UNIT 1: NUTRITIONAL STATUS 12 hours

- The relation of good nutrition to normal physical development and sound health
- Methods of assessing nutritional status – Population sampling, collection of data on the nutritional adequacy of diet consumes, anthropometric measurements, clinical examination, biochemical assessment
- Diet surveys – methods

ENERGY

- Definition of health and nutrition. Definition of calorie and joule. Measurement of calorific values of foods
- Basal Metabolic Rate (BMR)
- Specific Dynamic Action (SDA) of foods
- Energy needs of the body. Measurement of energy balance of the body. Direct and indirect calorimetry.Calculation of energy requirements
- The ideal proportion of calories from protein, carbohydrates and fats

UNIT 2: CARBOHYDRATES 12 hours

- Classification, chemistry, digestion, absorption, brief overview of metabolism, functions, sources and requirements

UNIT 3: PROTEINS 12 hours

- Classification, chemistry, digestion, absorption, brief overview of metabolism, functions, sources and requirements. Essential amino acids, evaluation of protein quality, supplementation and deficiency state

UNIT 4: LIPIDS / FATS 12 hours

- Classification, chemistry, digestion, absorption, brief overview of metabolism, functions, sources and requirements. Saturated and unsaturated fatty acids and effects of deficiency

PRACTICALS 36 HOURS 3 HRS/WEEK

1. Qualitative test for proteins
2. Quantitative estimation of glucose
3. Estimation of total lipid in egg yolk

REFERENCES

1. Guthrie AH (1986): Introductory Nutrition, 6th Edition, The CV Mosby Company
2. Swaminathan M (1985) Essentials of food and nutrition, Vol I and II, Ganesh and Co, Madras
3. Gopalan C (1991) Nutrition value of Indian foods, ICMR
4. WTO Technical Reports Series for Different Nutrients.
5. Robinson CH, Lawler MR, Chenoweth WL, Garwick AE (1986) Normal and therapeutic nutrition, 17th Edition, Macmillan Publishing Co.

I BSc FND - II Semester
ANIMAL FOOD SCIENCE
THEORY

48 hours
4 hrs / week

OBJECTIVES:
This course will enable the students to

1. Understand factors to be considered during selection of basic commodities, raw and processed and various aspects of their products and distribution
2. Understand the principles underlying changes in food characteristics during cooking.
3. Be familiar with evaluation of food products for their quality characteristics

UNIT 1: MILK AND MILK PRODUCTS 12 hours

- Composition and nutritive value
- Properties of milk
- Effect of heat on milk constituents
- Processing of milk – clarification, pasteurization and homogenization
- Preparation of cheese, butter, curd and ice cream
- Problems encountered in cooking milk
- Milk products – Vitamin D milk, skim milk, concentrated milk and cream

UNIT 2: EGG 12 hours

- Structure and nutritive value
- Composition – egg white and egg yolk proteins
- Egg quality – evaluation of egg quality, egg grading and deterioration of egg quality
- Egg beating and factors affecting foaming
- Egg cookery
    - Egg prepared in the shell
    - Egg prepared out of the shell – poached egg, fried egg, scrambled egg and omelette
- Products based on egg as thickening agent - Custard
- Products based on egg as emulsifying agent - Meringues
- Storage of egg

UNIT 3: MEAT 12 hours

- Structure and composition of meat
- Classes of meat
- Gelatin
- Cuts and grades of meat and their selection
- Post mortem changes, storage and changes during cooking
- Ageing of meat and curing of meat
- Factors affecting tenderness of meat

UNIT 4: POULTRY AND FISH 12 hours

- Classification and nutritive value
- Processing and preservation
- Selection and storage
- Methods of cooking poultry and fish cookery
- Spoilage of fish

MISCELLANEOUS

- Spices and condiments – Composition, flavouring extracts, adulteration and medicinal values
- Processing and uses of major spices – Pepper (white and green), cardamom, ginger and turmeric

PRACTICALS 36 HOURS 3 HRS/WEEK

1. Fats and oils
   Smoking point
   Preparation of common recipes

2. Milk cookery
   Experimental cookery on milk
   Common preparations with milk, cheese and curds

3. Egg cookery
   Evaluation of fresh egg
   Experimental cookery – boiled egg, poached egg, omelette and custard
   Preparation of selected common recipes with milk

REFERENCES

- Levies (1988): Food commodities, Heinemann Ltd., London
- Hughes and Benniion M (1970) Introductory Foods, Macmillan and Co, New York
- Dowell P, Bailey A (1980) The Book of ingredients, Dorking Kinderley Ltd., London
- Roseville LJ, Viera ER (1992) Elementary food science, 3rd Edition, Chapman and Hall, New York
- Charley H. (1982) Food Science, 2nd Edn, John Wiley and Sons.
- Potter NN, Hotchkiss JH (1966) Food Science, Edn 5, CBS Publisher and Distributors, Delhi

I Year B.Sc. FND II SEMESTER
HUMAN PHYSIOLOGY - II
THEORY

4 Hours/week
Total 48 hours

OBJECTIVES

This course will enable the students to

1. To understand the homeostatic status of the human body
2. Understand the physiological processes and functions as applicable to human nutrition

UNIT I: ENDOCRINE SYSTEM 10 Hours

- Definition, classification of endocrine glands and their hormones, properties of hormones
- Thyroid gland hormones – regulation of secretion. Disorders – hypo and hypersecretion of hormone
- Adrenal gland, adrenal cortex, physiological anatomy of adrenal gland
- Adrenal cortex, cortical hormones – functions and regulation
- Adrenal medulla – hormones, regulation and secretion
- Functions of adrenaline and nor-adrenalin
- Pituitary hormones – anterior and posterior pituitary hormones, secretion, function
- Pancreas – hormones of pancreas
- Insulin – secretion, regulation, function and action
- Diabetes mellitus – regulation of blood glucose level
- Parathyroid gland – function, action, regulation of secretion of parathyroid hormone
- Calcitonin – function, action, calcium metabolism and hormone regulating calcium metabolism

UNIT II:

i) SPECIAL SENSES AND NERVOUS SYSTEM 4 Hours

- Vision – structure of eye, function of different parts, light reflex
- Structure of retina, refractive errors, colour blindness, night blindness, accommodation
- Hearing – structure and function of ear, mechanism of hearing, deafness, vestibular apparatus
- Taste buds – functions, smell physiology, receptors

ii) NERVOUS SYSTEM 12 Hours

- Functions of nervous system, neuron structure, classification and properties, neuroglia
- Nerve fibre, classification, conduction of impulses, factors affecting conduction
- Synapse - structure, types, properties
- Receptors - definition, classification, properties
- Reflex action - reflex arc, properties of reflex action, Babinski's sign
- Spinal cord nerve tracts - classify tracts and describe their function
- Functions of medulla, pons, hypothalamus
- Cerebral cortex, lobes and functions, sensory cortex, motor cortex
- Cerebellum - functions of cerebellum
- Basal ganglion - functions, EEG, Parkinson's disease
- Cerebro Spinal Fluid (CSF) - formation, circulation, properties, composition and functions, lumbar puncture, sleep, types of sleep

iii) AUTONOMIC NERVOUS SYSTEM 2 HOURS

- Sympathetic and parasympathetic distribution and functions. Comparisons of functions

