COURSE CURRICULUM FOR UNDERGRADUATE COURSES UNDER CHOICE BASED CREDIT SYSTEM

SYLLABUS

FOR

BSc. (HONOURS)
IN
FOOD AND NUTRITION

WEST BENGAL STATE UNIVERSITY

PROPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM FOR B.Sc. HONOURS IN FOOD AND NUTRITION

SEMESTER	CORE COURSE (14)	ABILITY ENHANCEMENT COMPULSORY COURSE (AECC) (2)	SKILL ENHANCEMENT COURSE (SEC) (2)	DISPLINE SPECIFIC ELECTIVE COURSE (DSE) (4)	ELECTIVE: GENERIC COURSE (4)
I	**C1:** HUMAN NUTRITION	**AECC:**ENVIRONMENTAL SCIENCE			**GE***
	C2:PHYSIOLOGY IN NUTRITION				
II	**C3:** FOOD CHEMISTRY, BIOPHYSICS AND BIOCHEMICAL PRINCIPLES	**AECC:** ENGLISH COMMUNICATION/MIL			**GE***
	C4: HUMAN PHYSIOLOGY				
III	**C5:**NUTRIENTS METABOLISM		**SEC***		**GE***
	C6: NUTRITION THROUGH LIFE SPAN				
	C7: ELEMENTARY DIETETICS AND MENU PLANNING				
IV	**C8:** COMMUNITY NUTRITION		**SEC***		**GE***
	C9: EPIDEMIOLOGY AND PUBLIC HEALTH				
	C10:DIET THERAPY FOR LIFE STYLEDISORDERS				
V	**C11:**CLINICAL NUTRITION AND DIET FOR SPECIAL SITUATIONS IN LIFE			**DSE***	
	C12: FOOD MICROBIOLOGY AND IMMUNOLOGY			**DSE***	
VI	**C13:** FOOD PROCESSING AND FOOD TECHNOLOGY			**DSE***	
	C14: RESEARCH METHODOLOGY AND BIOSTATISTICS			**DSE***	

- **Any 4 DSE, 2 SEC and 4 GE to be picked up by the students**

STRUCTURE OF FOR B.Sc. HONOURS IN FOOD AND NUTRITION UNDER CBCS

CORE COURSE (14Courses) Total credits 84

CREDITS-6 Each (4 Credits Theory +2 Credits Practical=6)

FNTACOR01- Human Nutrition:4 Credits Theory +2 Credits Practical

FNTACOR02-Physiology in Nutrition:4 Credits Theory +2 Credits Practical

FNTACOR03- Food chemistry, Biophysicsand Biochemical Principles: 4 Credits Theory +2 Credits Practical

FNTACOR04-Human Physiology: 4 Credits Theory +2 Credits Practical

FNTACOR05-NutrientsMetabolism: 4 Credits Theory +2 Credits Practical

FNTACOR06- Nutrition through Life Span: 4 Credits Theory +2 Credits Practical

FNTACOR07-Elementary Dietetics and Menu Planning: 4 Credits Theory +2 Credits Practical

FNTACOR08-Community Nutrition: 4 Credits Theory +2 Credits Practical

FNTACOR09-Epidemiology and Public Health: 4 Credits Theory +2 Credits Practical

FNTACOR10-Diet therapy for Life Style Disorders: 4 Credits Theory +2 Credits Practical

FNTACOR11-Clinical Nutrition and Diet for Special Situations in Life**:** 4 Credits Theory +2 Credits Practical

FNTACOR12-Food Microbiology and Immunology: 4 Credits Theory +2 Credits Practical

FNTACOR13-Food Processing and Food Technology: 4 Credits Theory +2 Credits Practical

FNTACOR14-Research Methodology and Biostatistics: 4 Credits Theory +2 Credits Practical

DSCIPLINE SPECIFIC ELECTIVE (ANY FOUR) (4x6=24 Credits)

CREDITS-6 Each (4 Credits Theory +2 Credits Practical=6)

FNTADSE01-Sports nutrition: 4 Credits Theory +2 Credits Practical

FNTADSE02- Entrepreneurship in food industry: 4 Credits Theory +2 Credits Practical

FNTADSE03- Food Borne Diseases and Food Toxicology: 4 Credits Theory +2 Credits Practical

FNTADSE04- Food and Beverage Management:4 Credits Theory +2 Credits Practical

FNTADSE05-Dairy Technology: 4 Credits Theory +2 Credits Practical

FNTADSE06-Nutritional Management and Counseling:4 Credits Theory +2 Credits Practical

SKILL ENHANCEMENT ELECTIVE COURSE

CREDITS-2 Each (2 Credits Theory and Practical=2)

FNTSSEC01M- Instrumentation: 2 Credits Theory and Practical

FNTSSEC02M- Field study in Clinical / Community Setting:2 Credits Theory and Practical

GENERIC ELECTIVE (ANY FOUR)

CREDITS-6 Each (4 Credits Theory +2 Credits Practical=6)

FNTHGEC01: Food and Nutrition: 4 Credits Theory +2 Credits Practical

FNTHGEC02: Human body and Nutrition: 4 Credits Theory +2 Credits Practical

FNTHGEC03: Community, Nutrition and Health Assessment: 4 Credits Theory +2 Credits Practical

FNTHGEC04:Dietetics**:** 4 Credits Theory +2 Credits Practical

DISTRIBUTION OF CREDITS IN THE COURSE CURRICULUM

Semester	Name of the Course					Total Credits
	Core Course (CC)	Ability Enhancement Compulsory Course (AECC)	Skill Enhancement Course (SEC)	Discipline Specific Elective (DSE)	Generic Elective (GE)	
I	6x2= 12	2x1=2	---	---	6x1=6	20
II	6x2= 12	2x1=2	---	---	6x1=6	20
III	6x3=18	---	2x1=2	---	6x1=6	26
IV	6x3=18	---	2x1=2	---	6x1=6	26
V	6x2=12	---	---	6x2=12	---	24
VI	6x2=12	---	---	6x2=12	---	24
Total Course	14 (CC) (14×6)=84 Credits	2 (AECC) (2x2)=4credits	2 (SEC) (2×2)=4credits	4 (DSE) (4×6)=24 credits	4 (GE) (4x×6)=24 credits	140

NOTE:
1. 14 Core Courses (CCs) should be compulsorily studied for BSc. Food and Nutrition(Honours) students.
2. 4 DSE and 2 SEC to be chosen by the Food and Nutrition (Honours) students (Choice based).
3.4 GE subjects in Food and Nutrition Syllabus are to be studied by other discipline students.