UNIT III

i) EXCRETORY SYSTEM 10 HOURS

- Classify excretory organs
- Kidneys: functions of kidneys, structural and functional unit nephrons, vasarecta, cortical and juxtamedullary nephrons - comparison, juxtaglomerluar apparatus - structure and function
- Renal circulation peculiarities
- Mechanism of urine formation - ultrafiltration criteria for filtration, GFR, plasma fraction, determination of GFR
- Selective reabsorption - sites of reabsorption, substance reabsorbed, mechanisms of reabsorption
- Tubular secretion, properties and composition of normal urine output
- Abnormal constituents of urine
- Counter-current mechanisms: micturition, innervations of bladder, cystourethrogram
- Diuretics: water, diuretics, osmotic diuertics, artificial kidney, renal function tests

ii) SKIN

- Structure and function
- Body temperature measurement, physiological variation, regulation of body temperature by physical, chemical and nervous mechanisms
- Role of hypothalamus, hypothermia and fever

UNIT IV: REPRODUCTIVE SYSTEM 5 HOURS

- Function of reproductive system, puberty
- Male reproductive system - functions of testis, spermatogenesis, ... stages, factors influencing semen, endocrine functions of testes
- Androgens - Testosterone structure and functions
- Female reproductive system - ovulation, menstrual cycle, physiological changes during pregnancy, pregnancy test
- Lactation: Composition of milk factors controlling lactation
- Contraception

UNIT V: MUSCLE NERVE PHYSIOLOGY 5 HOURS

- Classification of muscle, structure of skeletal muscle, sarcomere, contractile proteins
- Neuromuscular junction, transmission across neuromuscular junction, excitation contraction coupling. Mechanism of muscle contraction muscle tone, fatigue
- Rigor mortis, isometric and isotonic concentration

PRACTICALS 36 HOURS 3 HRS/WEEK

i) Spotters - instruments used in haematology
ii) Minor experiments - Bleeding time, clotting time
iii) Major experiments - Total leucocyte count, RBC count, Differential WBC count

REFERENCES

1. Guyton AC, Hall JE (1996): Textbook of Medical Physiology, 9th Edn, Prism Books Pvt Ltd., Bangalore
2. Chatterjee Chandi Charan (1988) London, WB
3. Wilson (1989) Anatomy and Physiology in Health and Illness, Edinburgh Churchill Livingstone
4. Textbook of medical physiology by Sembulingam

I BSc FND - II Semester

HUMAN NUTRITION

48 hours

4 hrs / week

OBJECTIVES:

This course will enable the students to

1. Understand the functions and sources of nutrients
2. Apply the knowledge in maintenance of good health for the individual and the community.
3. To be familiar with factors affecting availability and requirements

UNIT 1: MACRO MINERALS 12 hours

Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chlorine and Sulphur-functions, sources, requirements and effects of deficiency

UNIT 2: MACRO MINERALS 12 hours

Copper, Cobalt, Zinc, Iodine, Manganese, Fluorine, Molybdenum, Selenium, Chromium, Iron-functions, sources, requirements and effects of deficiency

UNIT 3: VITAMIN 12 hours

Classification on the basis of solubility, Vitamin A, D, E, K, Ascorbic acid, Thiamin, Riboflavin, Niacin, Folic acid, Vitamin B12, Pantothenic acid, Pyridoxine-functions, sources, absorption, requirements and deficiency

UNIT 4: WATER AND FIBRE 12 hours

Water: Importance, distribution in the body, functions, oedema, dehydration, sources, water balance and requirements

Fibre: Definition, classification, sources and role of fibre in human nutrition

PRACTICALS 36 HOURS 3 HRS/WEEK

4. Qualitative test for minerals
5. Quantitative estimation of Ascorbic acid using any two different samples
6. Preparation of ash solution and quantitative estimation of Calcium, Phosphorus, Iron using any two different samples
7. Estimation of Calcium from types of milk

REFERENCES

- Guthrie AH (1986): Introductory Nutrition, 6th Edition, The CV Mosby Company
- Swaminathan M (1985) Essentials of food and nutrition, Vol I and II, Ganesh and Co, Madras
- Gopalan C (1991) Nutrition value of Indian foods, ICMR
- WTO Technical Reports Series for Different Nutrients.
- Robinson CH, Lawler MR, Chenoweth WL, Garwick AE (1986) Normal and therapeutic nutrition, 17th Edition, Macmillan Publishing Co.

II BSc FND - III Semester
CHEMISTRY I
THEORY

48 hours
4 hrs / week

OBJECTIVES:

- To enrich the knowledge about the basic principles, fundamental concepts and unique mechanistic steps involved in chemical and biochemical reactions
- To provide an introduction to key concepts of modern analytical methods and to equip the students to handle the modern analytical instruments
- To expose the students to the rapid development and enormous expansion of every phase of chemistry

UNIT 1:

1. Periodic table and periodicity 6 hours

Modern periodic table, classification of elements into s,p,d and f blocks, Periodic properties: atomic size, ionization energy, electron affinity and electro negativity, factors influencing variation in a group and period explanation for observed trend

2. Structure and Bonding 5 hours

Chemical bonding, types of chemical bonds – ionic, covalent, coordinate. Hybridization – sp, sp2, sp3, bond length, bond angles, bond energy, van der Waals interactions, Hydrogen bonding – inter and intramolecular and their significance – anomalous properties of water

3. Solvents 3 hours

Types of solvents and their characteristics, weak interactions in aqueous solutions, interaction between water and polar solutes, solubility of ionic solids and its dependence on lattice energy and solvation energy. Explanation for solubility of alcohols and sugars in water

UNIT II:

1. Methods of analysis 6 hours

Qualitative, quantitative volumetry, gravimetry and instrumental methods of analysis. Errors in quantitative analysis, minimization of errors. Accuracy, precision, significant figures, measurement of accuracy – absolute error, relative error, measurement of precision – standard deviation, variance

2. Viscosity and surface tension 2 hours

Definition, effect of temperature, determination, applications

3. Reaction Kinetics 4 hours

Molecularity and order of reactions, second order reactions, differential integral equations, methods of determining order of a reaction, theories of reaction rates – collision theory and transition state theory, parallel and consecutive reactions with examples

UNIT III:

1.Acids and bases: 6 hours

Arrhenius, Bronsted Lowry, solvent system and Lewis concept of acids and bases. Hard and soft acids and bases. Ionic product of water, common ion effect and applications, pH scale, buffers, buffer capacity, Henderson's equation, preparation of acidic and basic buffers, buffers in biological system – blood plasma, RBC and tissue fluids, theory of acid-base indicators, pH titration curves and isoelectric pH of amino acids. Choice of indicators of acid base titrations

2. Binary Liquid mixtures 06 hours

Liquid-liquid mixtures, ideal liquid mixtures, non ideal liquid mixtures
Azeotropes HCl – water, ethanol-water systems. Principle of fractional distillation, partially miscible liquids – phenol water system. Trimethyl amine – water and nicotine water systems Lower and upper consolute temperature. Effect of impurity on consolute temperature, steam distillation – principle and applications, Nernst distribution law and applications. Solutions of gases in liquids – Henry's law and its limitations

UNIT IV

1. Introduction to Organic Chemistry 03 hours
   Classification, unique characteristics, IUPAC nomenclature of organic compounds, isomerism
2. Investigation of organic compounds 03 hours
   Detection and quantitative estimation of elements Nitrogen, Sulphur, Phosphorus and Halogens (problems to be solved)
3. Field effects and reaction intermediates 03 hours
   Resonance, hyper conjugation, aromaticity inductive and field effects, hemolytic and heterolytic bond breaking, electrophiles, nucleophiles, energy consideration, reactive intermediates, carbo – cations, carbanions free radicals, carbenes with examples
4. Arenes 03 hours
   Structure of benzene, mechanism of nitration and Fridel-Crafts reaction. Electronic interpretation of orienting influence of the substituents in the electrophilic substitution of chlorobenzene, toluene, nitrobenzene and phenol

PRACTICALS 36 HOURS 3 HRS/WEEK

4. Qualitative analysis of organic compounds – Urea, benzamide, aniline, acetophenone, O-cresol, nitro benzene, chlorobenzene, Benzoic acid, resorcinol benzyl alcohol, benzaldehyde
5. Chromatography experiments
   1. Ascending paper chromatography of amino acids
   2. Separation of natural lipids by TLC

REFERENCES

- Soni PL (1988) A textbook of Inorganic chemistry, Sulthan Chand & Sons
- Lee JD (1988) Concise Inorganic Chemistry, Blackwell Sceince
- Skoog, West and Hollar (1993) Fundamental Analytical Chemistry, New York CBS Publishers
- Gurudeep Raj (2001) A text book of Inorganic chemistry, Goel Publishing house, Meerut
- Soni PL (2000) A textbook of Organic chemistry, Sulthan Chand & Sons
- Bahl A and Bahl BS (2000) Advanced organic chemistry, Sulthan Chand & Sons
- Vogel AL (1994) ELBS Edition,
- Agarwal OP (1998) Chemistry of natural products, Goel Sulthan Chand & Sons Publishing House, Meerut
- Madan RL, Tuli GD (2001) Physical Chemisty, Sulthan Chand & Sons
- Raj Gurudeep (2001) Textbook of advanced Physical chemistry, Goel Publishing House, Meerut
- Lehninger, A.L., Nelson, D.L. and Cox, M.M (1993); 2nd Ed. Principles of Bio Chemistry, CBS Publishers and distributors.

II BSc FND - III Semester
LIFE SPAN NUTRITION

48 hours
4 hrs / week

OBJECTIVES:
This course will enable the students to
- Understand the process of growth and development from birth till adolescence
- Familiarize with nutritional needs at different stages of growth.
- Understand the concept of growth promotion

UNIT 1: BASIC PRINCIPALS OF MEAL PLANNING 12 hours
- Explanation of terms: Health, RDA, Adequate intake, Balanced diet
- Food exchange list, food guide pyramid
- Vegetarian diets - classification of vegetarianism
- Quality of various nutrients - proteins, fats, minerals, vitamins, fibres and antioxidants
- Principles of planning meals
- Factors affecting meal planning

UNIT 2: NUTRITION DURING INFANCY 12 hours
- Growth and development
- Use of growth chart to monitor development
- Advantages of breast feeding
- Nutrition factors of human milk
- Difference between human and animal milk
- Artificial feeding
- Factors to be considered in bottle feeding
- Feeding problems
- Nutritional requirements

Weaning: Need and use
- Points to be considered in introducing weaning foods
- Problems in weaning
- Types of supplementary foods

UNIT 3: NUTRITIONAL NEEDS FOR PRE SCHOOL AND SCHOOL CHILDREN
12 hours

Pre School
- Factors to be considered in planning meals for preschool children
- Factors affecting nutritional status
- Pica
- Dietary guidelines
- Nutritional requirements
- Diet planning

School children
- Meal planning for school children
- Feeding problems
- School lunch programmes

- Factors affecting feeding programmes
- Nutritional requirements
- Diet planning

UNIT 4: NUTRITIONAL NEEDS FOR ADOLESCENTS 12 hours

- Special needs for girls during menarche
- Food habits
- Dietary guidelines
- Nutritional problems- obesity, eating disorder, osteoporosis, anemia, under nutrition, premenstrual syndrome
- Nutritional requirements
- Diet planning

PRACTICALS 36 HOURS 3 HRS/WEEK

Planning, preparing and calculating the major nutrients of the following (Standard with two planned diets with different calories) – Weaning, Normal diet, Infancy, Preschool Child, School going Child, Adolescents

REFERENCES

1. Ghosh (1992) The feeding and care of infants and young children, VHAI, 6th Edn, New Delhi
2. WHO (1978): A growth chart for international use in maternal and child health care, Geneva
3. Gopalan C (1993) Recent trends in nutrition, 9th Edn, Oxford Univ. Press
4. Mclaren DS, Meguid MM (1998) Nutrition and its disorders, Churchhill Livingstone
5. Swaminathan M (1985) Essentials of food and nutrition, Vol I and II, Ganesh and Co, Madras

II BSc FND - III Semester
DIETETICS

48 hours
4 hrs / week

OBJECTIVES:
This course will enable the students to
1. Know the principles of diet therapy
2. Understand the modifications of normal diet for therapeutic purposes
3. Understand the role of dietician

UNIT 1: CONCEPT OF DIET THERAPY AND MEAL PLANNING 12 hours
- Reference man and woman
- Balanced diet
- Recommended dietary allowances [RDA] and its approaches of assessing nutrient requirements
- Objectives of diet therapy
- Growth and scope of dietetics
- Characteristics and role of dietician
- Food prescription

UNIT 2: ROUTINE HOSPITAL DIETS 12 hours
- Liquid diet, semi-solid, regular and bland diet
- Modification of normal diets
- Types of feeding - oral feeding and tube feeding - enteral and parental

UNIT 3: DIETS IN OBESITY AND UNDERWEIGHT 12 hours
Obesity
- Etiology, assessment, types
- Regional distribution of fat in the body
- Metabolic changes in obesity
- Modification, dietary treatment
- Nutritional requirements
- Diet planning

Under weight:
- Aetiology
- Symptoms and complications
- Dietary management

UNIT 4: DIET IN FEBRILE CONDITIONS 12 hours
Fever: Development, types and metabolic changes
Causes and dietary management of typhoid, influenza, malaria, tuberculosis and AIDS

PRACTICALS 36 HOURS 3 HRS/WEEK
Planning, preparing and calculating the following diets (Standards with two different planned diets)
- Fluid diets
- Obesity
- Underweight

- Febrile conditions

REFERENCES

1. Anderson L, Dibble MV, Turkki PR, Mitchall HS, Rynbergin HJ (1982): Nutrition in health and disease, 17th Edn, JB Lippincott and Co., Philadelphia
2. Antia FP (1973) Clinical dietetics and nutrition, 2nd Edn, Oxford Univ. Press, Delhi
3. Williams SR (1989) Nutrition and diet therapy, 6th Edn, Time, Mirror, Mosby College Publishing, St Louis
4. Raheen Begum (1989) A textbook of foods, nutrition and dietetics, Sterling Publishers, New Delhi
5. Joshi SA, (1992) Nutrition and dietetics, Tata McGraw Hill Publications, New Delhi
6. Srilakshmi B (2011) Dietetics, 6th Edn, New Age International Publishers, New Delhi

II BSc FND - IV Semester

NUTRITION THROUGH LIFE CYCLE

THEORY

48 hours

4 hrs / week

OBJECTIVES:

This course will enable the students to

1. Understand the process of growth and development and the concept of growth promotion
2. Get familiar with nutritional needs at different stages of growth.