B.Sc (H) FOOD AND NUTRITION- SCHEME OF EXAMINATION

Semester	Course opted	Course Name	Credits
I	Ability Enhancement Compulsory Course-I	English Communication/MIL/ Environmental Science	2
	FNTACOR01T Theory	Human Nutrition	4
	FNTACOR01P Practical	Human Nutrition	2

	FNTACOR02T Theory	Physiology in Nutrition	4
	FNTACOR02P Practical	Physiology in Nutrition	2
	GE-1 Theory	GE-1Theory	4
	GE-1 Practical	GE-1 Practical	2
II	Ability Enhancement Compulsory Course-II	English Communication/MIL/ Environmental Science	2
	FNTACOR03T Theory	Food chemistry, Biophysicsand Biochemical Principles	4
	FNTACOR03P Practical	Food chemistry, Biophysicsand Biochemical Principles	2
	FNTACOR04T Theory	Human Physiology	4
	FNTACOR04P Practical	Human Physiology	2
	GE-2Theory	GE-2 Theory	4
	GE-2Practical	GE-2Practical	2
III	FNTACOR05T Theory	NutrientsMetabolism	4
	FNTACOR05P Practical	NutrientsMetabolism	2
	FNTACOR06T Theory	Nutrition through Life Span	4
	FNTACOR06P Practical	Nutrition through Life Span	2
	FNTACOR07T Theory	Elementary Dietetics and Menu Planning	4
	FNTACOR07P Practical	Elementary Dietetics and Menu Planning	2
	SEC -1		2
	GE-3Theory	GE-3 Theory	4
	GE-3Practical	GE-3Practical	2
IV	FNTACOR08T Theory	Community Nutrition	4
	FNTACOR08P Practical	Community Nutrition	2
	FNTACOR09T Theory	Epidemiology and Public Health	4
	FNTACOR09P Practical	Epidemiology and Public Health	2
	FNTACOR10T Theory	Diet therapy for Life Style Disorders	4
	FNTACOR10P Practical	Diet therapy for Life Style Disorders	2
	SEC -2		2
	GE-4Theory	GE-4Theory	4
	GE-4Practical	GE-4Practical	2

V	FNTACOR11T Theory	Clinical Nutrition and Diet for Special Situations in Life	4
	FNTACOR11P Practical	Clinical Nutrition and Diet for Special Situations in Life	2
	FNTACOR12T Theory	Food Microbiology and Immunology	4
	FNTACOR12P Practical	Food Microbiology and Immunology	2
	DSE -1 Theory	Any one from FNTADSE01 to FNTADSE03 Theory	4
	DSE- 1 Practical	Any one from FNTADSE01 to FNTADSE03 Practical	2
	DSE- 2 Theory	Any one from FNTADSE01 to FNTADSE03(excluding the selected choice for DSE 1) Theory	4
	DSE- 2 Practical	Any one from FNTADSE01 to FNTADSE03(excluding the selected choice for DSE 1)Practical	2
VI	FNTACOR13T Theory	Food Processing and Food Technology	4
	FNTACOR13P Practical	Food Processing and Food Technology	2
	FNTACOR14T Theory	Research Methodology and Biostatistics	4
	FNTACOR14P Practical	Research Methodology and Biostatistics	2
	DSE -3 Theory	Any one from FNTADSE04to FNTADSE06 Theory	4
	DSE- 3 Practical	Any one from FNTADSE04to FNTADSE06 Practical	2
	DSE- 4 Theory	Any one from FNTADSE04to FNTADSE06(excluding the selected choice for DSE 3) Theory	4
	DSE- 4 Practical	Any one from FNTADSE04to FNTADSE06 (excluding the selected choice for DSE 3)Practical	2

Total Credits: 84 Core + 24 DSE +4 SEC+4 AECC+24 GE =140

PREAMBLE

The course in Choice Based Credit System would be of 3 year duration having 6 semesters, divided into 14 Core papers, 4 Discipline Specific Elective courses, 2 Skill Enhancement Elective Courses and 4 Generic Elective Courses. Each Year would consist of 2 semesters. The new course has been prepared

keeping in view, the unique ¬requirements ofB.Sc. (H) Food and Nutrition students. The objectives of the course are-

- To impart knowledge of various areas related to Food Science and Dietetics,
- To enable the students to understand food composition and its physicochemical,¬ nutritional, microbiological and biochemical aspects,
- To familiarize the students about the spoilage, processing and preservation techniques¬ of pulses, oilseeds, spices, fruits and vegetables, meat, fish, poultry, milk & milk products,
- To emphasize the importance of community nutrition, therapeutic nutrition, public health, food safety, food quality, food laws and regulations.
- To familiarize students with importance and requirements of nutrition during various stages of life.
- To impart knowledge regarding etiology and management of nutritional disorders from nutritional deficiency.
- To introduce with different skill development techniques and training in food and nutrition.

The contents have been drawn-up to accommodate the widening horizons of the discipline of Food and Nutrition. They reflect the current changing needs of the students. For the Generic elective(GE) to be chosen by Food and Nutrition students, It is recommended that subjects like Biochemistry, Anthropology, Microbiology, Physiology, Molecular Biology, Fishery Science, Chemistry, Maths & statistics, Biostatistics, Physics be chosen as they are synergistic to the curriculum. However, students are free to pick up any of the Generic Elective Courses offered by other departments.

- The detailed syllabus for each paper is appended with the list of suggested readings.
- Teaching time allotted for each paper shall be 4 periods for each theory paper and 4periods for each practical class per week for each paper per week .Each practical batch should ideally be between 15-20 students so that each student receives individual attention.