UNIT 1: NUTRITIONAL NEED FOR ADULTS 12 hours

- Reference man and reference woman in relation to occupation
- Dietary guidelines to reduce the cost of a meal
- Nutritional requirements
- Diet planning

UNIT 2: NUTRITION DURING PREGNANCY 12 hrs

- Normal growth and weight gain
- Physiological changes
- Dietary modifications
- General dietary problems
- Complications during various stages of pregnancy
- Nutritional requirements
- Diet planning

UNIT 3: NUTRITION NEEDS DURING LACTATION 12 hrs

- Physiology of lactation
- Milk output and factors affecting it
- Dietary guidelines
- Nutritional requirements
- Diet planning

PRACTICALS 36 HOURS 3 HRS/WEEK

Planning, preparing diets and calculating the major nutrients of following (Standard with two planned diets of different calories and activities)

- Adult
- Pregnancy
- Lactation
- Old age

REFERENCES

1. Ghosh (1992) The feeding and care of infants and young children, VHAI, 6th Edn, NewDelhi
2. WHO (1978): A growth chart for international use in maternal and child health care, Geneva
3. Gopalan C (1993) Recent trends in nutrition, 9th Edn, Oxford Univ. Press
4. Mclaren DS, Meguid MM (1998) Nutrition and its disorders, Churchhill Livingstone
5. Swaminathan M (1985) Essentials of food and nutrition, Vol I and II, Ganesh and Co, Madras
6. Srilakshmi B (2011) Dietetics, 6th Edn, New Age International Publishers, New Delhi

II BSc FND - IV Semester

DIET THERAPY

THEORY

48 hours

4 hrs / week

OBJECTIVES:

This course will enable the students to

3. Know the principles of diet therapy
4. Understand the modifications of normal diet for therapeutic purposes
5. Understand the role of the indication.

UNIT 1: DIET IN BURNS INJURY AND SURGERY CONDITIONS 12 hours

Nutritional care and modification of diets in burns, injury and surgery conditions

DISEASE OF GASTRO-INTESTINAL TRACT

Aetiology, complication and dietary management of the following: Peptic ulcer, Gastritis – acute and chronic gastritis, Diarrhoea and constipation

UNIT 2: FOOD ALLERGY 12 hours

- Definition, types of allergy, common food as allergens
- Signs and Symptoms, tests for allergy
- Dietetic treatment

UNIT 3: NUTRITIONAL DEFICIENCY DISEASE 12 hours

- Aetiology, dietary treatment and prevention
- Protein – energy malnutrition
- Vitamin – A deficiency

UNIT 4: NUTRITIONAL ANAEMIA 12 hours

- Types and Dietary treatment
- Prevention of Iron deficiency Anaemia / Disorder (IDD)
- Megaloblastic Anaemia, Folate Deficiency
- Pernicious Anaemia

PRACTICALS 36 HOURS 3 HRS/WEEK

Planning, preparing and serving the following diets (Standard with two variations)

- Constipation
- Peptic ulcer
- Protein – deficiency
- Iron – deficiency
- Vitamin A deficiency

REFERENCES

1. Anderson L, Dibble MV, Turkki PR, Mitchall HS, Rynbergin HJ (1982): Nutrition in health and disease, 17th Edn, JB Lippincott and Co., Philadelphia
2. Antia FP (1973) Clinical dietetics and nutrition, 2nd Edn, Oxford Univ. Press, Delhi
3. Williams SR (1989) Nutrition and diet therapy, 6th Edn, Time, Mirror, Mosby College Publishing, St Louis
4. Raheen Begun (1989) A textbook of foods, nutrition and dietetics, Sterling Publishers, New Delhi
5. Joshi SA, (1992) Nutrition and dietetics, Tata McGraw Hill Publications, New Delhi
6. Srilakshmi B (2011) Dietetics, 6th Edn, New Age International Publishers, New Delhi

II BSc FND - IV Semester
CHEMISTRY II
THEORY

48 hours
4 hrs / week

OBJECTIVES:

- To enrich the knowledge about the basic principles, fundamental concepts and unique mechanistic steps involved in chemical and biochemical reactions
- To provide an introduction to key concepts of modern analytical methods and to equip the students to handle the modern analytical instruments
- To expose the students to the rapid development and enormous expansion of every phase of chemistry

UNIT 1:

4. Bioinorganic Chemistry 6 hours

Essential and trace elements in biological systems, functions of Sodium, Potassium, Calcium, Magnesium. Importance of compounds of Sulphur and Selenium in biological system. Toxicity of lead, mercury, cadmium and arsenic. Importance of phosphorus and nitrogen compounds in biological systems. Nitrogen and phosphorus cycles.

5. Metal ions in Biological systems 6 hours

Examples of naturally occurring complex compounds in living systems. Role of Iron in Hemoglobin, myoglobin and cytochromes, copper in hemocyanin, magnesium in chorophyll, cobalt in Vitamin B12, molybdenum in nitrogenase, metaloenzymes – example and importance

UNIT 2:

1. Adsorption 2 hours

Types, Frendlich adsorption isotherm, Langmuir's adsorption isotherm applications of adsorption, adsorption indicators in precipitation titrations

2. Colloidal State 4 hours

Solids in liquids (sols), properties, kinetic optical and electrical, stability of colloids, protective action, Hardy Schulze law, Gold number, Liquids in liquids (emulsions), Types of emulsions, preparation, emulsifiers. Liquids in solids (gels). Classification, preparation and properties, Inhibition of gels – general applications of colloids

3. Radio chemistry 6 hours

Nuclear stability, n/p ratio, Natural radioactivity, characteristics of radioactive elements, radioactive decay series, artificial transmutation using protons, neutrons, deuterons, induced radio activity, disintegration constant, half life. Detection of radioactivity by GM counter. Application of radio isotopes in medicine, agriculture and study of reaction mechanism and ^{14}C dating. Biological effects of radiation, safety measurements in handling radio isotopes

UNIT 3:

1. Photochemistry 6 hours

Laws of photochemistry – Grothus and Draper law, Einstein's law of photochemical equivalence, quantum efficiency, high and low quantum efficiency, photosensitization, photoinhibition, fluorescence, phosphorescence, chemiluminescence, bioluminescence with examples, photosynthesis. Radiation chemistry – radiolysis of water, radiation dosimetry, Fricke and Cerric sulphate dosimeter

2. Instrumental methods of analysis 6 hours

Lambert's law, Beer's law, Beer-Lambert's law, molar absorption, molar extinction coefficient, transmittance and optical density, their relationship, photoelectric colorimeter, determination of Cu in the unknown solution, spectrophotometer construction, working, applications. Flame photometry – instrumentation, working, applications

UNIT 4

1. Alkenes 3 hours

Preparation of alkenes: Chemical reactions of alkenes: oxidation, ozonolysis, hydration, hydroxylation, polymerization, addition of HBr to propene, Markownikoff's rule

2. Dienes 3 hours

Classification, types with examples, butadiene, methods of preparation. Chemical reactions, mechanism of addition of Br_2 and HBr. Polymerization, Diels alder reaction

3. Alkynes 2 hours

Acidity of alkynes, ozonolysis, polymerization

4. Alkyl halides 4 hours

SN1 and SN2 reactions. Mechanism with one example for each. Concept of elimination reactions. E1 and E2 mechanims.

PRACTICALS 36 HOURS 3 HRS/WEEK

Volumetric analysis

1. Use of analytical balance and calibration of pipette
2. Preparation of standard Sodium carbonate solution and estimation in the given solution
3. Preparation of standard Oxalic acid solution. Standardization of NaOH and estimation of H2SO4 in the given solution (Phenolphthalein)
4. Preparation of standard Oxalic acid solution. Standardization of KmNO4 and estimation of H2O2 in the given solution
5. Preparation of K2Cr2O7. Standardization of Na2S2C3 and estimation of CuSO4 in the given solution (starch)
6. Preparation of ZnSO4. Standardization of EDTA and estimation of total hardness of water using Eriochrome black T indicator
7. Preparation of K2Cr2O7 solution. Estimation of Ferrous/Ferric ions in a mixture using diphenylamine indicator
8. Preparation of standard potassium bisulphate. Standardization of NaOH and estimation of HCl in the given solution (Phenolphthalein)
9. Estimation of alkali content in antacid tablet by using HCl
10. Estimation of Vitamin C
11. Estimation of Glucose
12. Estimation of amino acid

III BSc FND - V Semester
THERAPEUTIC DIET
THEORY

48 hours
4 hrs / week

OBJECTIVES:
This course will enable students to:
1. Understand the role of the dietician in preventive, promotive and curative health care
2. Be able to make appropriate dietary modification for various disease conditions based on the Physiology
3. Understand the role of the dietician

UNIT I: DIABETIS MELLITUS 16 HRS

- Definition
- Types – IDDM, NIDDM, Gestational Diabetes and MRDM
- Aetiology and symptoms
- Diagnosis tests – Glyosuria, RBS, GTT
- Metabolism
- Complications in diabetes
    - Acute complication, hypoglycaemia, ketoacidosis
    - Chronic complications – Diabetes and heart diseases, diabetes and alcohol, diabetes and pregnancy, diabetic retinopathy, diabetic nephropathy and diabetic neuropathy
- Diabetes and physical activity
- Diabetes and alcohol
- Glycemia index and nutritional requirement
- Artificial sweeteners – low calorie sweeteners and non-calorie sweeteners
- Dietary guidelines

UNIT 2: DISEASE OF THE LIVER 12 HRS

- Functions of liver
- Damage caused to the liver
- Nutrition and liver disease
- Infective hepatitis, cirrhosis of liver – aetiology, symptoms and dietary treatment
- Hepatic coma – clinical features, symptoms, complications, Nasogastric feeding and dietary treatment

UNIT 3: DISEASE OF GALL BLADDER AND PANCREAS 12 HRS

- Gall stone disease – biliary sludge, cholesterol and pigment stones – Dietary management
- Pancreatitis – acute and chronic
- Cholecystitis and cholelithiasis – etiology, symptoms and dietary treatment

UNIT 4: DISEASE OF THE KIDNEY 12 HRS

- Functions of the kidney
- Glomerulonephritis – causes, symptoms and dietary treatment
- Renal failure – acute and chronic - causes, symptoms and dietary management
- Nephrotic syndrome - symptoms and dietary treatment
- Urolithiasis (Kidney stones / uremia) etiology, symptoms and dietary treatment
- Dialysis – types of dietary management

PRACTICALS 36 HOURS 3 HRS/WEEK

Planning, preparing and calculating the major nutrient of the following (Standard with 2 variations)

1. 24 hours recall method
2. Diabetes mellitus
3. Liver disease
4. Renal disease

REFERENCES

1. Anderson L, Dibble MV, Turkki PR, Mitchall HS, Rynbergin HJ (1982): Nutrition in health and disease, 17th Edn, JB Lippincott and Co., Philadelphia
2. Antia FP (1973) Clinical dietetics and nutrition, 2nd Edn, Oxford Univ. Press, Delhi
3. Williams SR (1989) Nutrition and diet therapy, 6th Edn, Time, Mirror, Mosby College Publishing, St Louis
4. Raheen Begum (1989) A textbook of foods, nutrition and dietetics, Sterling Publishers, New Delhi
5. Joshi SA, (1992) Nutrition and dietetics, Tata McGraw Hill Publications, New Delhi
6. Srilakshmi B (2011) Dietetics, 6th Edn, New Age International Publishers, New Delhi

III Year B.Sc. FND V SEMESTER
FOOD LAWS AND FOOD STANDARDS
THEORY

3 Hours/week
Total 48 hours

OBJECTIVES

- Gain an insight into quality of food
- Know the adulterants added to foods
- Familiarize international and national food laws, regulations and standards

UNIT I: FOOD LAWS 12 HRS

PFA: Mode of work and duties of food inspectors
Essential commodities act: fruit product order, milk and milk product order, meat product order, cold storage order, the vegetable oil product order, standard and weight measurement act, the infant milk substitute, feeding bottles and infant food act.
Food standards: ISI, AGMARK, Export inspection council, consumer protection act, CODEX Alimentarius.

UNIT II: HACCP 12 HRS

Importance. Principles. Determination of CCP. Problems in implementing HACCP.
Importance of TQM, GMP and GLP

UNIT III: ADULTERATION OF FOOD 12 HRS

Definition. Types. Contamination of food by incidental adulteration by microorganisms, packing materials and other sources. Tests to detect common adulterants

UNIT IV: FOOD TECHNOLOGY 16 HRS

Biotechnology in food
Nutraceuticals
Organic foods
Packaging of foods: Classification, types of packaging materials – paper, plastics, glass, tins and metals, packaging of different food products – bakery, dairy, dehydrated, fresh fruits and vegetables, fats and oils, frozen food products

PRACTICAL 36 HOURS / 3 HRS/WEEK

- Quality evaluation of milk – lactometer reading, Iodine test, Determination of fat using butyrometer, Other necessary tests to detect adulteration of milk
- Quality analysis of egg – Candling, yolk index, albumin index
- Detection of hardness of water by titration method
- Determination of moisture content of various food stuff

REFERENCES

1. Keister DC (1977) Food and beverage control, Prentice Hall Inc, New Jersey
2. Coltman MM (1977) Food and beverage cost control, Prentice Hall Inc, New Jersey
3. Kotas R – An approach to food costing, Berrie and Rockliff Ltd., London
4. Ranjanna S (1985) Handbook of analysis and quality control for fruit and vegetable products
5. Martin EH (1986) Standard methods for the examination of dairy products
6. Lees R (1978) Food analysis, analytical and quality control methods for food manufacturer and buyer

III Year B.Sc. FND V SEMESTER

PRINCIPLES OF FOOD PRESERVATION

THEORY

3 Hours/week
Total 48 hours

OBJECTIVES

To understand the basic concepts and parameters of preservation techniques
To know the types and variety of foods available in the markets
To learn to purchase and preserved different foods
To learn various quality and preservation techniques used in various foods

UNIT I: FOOD PRESERVATION 12 HRS

Definition, Importance of food preservation. Principles of food preservation. Methods of food preservation. Simple methods of preservation – asepsis (keeping out of microorganisms). Removal of microorganisms
Maintenance of aseptic condition, classification of food for processing

UNIT II: PRESERVATION WITH HIGH CONCENTRATIONS 12 HRS

Sugar concentrates – general principles
Methods of preparation of jam, jellies and marmalade
Theory of gel formation
Definition and preparation of crystallized and glazed fruits
Preservation of squashes and syrups, type of syrups
Temperature test for syrups and candies
Salt concentrates – general principles
Role of ingredients
Definitions and preparation of sauerkraut, dill and common Indian pickles

UNIT III: PRESERVATION BY USE OF HIGH TEMPERATURE 12 HRS

Definition and methods – pasteurization and sterilization
Canning – definition. General principles, steps in canning / bottling of any one fruit and vegetable. Advantage and disadvantages of canning. Storage of canned foods
Process evaluation, thermal death time and heat penetration

UNIT IV: DRYING AND DEHYDRATION 12 HRS

Definition, General Principle, Methods of drying – air convection drier, drum/roller drier, vacuum drier, freeze drier. Factors controlling drying and dehydration. Sun drying vs. artificial drying