CORE COURSE (CC)
FNTACOR01T: HUMAN NUTRITION (THEORY)

TOTAL HOURS: 60 **4 CREDITS**

1. Introduction to Food and Nutrition No. of Hours 10

Foods: Energy giving, body building and protective. Nutrients: macro and micro nutrients,Diet and balanced diet, Menu. Health and nutritional status.Malnutrition, functional food, prebiotics, probiotics,

phytochemicals, nutraceuticals. Fibre. Functions of foods: physiological, psychological, social. Food groups, food pyramid, Relation between food and nutrition, health and diseases.

2. Foods, Nutrients and cooking of food No. of Hours 10

Foods and their nutrient contents: Nutrients present in cereals and millets, pulses, nuts and oil seeds, fruits and vegetables, milk and milk products, flesh food, eggs, Condiment and spices, salt. Non-nutrient components of foods: phytate, tannins, oxalate, trypsin inhibitor,goitrogens and other toxic agents in food. Cooking: Beneficial and adverse effects of cooking. Different methods of cooking-dry, moist, frying, and micro wave cooking- advantage, disadvantage and the effect of various methods of cooking on foods, Solar cooking.

3.Food energy and energy requirements No. of Hours 15

The energy value of foods: Physical and physiological calories. Bomb calorimeter Energy requirement of an individual: Basal metabolic rate (BMR) and physical activity. . BMR: Measurement (direct and indirect), factors affecting BMR, SDA of foods. physical activity ratio (PAR). Classification of activities based on occupations.Nutritional requirements and Recommended dietary allowances (RDA): factors affecting RDA, Application of RDA, Reference man and woman..

4. Digestion of Foods No. of Hours 25

Components of gastrointestinal tract. Structure of different segments of GI tract. Digestive glands: structure of salivary glands, gastric glands and intestinal glands. Structure of pancreas and liver., Digestive secretions: salivary juice, gastric juice, pancreatic juices and intestinal juices. Bile and bile secretion. Digestion and absorptions of carbohydrate, protein, lipid, fat soluble vitamins, water soluble vitamins(thiamine, riboflavin, niacin, pyridoxine, folate, vit B12, vit C), minerals (Ca, Fe, I, F, Cu, Zn)

FNTACOR01P: HUMAN NUTRITION (PRACTICAL)

TOTAL HOURS: 60 2 CREDITS

1. Process involved in cooking, microwave, steaming, grilling, deep fat frying.
2. General concepts of weights and measures, Eye estimation of raw cooked foods
3. Preparation of food from different food groups and their significance in relation to health
4. Preparation of supplementary food from different age group and their nutritional significance
5. Planning and preparation of low cost diet for Grade I and Grade II malnourished child

SUGGESTED READINGS

1. B.Srilakshmi : Nutrition Science, New Age International Publishers
2. Guthrie, A.H.: Introductory Nutrition, 6th Ed. The C.V. Mosby Company
3. Robinson, C.H.Lawer, M.R.; CheiToweth, W.L. and Garwick, A.E.: Normal and Therapeutic Nutrition.17th Ed. Mac Milan Publishing Co.
4. Swaminathan, M : Essentials of Foods and Nutrition, Vols-1and II. Ganesh and Co. Madras.
5. Gopalan, C et. al: Nutritive value of Indian Foods, Indian Council of medical Research.
6. Indian Council of Medical Research : Nutrient Requirements and Recommended Dietary Allowance for Indians, New Delhi.
7. FAO/WHO/UNO: Technical Report Series, 724 (1985). Energy and Protein Requirement, Geneva.

8. WHO Technical Reports Series for different Nutrients.
9. Ghosh, S.: The Feeding and Care of Infants arid Young Children, VHAI. 6th Ed. Delhi.
10. WHO: A growth chart for International use In Maternal and Children Health Care, Geneva.
11. Mann and Truswell: Essentials of Human Nitration, Oxford University press.

FNTACOR02T: PHYSIOLOGY IN NUTRITION (THEORY)

TOTAL HOURS: 60 **4 CREDITS**

1.Unit of Life: Cell and Tissue Structure No. of Hours 12

Differencebetween prokaryotic and eukaryotic cells & plant and animal cells, Structure and basic functions of animal cell organelles, Structure and functions of plasma membrane, Role of membrane in transport and communications, Importance of cell junction- tight, gap and desmosome, Types of human tissue- location, structure and functions. Structure of muscles, bones, teeth and joints.

2.Blood and body fluids **No.ofHours12**

Blood and its composition, Morphology, formation and functions of formed elements, Blood groups and its importance in transfusion, hazards of mismatch blood transfusion. Mechanism of blood coagulation, Haemoglobin- structure and function.Extracellular fluid, lymph.

3. Cardiovascular system **No. of Hours 12**

Structure of heart, artery, vein and capillary, Properties of cardiac muscle, Cardiac cycle, cardiac output, heart rate, heart sounds, ECG- normal and abnormal. Systemic and pulmonary circulation. Blood pressure, pulse pressure Radial pulse, coronary circulation

4. Respiratory system **No. of Hours 12**

Structure of lungs: alveoli and airways. Respiratory volumes and capacities,Mechanics of breathing. Oxygen and carbon dioxid**e** transport, Neural and chemical control of breathing.

5. Renal Physiology, skin and body temperature **No. of Hours 12**

Anatomy of renal system: kidney, ureter, urethra and urinary bladder, Nephron: structure, Juxtaglomeralarapparatus GFR and GFI, Tubular functions, Urine formation: Counter current exchanger and multiplier. Role of kidney in water and electrolyte balance. pHregulation by kidney. Structure of skin. Sweat and sweat glands. Sebum. Core body temperature, heat loss and heat gain, Regulation of body temperature.

FNTACOR02P: PHYSIOLOGY IN NUTRITION(PRACTICAL)

TOTAL HOURS: 60 **2 CREDITS**

1. Determination of pulse rate in Resting condition and after exercise (30 beats/10 beats method)
2. Determination of blood pressure by Sphygmomanometer (Auscultatory method).
3. Interpretetationog normal ECG curve with 6 chest leads.
4. Measumement of Peak Expiratory flow rate.(By spirometer)
5. Determination of Bleeding Time (BT) and Clotting Time (CT).
6. Detection of Blood group (Slide method).