PRACTICALS 36 Hours
3 Hrs/week

Prepare the following recipes – jellies, jams, squashes, pickles
To estimate the acidity of fruit juice
Visit to canning / bottling industry

REFERENCES

1. Frazier WC, Westoff DC (1998), Food Microbiology 4th Edition Tata Mc Graw Hill Publishing Co. Ltd
2. Prescott Proctor, Food Technology
3. Desroier NV The technology of food preservation
4. Lal and Sidappa Preservation of food and vegetables

III Year B.Sc. FND V SEMESTER
CHEMISTRY III
THEORY

3 Hours/week
Total 48 hours

OBJECTIVES

To enrich the knowledge about the basic principles, fundamental concepts and unique mechanistic steps involved in chemical and biochemical reactions

To provide an introduction to key concepts of modern analytical methods and to equip the students to handle the modern analytical instruments

To expose the students to the rapid development and enormous expansion of every phase of chemistry

UNIT I:

1. Co-ordination Compounds 08 hrs

Transition metals, properties (colour, oxidation states, magnetic properties, catalytic properties, complexation tendency). Double and complex salts – differences with examples. Postulates of Werner's theory (to be illustrated using Cobalt amine complexes). Types of ligands – uni, bi, poly-dentate, ambidentate with examples, coordination number, stability of complexes, factors influencing stability of complexes, Valence bond theory, structure and magnetic properties of some complexes. Applications of complex formation, metal complexes as therapeutic agents – Platinum, gold, copper complexes

2. Organometallic Chemistry 04 hrs

Definition, nomenclature and classification, preparation, properties, bonding and applications of alkyls and aryls of Li, Hg, and Al, metal carbonyls and nature of bonding

UNIT II:

1. Dilute solutions 08 hrs

Dilute solutions and colligative properties. Ideal and non ideal solutions, methods of expressing concentrations of solutions. Colligative properties, osmotic pressure and its measurement by Berkley and Hartley's method. Laws of osmotic pressure. Importance of osmotic pressure on living cells – hypotonic, hypertonic, isotonic solutions. Donnan membrane equilibrium, Raoult's law, relative lowering of vapour pressure. Molecular weight determination from osmotic pressure and relative lowering of vapour pressure. Elevation of boiling point, depression in freezing point, experimental methods for determining various colligative properties. Vant Hoff's factor. Abnormal molecular weight.

2. Phase Rule 04 hrs

Statement and meaning of the terms phase, component and degrees of freedom, phase equilibria of one component system – water system, condensed phase rule, application of phase rule to two component system – Pb-Ag system, NaCl-H2O system, freezing mixture

UNIT III:

1. Alcohols 05 hrs

Classification, monohydric alcohols – general reactions, distinguishing reaction for 1,2 and 3 alcohols. Dihydric alcohols – Glycol preparation reactions and uses. Trihydric alcohols: Glycerol, synthesis, reactions uses

2. Phenols 03 hrs

Acidity of phenols, effects of substituents on acidity on phenols. Reactivity of phenols towards electrophiles, uses.

3. Carbonyl compounds 04 hrs

Synthesis of aldehydes and ketones. Structure, reactivity and properties of carbonyl group, nucleophilic addition reactions, aldol condensation, perkins reaction, Cannizzaro reaction (mechanism)

UNIT IV

1. Carboxylic acids 06 hrs

Synthesis of monocarboxylic acids, acidity of carboxylic acids, effect of substituents on acidity of carboxylic acids

2. Hydroxy acids and dicarboxylic acids
3. Structure, preparation and properties of:
    a. lactic acid, tartaric acid, citric acid.
    b. Succinic, maleic and fumaric
    c. Pyruvic, alpha ketoglutaric, oxaloacetic acid
    d. Effects of heat and dehydrating agents on hydroxy acids
4. Amines

Classification, properties, synthesis of aliphatic and aromatic amines, separation of primary, secondary and tertiary amines and structural features affecting basicity of amines. Reactions, acylation with HNO2 and Schiff's base formation. Distinguishing reactions of primary, secondary and tertiary amines

5. Drugs

Analgesics, antipyretics, antiseptics, disinfectants, antiviral, antifungal, tranquilizers, antimalarials with examples. Structure, preparation and uses of aspirin, paracetamol, barbituric acid, chloroxyleneol, methyl salicylate, penicillin and cholorquin

PRACTICALS 36 Hours
3 Hrs/week

1. Organic preparations 5 weeks
    a. Acetanilide from aniline
    b. M-dinitro benzene
    c. Parabromo acetanilide
    d. Benzoic acid from toluene
    e. Benzoic acid from ethyl benzoate
    f. Aspirin from salicylic acid

2. Physical chemistry experiments (non instrumental)
    a. Determination density of a liquid using specific gravity bottle, viscosity using Ostwald's method
    b. Determination of molecular weight of non-volatile substance by Walker Lumsden method
    c. Determination of critical solution temperature of phenol water system
    d. Determination of percentage of given electrolyte (NaCl) in water – phenol system by miscibility temperature method
    e. Determination of rate constant of decomposition of H_2O_2 using $KmNO_4$
    f. Determination of density of a liquid using specific gravity bottle and surface tension
    g. Enthalpy of ionization of weak acid

REFERENCES

1. Soni PL (1988) A textbook of Inorganic chemistry, Sulthan Chand & Sons
2. Lee JD (1988) Concise Inorganic Chemistry, Blackwell Sceince
3. Skoog, West and Hollar (1993) Fundamental Analytical Chemistry, New York CBS Publishers
4. Gurudeep Raj (2001) A text book of Inorganic chemistry, Goel Publishing house, Meerut
5. Soni PL (2000) A textbook of Organic chemistry, Sulthan Chand & Sons
6. Bahl A and Bahl BS (2000) Advanced organic chemistry, Sulthan Chand & Sons
7. Vogel AL (1994) ELBS Edition,
8. Agarwal OP (1998) Chemistry of natural products, Goel Sulthan Chand & Sons Publishing House, Meerut
9. Madan RL, Tuli GD (2001) Physical Chemisty, Sulthan Chand & Sons
10. Raj Gurudeep (2001) Textbook of advanced Physical chemistry, Goel Publishing House, Meerut
11. Lehninger, A.L., Nelson, D.L. and Cox, M.M (1993); 2nd Ed. Principles of Bio Chemistry, CBS Publishers and distributors.

III Year B.Sc. FND VI SEMESTER
FOOD MICROBIOLOGY
THEORY

3 Hours/week
Total 48 hours

OBJECTIVES

This course will enable the students to:

Understand the principles of various methods used in the prevention and control of microorganisms in foods

Understand the criteria for microbiological safety in various food operations to avoid public health hazards due to contaminated foods

UNIT I: 12 HRS

General principles underlying spoilage of food – Fitness and unfitness of food for consumption; Causes for spoilage

Factors affecting kinds and numbers of microorganisms in food

Factors affecting the growth of microorganisms in food

UNIT II: 12 HRS

Contamination and kinds of organisms causing spoilage of fruits and vegetables

Contamination and kinds of organisms causing spoilage of meat, poultry, fish and eggs

Contamination and kinds of organisms causing spoilage of milk and milk products

A brief account on contamination and spoilage of fats and oils, bottled beverages, spices and condiments

UNIT III: 12 HRS

Food poisoning – Staphylococcal poisoning, Streptococcal poisoning, botulism, salmonellas, Shigellosis

Food borne infections – Clostridium perfringens, Vibrio, EPEC, Bacillus cereus, Campylobacter, Listeria, yersiniosis