7. Measurement of Haemoglobin level (Sahli`s or Drabkinmethod).

SUGGESTED READINGS

1. Chatterjee CC (1988). Text Book of Physiology – Vol I & II.
2. Chaudhuri SK (2000). Concise Medical Physiology. New Central Book Agency (P) Ltd.
3. Guyton AC, Hall JE (1966). Text book of Medical Physiology. 9th Ed. Prism Books (Pvt.) Ltd. Bangalore.
4. Guyton AC (1985). Function of the Human Body, 4th Edition, W.B. Sanders Company, Philadelphia.
5. Hadley ME (2000). Endocrinology. 5th ed. Pearson Education.
6. Hoar WS (1984). General and comparative Physiology. 3rd ed. Prentice-Hall of India.
7. Wilson (1989). Anatomy and Physiology in Health and Illness. Edinburgh, Churchill Livingstone.
8. Winword (1988): Sear's Anatomy and Physiology for Nurses. London, Edward Arno ll.

FNTACOR03T: FOOD CHEMISTRY, BIOPHYSICS AND BIOCHEMICAL PRINCIPLES(THEORY)

TOTAL HOURS: 60 **4 CREDITS**

1.Proteins and Amino acids **No. of Hours 10**

Proteins: Classification. Protein structure and organization: primary, secondary, tertiary and quaternary structure. Amino acid classification. Physical and chemical properties of amino acid and protein. Biological value of proteins (BV), Net protein utilization (NPU) and Proteinefficiency ratio (PER).

2.Carbohydrate Chemistry **No. of Hours 12**

Carbohydrates: classification- mono-, di- & polysaccharides; Stereoisomerism in carbohydrates. Physical and chemical properties of mono-, di- and polysaccharides; Dietary fibre - definition; Fibre components - cellulose, hemicellulose, pectin substances, lignin.

3.Lipid Chemistry **No. of Hours 10**

Lipids: Classification- Fatty acids, triglycerides, phospholipids, Glycolipids, sterols and steroids. Eiconoids. Edible fats and oils - physical and chemical properties, Hydrogenation and importance of fats in the diet. Physical and chemical properties of saturated, monounsaturated, polyunsaturated fatly acids, trans fatty acids, phospholipids, cholesterols and liposomes. Essential fatty acids.

4. Water **No. of Hours 6**

Definition of water in foods, water activity, phase transition of food containing water.Water activity and its influence on quality and stability of foods, methods for stabilization of food systems by control of water activity.

5. Physicochemical principles **No. of Hours 18**

Laws of thermodynamics, Enthalpy, Entropy. Gibbs' free energyThermodynamics and living system. Definition, explanation, importance and biological application of diffusion, osmosis, adsorption,

absorption, viscisity and surface tension. Colloids: definition and importance. Acids and bases, Hydrogen ion concentration. Buffers. Oxidation reduction potential of bioactives (e.g. flavonoids, phenolic acids, quinols) and their applications in food systems.

6.Enzymes No. of Hours 4

Enzmes: Definition and structure. Enzyme substrate interaction. Enzyme kinetics, MichaelisMenten constant(K_m). Enzyme inhibition.Factors regulating enzyme activities, Isoenzymes, Pro- enzymes, Ribozymes, Abzymes, Concept of Rate limiting enzymes.

FNTACOR03P: FOOD CHEMISTRY, BIOPHYSICS AND BIOCHEMICAL PRINCIPLES(PRACTICAL)

TOTAL HOURS: 60 2 CREDITS

1. Qualitative tests for the identification of: Glucose, Galactose, Fructose, Sucrose, Lactose, Starch, Dextrin.
2. Glucose estimation in blood .
3. Qualitative tests for the identification of - Albumin, Gelatin, Peptone, urea, uric acid.
4. Protein estimation by Biuret and Lowry methods.
5. Estimation of urea and uric acid in blood.
6. Determination of acid value of oils by titrimetric method.
7. Determination of osmotic pressure of colloidal solutions.
8. Determination of specific gravity of liquid (fruit juice, blood).

SUGGESTED READINGS

1.Fennema, Owen R (1996), Food Chemistry, 3rd Ed., Marcell Dekker, New York.
2. Whitehurst and Law (2002), Enzymes in Food Technology, CRC Press, Canada.
3. Murray, R. K. Grannen, D. K.; Mayes, P. A. and Rodwell. V. W: Harper's Biochemistry. Lange Medical Book.
4. Potter,N.N.andHotchkiss,J.H (1995), Food Science, 5th Ed., Chapman & Hall.
5. DeMan, J.M.(1990), Principles of Food Chemistry, AVI, NewYork.
6. Lehninger, A.L.; Nelson, D. L. and Cox, M. M. Principles of Biochemistry. CBS Publishers and Distributors.

FNTACOR04T: HUMAN PHYSIOLOGY (THEORY)

TOTAL HOURS: 60 4 CREDITS

1.Physiology of excitable cells: No. of Hours 15

Different types of muscles and their structures Mechanism of skeletal muscle contraction and relaxation, Muscle energetic, Isometric and isotonic muscle contraction. Structure of nerves. Nerve impulse and its conduction. Synapse and Neuromuscular junctions. Synaptic transmission. Neutrotrophins.

2. Nervous System No. of Hours 15

Brief anatomy of Brain and spinal cord. Central and Peripheral nervous system. Reflex action and Reflex arc. Outline of functions of cerebrum, cerebellum, hypothalamus. Autonomic nervous system: Sympathetic and parasympathetic nervous system. Sensory physiology: Sensory Receptors as biotransducers. Brief outline of the special senses. Structure and functions of photoreceptors in eye and hair cells in cochlea.

3.Reproductive system No. of Hours 15

Structure of ovary, fallopian tubule and uterus. Oogenesis and ovulation. Changes during menstrual cycle, Hormonal regulation of menstrual cycle and menopause Fertilisation and implantation of blastocysts , Placenta.Hormonal control of pregnancy, parturition, lactation, Structure of testis, prostrate and seminal vesicle. spermatogenesis and its hormonal regulation.

4.Endocrine system **No. of Hours 15**

Structure, hormones and functions of pituitary, thyroid, parathyroid, adrenal gland and pancreas. Hypothalamus as an endocrine gland. Gastrointestinal hormones. Growth factors.

FNTACOR04P: HUMAN PHYSIOLOGY (PRACTICAL)

TOTAL HOURS: 60 **2 CREDITS**

1. Test for Visual acuity, Colour vision.
2. Identification with reasons of histological slides (Lung, Liver, Kidney, Small intestine, Stomach, Thyroid, Adrenal, Pancreas, Testis, Ovary and Muscle of mammals).
3. Qualitative determination of glucose in blood or urine.
4. Total count (TC) and Differential count (DC)

SUGGESTED READINGS

1. Winword (1988): Sear's Anatomy and Physiology for Nurses. London, Edward Arno ll.
2. Chatterjee CC (1988). Text Book of Physiology – Vol I & II.
3. Chaudhuri SK (2000). Concise Medical Physiology. New Central Book Agency(P) Ltd.
4. Guyton AC, Hall JE (2012). Text book of Medical Physiology. 9th Ed. Prism Books (Pvt.) Ltd. Bangalore
5. Guyton AC (2003). Function of the Human Body, 4th Edition, W.B. Sanders Company, Philadelphia.
6. Hadley ME (2000). Endocrinology. 5th ed. Pearson Education.
7. Hoar WS (1984). General and comparative Physiology. 3rd ed. Prentice-Hall of India.
8. Wilson (1989). Anatomy and Physiology in Health and Illness. Edinburgh, Churchill Livingstone.

FNTACOR05T: NUTRIENTS METABOLISM(THEORY)

TOTAL HOURS: 60 **4 CREDITS**

1.Carbohydrate Metabolism **No. of Hours 14**

Glycolysis & its regulation. Glycogen metabolism. Metabolism of pyruvate. Outline of pentose phosphate pathway. Anaplerotic reactions. Importance of gluconeogenesis.

2. Lipid Metabolism **No. of Hours 12**

Fatty acid synthase and *de novo* biosynthesis of fatty acid; regulation and mechanism of chain elongation. Metabolism of cholesterol, its control and pathophysiological importance. β-oxidation of fatty acids.

3.Amino acid Metabolism **No. of Hours 8**

Essential amino acids.Transamination. Deamination. Transmethylation. Decarboxylation. glucogenic and ketogenic amino acids. Outline of urea cycle. Inborn errors of Metabolism.

4. Biological oxidation **No of hours 4**

Mitochondrial electron transport chain. High energy phosphate bond. Formation of ATP.

5. Nucleic acid metabolism **No. of Hours 8**

Chemical structure of purine and pyrimidine, Catabolism and anabolism of pyrimidines. Gout - occurrence, prognosis, progression and therapy.

6. Vitamins **No. of Hours 10**

Classification, charcateristics and chemical properties of fat and water soluble vitamins. Functions of fat and water soluble vitamins.Hypervitaminosis. Role of vitamins A, D, C, B_1, B_2B_6, B_{12} and folic acid in metabolism.

7.Mineral Metabolism **No. of Hours 8**

Role of minerals in physiology. Trace elements. Sodium potassium balance. Role of calcium, iron and zinc in human body -metabolism, functions, deficiency and toxicity.

FNTACOR05P: NUTRIENTS METABOLISM(PRACTICAL)

TOTAL HOURS: 60 **2 CREDITS**

1. Estimation of Vitamin C in citrus fruits.
2. Estimation of calcium in blood (using kit) and drinking water (Complexometry).
3. Estimation of sodium and potassium in blood (using kit).
4. Estimation of iron in vegetables by spectrophotometry.
5. Estimation of DNA (PDA method) and RNA (Orcinol method) in tissues by spectrophotometry.

SUGGESTED READINGS

1. Murray, R. K. Grannen, D. K.; Mayes, P. A. and Rodwell. V. W: Harper's Biochemistry. Lange Medical Book.
2. Handler, P.: Smith E.I.; Stelten, D. W. : Principles of Biochemistry, Me. Grew Hill Book Co.
3. Lehninger, A.L.; Nelson, D. L. and Cox, M. M. Principles of Biochemistry. CBS Publishers and Distributors.
4. Devlin, T. M. : Text Book of Biochemistry with Clinical Co-relations. John Wiley and Sons.
5. Stryer. L. Biochemistry. Freeman W.H. and Co. 6. Assaini. J. Kaur. Text Book of Biochemistry. C.B.S. Publication

FNTACOR06T: NUTRITION THROUGH LIFE SPAN(THEORY)

TOTAL HOURS: 60 **4 CREDITS**

1. Basics of Meal Planning **No. of Hours 4**

Principles of meal planning,Food groups and Food exchange list,Factors affecting meal planning and food related behaviour

2. Nutrition in Adults and Elderly **No. of Hours 8**

Physiological changes in elderly. .RDA and nutritional guidelines, nutritional concerns and healthy food choices for: Adult man and woman, Elderly.

3. Nutrition during Pregnancy **No. of Hours 13**

Nutrition During Pregnancy: Factors (non-nutritional) affecting pregnancy outcome, importance of adequate weight gain during pregnancy, antenatal care and its schedule, Nutritional requirements during pregnancy and modification of existing diet and supplementation, Deficiency of nutrients, specially energy, iron folic acid, protein, calcium, iodine. Common problems of pregnancy and their managements, specially - nausea, vomiting, pica, food aversions, pregnancy induced hypertension, obesity, diabetes. Adolescent pregnancy.

4.Nutrition during Lactation **No. of Hours 10**

Nutrition during Lactation: Nutritional requirements during lactation, dietary management, food supplements, galactogogues, preparation for lactation. Care and preparation of nipples during breast feeding.

5.Nutrition during Infancy **No. of Hours 15**

Nutrition during Infancy: Infant physiology relevant to feeding and care, Breast feeding, colostrum, its composition and importance in feeding, Initiations of breast feeding. Advantages of exclusive breast feeding. Basic principles of breast feeding. Introduction of supplementary foods, initiation and management of weaning, Baby-led weaning. Bottle feeding-circumstances under which bottle feeding is to be given. Care & sterilization of bottles. Preparation of formula. Mixed feeding, breast feeding and artificial feeding,Management of preterm and low birth weight babies.