Microbiology of air borne diseases – bacterial and fungal air borne diseases

Microbiology of sewage and sewage disposal

UNIT IV: 12 HRS

Microbiology of water – sources, bacteriological examinations, total count, test for E.coli

Purification of water – filtration, sedimentation, disinfection

Water borne diseases – bacterial, viral, protozoan

REFERENCES

1. Frazier WC, Westoff DC (1998), Food Microbiology 4th Edition Tata Mc Graw Hill Publishing Co. Ltd
2. Jay James M (1986) Modern Food microbiology, 3rd Edn., Van No Strand Reinhold Co. ,Inc.
3. Pelezer ML and Reid RD (1978) Microbiology, McGraw Hill Book Co., New York
4. Benson Harlot (1990) Microbiological methods, Butterworth, London

III Year B.Sc. FND VI SEMESTER
NUTRITIONAL BIOCHEMISTRY II
THEORY

3 Hours/week
Total 48 hours

OBJECTIVES

This course will enable the students to

1. Understand the principles of biochemistry (as applicable to human nutrition).
2. Obtain an insight into the chemistry of major nutrients and physiologically important compounds.
3. Understand the biological processes and systems as applicable to human nutrition.
4. Apply the knowledge acquired to human nutrition and dietetics

UNIT 1: PROTEINS 12 Hours

Proteins – Aminoacids, chemical bonds involved in protein structure, Protein configuration – primary, secondary, tertiary and quaternary structure, biological role of proteins. Classification of proteins – simple, conjugated proteins, derived proteins, Example. Biosynthesis. Protein digestion and absorption, protein malnutrition.

UNIT II: NUCLEIC ACIDS 12 Hours

Introduction, components, nucleosides, nucleotides. DNA, base composition, double helical structure, DNA – Denaturation, DNA replication mechanism. DNA Repair Mechanisms, Transcription – requirements and mechanism. RNA – Types, structure and functions

UNIT III: VITAMINS AND MINERALS 12 Hours

Vitamins: Chemistry and biochemical role of fat soluble vitamins – A,D,E and K.
Water soluble vitamins B1,B2, B3, B6 and C
Storage of vitamins in the body, daily human requirements, deficiency disorders.
Minerals: Biochemical role of inorganic elements, deficiency disorders.

UNIT IV: HORMONES 12 Hours

Biological role of hormones of pituitary, adrenal Cortex and Medulla, Thyroid Parathyroid and Pancreas.

PRACTICALS 36 Hours

3 Hrs/week

1. Qualitative analysis for proteins - Egg albumin, Gelatin, Peptone and Casein
2. Quantitative analysis - Serum inorganic phosphate, Serum protein and A/G ratio, Creatinine in urine

Estimation of Ascorbic acid content of foods by colorimetric method
Estimation of DNA

REFERENCES

1. West, E.S., Todd, W.R., Mason, H.S and Van Bruggen, J.T (1974): 4th Ed, Text book of Biochemistry, Amerind Publishing Co. Pvt. Ltd.,
2. Lehninger, A.L., Nelson, D.L. and Cox, M.M (1993); 2nd Ed. Principles of Bio Chemistry, CBS Publishers and distributors.
3. Devlin T.M (1986): 2nd Ed. Text book of Biochemistry with clinical correlations john Wiley and sons.
4. Stryer,L. (1995) Biochemistry, Freeman WH and Co.
5. Jain JL (2012), Fundamentals of Biochemistry, S. Chand and Company Ltd.

III Year B.Sc. FND VI SEMESTER
CLINICAL DIETETICS
THEORY

3 Hours/week
Total 48 hours

OBJECTIVES

1. To know the principles of diet therapy
2. To understand the modifications of normal diet for therapeutic purposes

UNIT 1: DISEASES OF THE CARDIOVASCULAR DISEASE 16 Hours

Prevalence, clinical features and Risk factors
Role of fat in the development of atherosclerosis - Cholesterol, Saturated fatty acids, Trans fatty acids,
Physical activity and heart diseases
Hypercholesteromemia
Functional foods
Dietary management
Dietary guidelines

UNIT 2: HYPERTENSION 08 Hours

- Pathogenesis, aetiology, types, symptoms
- Principles of diet and dietary treatment
- Kempner's Diet and Dash

UNIT 3: VITAMINS AND MINERALS 12 Hours

- Definition, classification
- Risk factors, dietary factors
- Carcinogenic foods
- Role of food in the prevention of cancer
- Nutrition problems of cancer therapy
- Feeding problems in cancer patients
- Dietary management
- Nutritional requirements

UNIT 4: GNETIC AND MENTAL DISORDER 12 Hours

- Phenylketonuria – Prognosis
- Galactosemia – Aetiology and dietary management
- Mental illness – Definition and precipitating factors
- Epilepsy – pathogenesis and dietary modifications
- Ketonenic diet

PRACTICALS 36 Hours
3 Hrs/week

1. Qualitative analysis for proteins
- Egg albumin, Gelatin, Peptone and Casein
2. Quantitative analysis
- Serum inorganic phosphate
- Serum protein and A/G ratio
- Creatinine in urine

- Estimation of Ascorbic acid content of foods by colorimetric method
- Estimation of DNA

REFERENCE

- West ES, Todd WR, Mason HS and Van Bruggen JT (1974) 4th Ed, Text book of Biochemistry, Amerind Publishing Co. Pvt. Ltd.,
- Lehninger AL, Nelson DL, Cox MM (1993) 2nd Ed. Principles of Bio Chemistry, CBS Publishers and distributors.
- Devlin T.M (1986): 2nd Ed. Text book of Biochemistry with clinical correlations john Wiley and sons.
- Stryer L, (1995) Biochemistry, Freeman WH and Co.
- Jain JL, (2012), Fundamentals of Biochemistry, S. Chand and Company

III Year B.Sc. FND VI SEMESTER
QUALITY CONTROL
THEORY

3 Hours/week
Total 48 hours

OBJECTIVES

This course will enable the students to

1. Gain an insight into quality of food
2. Know the importance and uses of food additives
3. Know how food is fortified and enriched with certain nutrients
4. Be familiar with the sensory evaluation of various quality parameters of food.

UNIT I: FOOD QUALITY AND QUALITY CONTROL 12 Hours

- Definitions
- Principles of quality control
- Food quality
- Sample and sampling methods
- Industrial quality control: Raw material control, Process control, Finished
- Product control and inspection.

UNIT II: FOOD ADDITIVES 12 Hours

- Definitions
- Principles and objectives
- Classification and uses
- Coloring agents: Natural, Synthetic and non certified colours
- Leavening agents: Classification and uses
- Flavoring agents: Natural and Synthetic flavours.