6. Nutrition for Children and Adolescents **No. of Hours 10**

Growth and development in children, RDA, nutritional guidelines, nutritional concerns and healthy food choices for: Preschool children, School children, Adolescents

FNTACOR06P: NUTRITION THROUGH LIFE SPAN(PRACTICAL)

TOTAL HOURS: 60 **2 CREDITS**

Meal planning and preparation of adequate meal for different age groups with special reference to different physiological conditions: infants, pre-schooler, school children, adolescents, adults, pregnancy, lactation and elderly.

SUGGESTED READINGS

1. B. Srilakshmi: Dietetics, New Age International Publishers.
2. Guthrie, A. H.: Introductory Nutrition, 6th Ed. The C. V. Mosby Company.
3. Robinson, C. H. Lawler, M. R.; CheiToweth, W. L. and Garwick, A. E.: Normal and Therapeutic Nutrition. 17th Ed. Mac Millan Publishing Co.
4. Swaminathan, M. : Essentials of Foods and Nutrition, Vols -1 and II. Ganesh and Co. Madras.
5. Gopalan, C. et. al : Nutritive value of Indian Foods, Indian Council of Medical Research.
6. Indian Council of Medical Research : Nutrient Requirements and Recommended Dietary Allowance for Indians, New Delhi.
7. FAO/WHO/UNO : Technical Report Series, 724 (1985). Energy and Protein Requirement, Geneva.
8. WHO Technical Reports Series for different Nutrients.
9. Ghosh, S.: The Feeding and Care of Infants arid Young Children, VHAI. 6th Ed. Delhi.
10. WHO : A growth chart for International use In Maternal and Children Health Care, Geneva.
11. Mann and Truswell: Essentials of Human Nitration, Oxford University press.

FNTACOR07T: ELEMENTARY DIETETICS AND MENU PLANNING (THEORY)

TOTAL HOURS: 60 **4 CREDITS**

1. Dietetics and Dietician **No. of Hours 4**

Definition and objective of dietetics, Dieticians-Definition, Classification and Responsibility

2. Food groups **No. of Hours 13**

Four food groups (Caribbean Food Guide; Canadian Food Guide; USA Food Pyramid; British Food Guide; Recommended Nutrient Intake (RNI); Dietary Value Intake; Dietary Reference Value, Five food group system of ICMR. Structure and composition of cereals. Wheat- structure and composition, types (hard, soft/ strong, weak) ,Diagrammatic representation of longitudinal structure of wheat grain. Malting, gelatinization of starch, types of browning- Maillard&caramelization. Rice- structure and composition, parboiling of rice- advantages and disadvantages. Structure and composition of pulses, toxic constituents in pulses, Milk and Milk Products-composition, classification and processing, Eggs-com[position, Meat, fish & poultry- Types, composition, Sugar & Sugar products-Types and composition, Fats & Oils-Types & sources, Food adjuncts- spices, condiments, herbs, extracts;concentrates essences, food colours, origin, classification, convenience foods, Bevarages-Tea, Coffee, Chocolate , cocoa poeder- composition

3. Dietary guidelines **No. of Hours 6**

Nutritive values as a basis for classificationof food, Recommended Daily Allowances (RDA), Dietary guidelines for Indians and food pyramids.

4.Menu Planning **No. of Hours 10**

Menu Planning: Rationale for menu planning, Factors affecting food choice, Nutritional factors, other factors; Exchange list and food composition tables for menu planning, Steps in the development of exchange list, Factors to be considered when planning the regular balanced diet: adequacy, balance caloric control, moderation, variety and aesthetics.

5. Basics of diet therapy **No. of Hours 15**

Basic concepts of diet therapy: Therapeutic adaptations of normal diet, principles and classification of the therapeutic diets, Nutrient modifications.

6. Diet for health care **No. of Hours 5**

Team approach to health care. Assessment of Patient's needs.

7. Routine Hospital Diet **No. of Hours 7**

Routine Hospital Diets: Regular, light, soft, fluid, parenteral and enteral feeding.

FNTACOR07P: ELEMENTARY DIETETICS AND MENU PLANNING (PRACTICAL)

TOTAL HOURS: 60 **4 CREDITS**

1. Planning and preparation of normal diets.
2. Planning and preparation of different fluid diets.
3. Planning and preparation of different soft/semi solid diets.
4. Planning and preparation of different nutrient modified diet.

SUGGESTED READINGS

1. Barbara Luke (19860 Principles of Nutrition and Diet Therapy, Little, Brown and Company, Boston
2. Eva Medved (1986) Food – Preparation and theory, Prentice – Hall, Inc. Englewood Cliffs, New Jersey.
3. Marion Bennion and Osee Hughes (1985) introductory Foods (6th Edition) Macmillan Publishing Co., Inc. New
4. York. Collier Macmillan Publishers, London.
5. Norman N. Potter (1986) Food Science 4th Edition Van Nostrand Reinhold Company, New York.
6. Shakuntal N. Manay and Shadaksharaswamy M. (1987) Foods – Facts and Principles, Wiley Eastern Limited.
7. Anderson, L., Dibble, M.V., Tukki, P.R., Mitchall, H.S., and Rynbergin H.J.: Nutrition in Health and Disease, 17th edition, J. B. Lipincott& Co. Philadelphia.
8. Antia F. P.: Clinical Dietetics and Nutrition, Second Edition, Oxford University Press, Delhi.
9. Dietary guidelines for Indians- A Manual; 2011; NIN, ICMR, Hyderabad.

FNTACOR08T: COMMUNITY NUTRITION (THEORY)

TOTAL HOURS: 60 **4 CREDITS**

1.Concept on Community **No. of Hours 6**

Concept of Community, types of Community, Factors affecting health of the Community.

2.Nutritional Assessment and Surveillance **No. of Hours 6**

Nutritional Assessment and Surveillance: Meaning, need, objectives and importance.

3.Assessment methods for human **No. of Hours 10**

Nutritional assessment of human: Clinical findings, nutritional anthropometry, biochemical tests, biophysical methods.

4.Diet survey **No. of Hours 12**

Diet survey: Need and importance, methods of dietary survey, Interpretation - concept of consumption unit, individual and total distribution of food in family, adequacy of diet in respect to RDA, concept of family food security.

5.Clinical Signs **No. of Hours 8**

Clinical Signs: Need and importance, identifying signs of PEM, vitamin A deficiency and iodine deficiency, Interpretation of descriptive list of clinical signs. Nutritional anaemia. Rickets, B-Complex deficiencies.

6. Nutritional anthropometry **No. of Hours 6**

Nutritional anthropometry:Need and importance, standard for reference, techniques of measuring height, weight, head, chest and arm circumference, interpretation of these measurements. Growth & Development; Body Composition: Changes through lifecycle Use of growth charts.

7. Agencies and programmes **No. of Hours 12**

International, national, regional agencies and organisations. National nutritional intervention programmes to combat malnutrition:ICDS, Midday meal, Special nutrition program, National programs for prevention of anaemia, Vitamin A deficiency and Iodine deficiency disorders.

FNTACOR08P: COMMUNITY NUTRITION (PRACTICAL)

TOTAL HOURS: 60 **2 CREDITS**

1. Anthropometric Measurement of infant - Height, weight, circumference of chest, mid - upper arm circumference, precautions to be taken.
2. Comparison with norms and interpretation of the nutritional assessment data and its significance. Weight for age, height for age, weight for height, Z scores, body Mass Index (BMI) Waist - Hip Ratio (WHR).
3. Growth charts - plotting of growth charts, growth monitoring and promotion.
4. Clinical assessment and signs of nutrient deficiencies specially PEM (Kwashiorkor, marasmus) I vitamin A deficiencies, Anaemia, Rickets, B-Complex deficiencies.
5. Estimation of food and nutrient intake: Household food consumption data, adult consumption unit, 24 hours dietary recall 24 hours record, Weighment method, food diaries, food frequency data, use of each of the above, information available through each individual, collection of data, estimation of intakes.

SUGGESTED READINGS

1. Jelliffe, D. B. : Assessment of the Nutritional Status of the Community; World Health Organisation.
2. Sain, D. R. Lockwood, R., Scrimshaw, N. S.: Methods the Evaluation of the Impact of Food and Nutrition Programmes, United Nations University.
3. Ritchie, J.A.S. : Learning Bettor Nutrition FAO, Rome.
4. Gopalon. C. : Nutrition Foundation of India, Special Publication service.
5. Beghin, 1. Cap. M: Dujardan. B. : A Guide to Nutrition Status Assessment. W.H.O. Geneva.
6. Gopaldas, t. Seshadri, S. : Nutrition Monitoring a Assessment: Oxford University Press.
7. Mason, J. B., Habicht, J. P.; Tabatabai. H. Valverde. U.: Nutritional Surveillance, W.H.O.

FNTACOR09T: EPIDEMIOLOGY AND PUBLIC HEALTH(THEORY)

TOTAL HOURS: 60 **4 CREDITS**

1. Introduction on Health **No. of Hours 6**

Health and its importance: Definition of health (WHO), Dimension of health, Positive health. Determinants of health. Concept of disease and its causations.

2. Data of Community health **No. of Hours 6**

Secondary sources of community health data: Indicators of health. Secondary sources of data from NFHS, Vital Statistics, Census of India, ICMR.

3.Epidemiology **No. of Hours 10**

Definition of epidemiology, components and aims of epidemiology, basic measurements in epidemiology. Demography and family planning. Brief idea about epidemics, epidemiological methods: analytical epidemiology (case control and cohort study); Experimental epidemiology. Infectious diseases in epidemiology. Dynamics of disease transmission, modes of transmission of disease.

4.**Diseases: Prevention and control** **No. of Hours 12**

Epidemiology of diseases, prevention and control [(Nutritionally related disease:- Hyperlipidaemia, clotting disorder, scurvy, beriberi, goiter); (vector borne disease: - HIV/AIDS, malaria, poliomyelitis, dengue, tuberculosis, mumps measles rubella, chicken pox, pertussis, chikungunya); (food borne disease:- salmonellosis, shigellosis, typhoid, botulism, amoebiasis, rotavirus, E.coli food poisoning, staphylococcal food poisoning); (water borne disease: arsenic toxicity, cholera);(non communicable disease:- obesity, diabetes, coronary heart disease)

5.Public health **No. of Hours 2**

Definition of public health, relation between health and nutrition.

6. Immunization **No. of Hours 7**

Immunization : definition. Host defenses and immunity, immunizing agents: its types, national immunization schedule- its importance, immunization in adults and travellers, hazards of immunization health advice to foreign travellers.

7. Community health care **No. of Hours 5**

Health care of the community, health care delivery, health care system, Primary health care in India, Indian public health standards for subcenters, PHCs, community health centers.Hospital waste management.

8. Community water management **No. of Hours 6**

Community water management: importance of water to the community, sources of water. Concept of water pollution. Purification of water in small and large scale. Drinking water handling and safe drinking water

9.Community waste management **No. of Hours 2**

Community waste management: types and methods of disposal of wastes, sewage disposal and treatment.

10. Air pollution **No. of Hours 4**

Air pollution: source of air pollution, factors of air pollution. Indoor air pollution. Monitoring of air pollution. Effects, prevention and control of air pollution.

FNTACOR09P: EPIDEMIOLOGY AND PUBLIC HEALTH(PRACTICAL)

TOTAL HOURS: 60 **2 CREDITS**

1. Preparation of 3 audio visual aids like charts, posters, models related to health and nutrition education.
2. Formulation and preparation of low cost and medium cost nutritious/ supplementary recipe.
3. Field visit (health centre, immunization centre, ICDS, MCH centre, NGOs etc.)

SUGGESTED READINGS

1. Smith, G.W.: Preventive Medicine and public health. 2nd edition. McMillan Co. New York.

2. Park: Park's Textbook of preventive and Social Medicine. 9th edition. M/s. BanarasidasBhanot. Jabalpur.

FNTACOR10T: DIET THERAPY FOR LIFE STYLE DISORDERS(THEORY)

TOTAL HOURS: 60 **4 CREDITS**

1. Lifestyle disorder **No. of Hours 4**

Introduction, types, aetiology, management.