UNIT III: FOOD FORTIFICATION AND ENRICHMENT 12 Hours

- Definition and importance
- Principles
- Commonly fortified an edenriched foods
- Non nutritional constituents and food safety: naturally occurring toxicants, microbial toxins, bacterial food poisoning and contamination arising from processing

UNIT IV: SENSORY ASSESSMENT OF FOOD QUALITY 12 Hours

Sensory evaluation: Sensory characteristics of food, Types of tests
Objective evaluation: Types of tests, Texture evaluation
Conducting sensory tests and preparation of evaluation card

PRACTICAL 36 Hours
3 Hrs/week

1. Detection of common adulterants present in the food samples
   Spices and condiments, Food grains, Sugars and preserves, fats and oils
2. Sensory evaluation of foods
   Sweet, sour, bitter, salt. Different tests employed in sensory evaluation
3. Quality of fats and oil
   Iodine value
   Acid number

4. Visit to a food industry

REFERENCES

1. Keister DC (1977) Food and beverage control, Prentice Hall Inc, New Jersey
2. Coltman MM (1977) Food and beverage cost control, Prentice Hall Inc, New Jersey
3. Kotas R – An approach to food costing, Berrie and Rockliff Ltd., London
4. Ranjanna S (1985) Handbook of analysis and quality control for fruit and vegetable products
5. Martin EH (1986) Standard methods for the examination of dairy products
6. Lees R (1978) Food analysis, analytical and quality control methods for food manufacturer and buyer

III Year B.Sc. FND VI SEMESTER
FOOD PRESERVATION
THEORY

3 Hours/week
Total 48 hours

OBJECTIVES
This course will enable students to:
Understand basic concepts and parameters of preservation techniques
Know the types and variety of foods available in the markets
Learn to purchase and preserve different foods
Learn various quality preservation techniques used in various foods

UNIT 1: TYPES OF HEATING 12 Hours
Conduction and convention heating
Microwave heating – advantages and disadvantages
Preservation and semi-moist foods / intermediate moist foods

UNIT 2: PRESERVATION BY USE OF LOW TEMPERATURE 12 Hours
Refrigeration: Definition, general principles, types. Chilling and cold storage foods. Cold storage defects
Freezing: Definition, general principles, methods of freezing, air freezing, indirect freezing, direct contact freezing, immersion freezing. Selection and preparation of foods for freezing. Changes during freezing, Freezer burn. Thawing

UNIT 3: FOOD RADIATION 12 Hours
Definition, Sources of radiation. Units of radiation. Dosimetry, mode of action. Effects on foods, Advantages and disadvantages. Uses

UNIT 4: PRESERVATION WITH CHEMICALS 12 Hours
Types and mode of action of organic and inorganic preservatives, antibiotics, antioxidant, anti-browning, cleaning, sanitizing and fungicidal agents

PRACTICALS 36 Hours
3 Hrs/week

Prepare the following:
Tutti frutti, ketchups & sauces, Chutneys, Chutney powder, Frozen fruits and vegetables
Visit to wheat roller flour mill / pulse processing mill / oil seeds processing mill

REFERENCES

1. Frazier WC, Westoff DC (1998), Food Microbiology 4th Edition Tata Mc Graw Hill Publishing Co. Ltd
2. Desroier NV The technology of food preservation
3. Norman Potter, Food Science
4. Prescott and Proctor, Food Technology
5. Lal and Sidappa Preservation of food and vegetables

III Year B.Sc. FND VI SEMESTER
CHEMISTRY - IV
THEORY

3 Hours/week
Total 48 hours

OBJECTIVES

To enrich the knowledge about the basic principles, fundamental concepts and unique mechanistic steps involved in chemical and biochemical reactions

To provide an introduction to key concepts of modern analytical methods and to equip the students to handle the modern analytical instruments

To expose the students to the rapid development and enormous expansion of every phase of chemistry

UNIT I:

1. Environmental Chemistry 08 hrs

Air pollution – air pollutants, their sources, effects and control. Water pollution: Types of water pollutants, biodegradation, dissolved oxygen level of water, Biochemical Oxygen Demand (BOD) of water, Chemical Oxygen Demand (COD) of water. Determination of DO, BOD and COD of waste water, industrial effluents, their effects, treatment of polluted water and sewage treatment. Soil pollution: pollutants, agricultural animal manures, crop harvesting. Pesticides. Use of fertilizers. Radioactive wastes. Control of soil pollution

2. Chromatography 04 hrs

General principles of chromatography, adsorption and partition techniques. Paper chromatography, ascending and circular. Rf values. Column chromatography. Principles of gel chromatography, ion exchange chromatography, TLC and their applications

UNIT II:

1. Electrochemistry 09 hrs

Specific equivalent and molar conductance, Kohlrausch's law, electrodes, electrode potential. Nernst equation. Reference electrode, Hydrogen electrode and calomel electrode, Qunihydrone electrode, glass electrode. Determination of equivalent conductance of NaCl. Conductometric titrations. Galvanic cells, EMF of galvanic cells, concentration cells, Electrochemical series. Potentiometric titration. Determination of pKa values of weak acids by potentiometric method. Determination of pH using quinhydrone electrode.

2. Chemical equilibrium 03 hrs

Second and third law of thermodynamics, concept of entropy, Equilibrium constant and energy, Lechatelier's principle and its applications

UNIT III:

1. Stereochemistry of organic compounds 08 hrs

Stereoisomerism, types of stereoisomerism, optical isomerism. Elements of symmetry, asymmetric, atom molecular dissymmetry, chirality, optical isomerism in glyceraldehydes, lactic acid and tartaric acid, Enantiomers, diastereomers, meso compounds resolution of enantiomers and racemisation. Geometrical isomerism – condition, examples, geometrical isomerism in oximes. Conformational isomerism: conformational analysis of ethane and butane, Newman projection difference between configuration and conformation.

2. Spectroscopy

Principle, instrumentation and applications of UV, IR and NMR spectroscopy

UNIT IV

1. Heterocyclic compounds 04 hrs

Occurrence, structural formula and importance of furan, pyrrole, thiophene, pyridine, purine, indole, imidazole, quinoline and isoquinoline, aromatic characteristics of pyrrole, furan, thiophene, pyridine, reactions

2. Terpenes 02 hrs

Classification isoprene rule, structure, occurrence and importance of limonene, menthol, camphor, santonin, phytol, lonosterol, dolichols

3. Alkaloids 03 hrs

Classification biological functions with examples, structure and physiological action of LSD, morphine, nicotine, atropine.

4. Polymers 03 hrs

Classification, polymerization process, number average and weight average molecular weights, properties of polymers, preparation and applications of Dacron, nylon66, Bakelite, PVC, polythene, expoxy resin, polyurethane

PRACTICALS 36 Hours

3 Hrs/week

1. Extraction of bio-molecules – starch from potato, caffeine from tea leaves, casein from milk
2. Physical chemistry experiments (instrumental) – Conductometric titration of strong acid and strong base, Conductometric titration of acid mixture against strong base. Verification of Beer-Lambert's law by colorimeter. Potentiometric titration of Mohr's salt against Potassium dichromate. Determination of pH of buffer by pH meter or potentiometer. Determination of equivalent conductance of strong electrolyte.
3. Chromatography experiments – Identification of amino acids by circular paper chromatography, Separation of green leaf pigments by column chromatography,

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2. Lee JD (1988) Concise Inorganic Chemistry, Blackwell Science
3. Skoog, West and Hollar (1993) Fundamental Analytical Chemistry, New York CBS Publishers
4. Gurudeep Raj (2001) A text book of Inorganic chemistry, Goel Publishing house, Meerut
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6. Bahl A and Bahl BS (2000) Advanced organic chemistry, Sulthan Chand & Sons
7. Vogel AL (1994) ELBS Edition,
8. Agarwal OP (1998) Chemistry of natural products, Goel Sulthan Chand & Sons Publishing House, Meerut
9. Madan RL, Tuli GD (2001) Physical Chemistry, Sulthan Chand & Sons
10. Raj Gurudeep (2001) Textbook of advanced Physical chemistry, Goel Publishing House, Meerut
11. Lehninger, A.L., Nelson, D.L. and Cox, M.M (1993); 2nd Ed. Principles of Bio Chemistry, CBS Publishers and distributors.