2.Diabetes Mellitus **No. of Hours 8**

Definition, Etiology, Classification, long and short term complications, Diagnosis, Management (Insulin Therapy, Dietary Management with food exchange list, Exercise,Pharmacological), Role of artificial sweeteners. Overview of special conditions: Diabetes in Childhood, Pregnancy, Role of Nutrition Education, Role of Nutrition in Prevention.

3.Cardiovascular diseases **No. of Hours 8**

Prevalence, incidence, mortality with special reference to Indian situation. Patho - physiology and Management of Atherosclerosis, Endothelial dysfunction, Thrombosis, Angina Pectoris, Congestive cardiac failure, stroke, MI. Hyper-lipidemia– classification, diagnosis and nutritional management, Hypertension: Oetiology, Risk factors, Patho-physiology, Management

4.Weight management **No. of Hours 12**

Obesity and Overweight: Body weight components, Classification of obesity,(gynoid/android and Regulation hypertrophy/hypersplasia, Etiology and assessment of obesity and prevalence in Indian situation, Complications of obesity. Management: Medical (Pharmacological), Nutrition and lifestyle, Surgical, Behavioural Juvenile Obesity. Underweight:Etiology ,Diet management, Eating disorders: (Anorexia Nervosa and Bulimia), Management (Medical,Nutritional care), Psychological support and Prevention.

5.Nutritional management of metabolic disease: Gout and inborn error of metabolism **No. of Hours 8**

Gout: Role of proteins and purine, Etiology, Symptoms and complications, Dietarymanagement,Inborn errors of metabolism: PKU, MSUD, Glycogen storage disorders, Galactosemia

6.Nutrition and respiratory health **No. of Hours 6**

Physiology and functions of the respiratory system, Nutritional management of Asthma

7.Nutritional management in cancer (Oral and colon) **No. of Hours 8**

Cancer: Pathogenesis and progression of cancer, Role of Nutrients and food additives in cancer therapies and their nutritional implications, Symptoms, Diagnosis, Cancer therapies: Nutritional implications, Dietary management

8.Arthritis and Osteoporosis **No. of Hours 6**

Etiology dietary treatment in arthritis and osteoporosis.

FNTACOR10P: DIET THERAPY FOR LIFE STYLE DISORDERS(PRACTICAL)

TOTAL HOURS: 60 **2 CREDITS**

Planning and preparation of Diets for the following diseases: i) Obesity and Underweight ii) Diabetes mellitus iii) Hypertension and Atherosclerosis iv) Overweight and Underweight v) Gout vi) Osteoporosis

SUGGESTED READINGS

1. Anderson, L., Dibble, M.V., tukki, P.R., Mitchall, H.S., and Rynbergin H.J.: Nutrition in Health and Disease, 17th edition, J. B. Lipincott& Co. Philadelphia.
2. Anita F. P.: Clinical Dietetics and Nutrition, Second Edition, Oxford University Press, Delhi.
3. Mahan, L. K., Arlin, M. T.: Krause's Food, Nutrition and Diet Therapy. 8th edition, W. B. Saunders Company, London.
4. Robinson. C.H. Lawler, M.R. Chenoweth, W. L., and Garwick, A. E. (1986): Normal and Therapeutic Nutrition. 17th edition, MacMilian Publishing Co.
5. Williams. S. R.: Nutrition & Diet Therapy, 6th edition, Times Mirror/Mosby College Publishings, St. Louis.
6. Raheena, Begum: A textbook of food, nutrition and dietetics Sterling Publishers, New Delhi.
7. Joshi, S. A. : Nutrition and Dietetics, Tata McGraw Hill, Publications, New Delhi.
8.Mehan, L.K. and Arlin, M.T.(1992). Krause's Food Nutrition and Diet Therapy, W.B. Saunders Company, Philadelphia.

FNTACOR11T: CLINICAL NUTRITION AND DIET FOR SPECIAL SITUATIONS IN LIFE (THEORY)

TOTAL HOURS: 60 **4 CREDITS**

1. Nutritional management of physiological stress **No. of Hours 4**
Nutrition in wound healing, Surgery: Pre and post surgical dietary management, Burns, Classification, Complication, Dietary management, Trauma: Dietary management, Sepsis: Dietary management.

2. Dietary Modification in febrile Condition **No. of Hours 5**
Acute, chronic and recurrent fevers, typhoid, rheumatic fever, tuberculosis, malaria, H1N1, dengue fever and chikun guinea.

3. Nutritional management of GI diseases **No. of Hours 14**
Diseases of Esophagus and stomach: Esophagitis(GERD), Dyspepsia, Peptic ulcer, Gastritis, Gastrectomy, Dumping syndrome .
Intestinal diseases: Flatulence, Diarrhea, Constipation, Hemorrhoids, Diverticular disease, Duodenal ulcer, Inflammatory Diseases of Bowl: Crohn's disease and ulcerative colitis, IrritablebowlSyndrome, Colostomy,Ileostomy

4.Malabsorption syndrome **No. of Hours 4**
Celiac disease (Tropical sprue),Steatorrhoea, Intestinal Brush border diseases,Protein losing enteropathy

5. Diseases of Gall bladder and pancreas **No. of Hours 8**Pathophysiologic changes, etiology and dietary management -(Biliary dyskinesia , Cholelithiasis, Cholecystitis, Cholecystectomy ,Pancreatitis)

6. Liver diseases **No. of Hours 8**
Pathophysiology,Progression of liver disease, Role of specific nutrients and alcohol in liver diseases. Nutritional care in liver disease in the context of results of specific liver function tests, Viral hepatitis , cirrhosis of Liver, Hepatic encephalopathy, Wilsons disease.

7. Nutrition Management of Renal Disease **No. of Hours 8**

Etiology and pathogenesis, Clinical and metabolic manifestations Diagnostic tests, Acute and chronic nephritis, Nephrotic syndrome, Renal Failure: Acute and chronic, Nnephroletheasis,ESRD

8. Nutritional management in Allergy **No. of Hours 5**

Definition, symptoms mechanism of food allergy, Biochemical and immune testing (short), Elimination diets, Food selection, Food allergy in infancy: Milk sensitive enteropathy, intolerance to breast milk, Prevention of food allergy.

9.Neurological diseases **No. of Hours 3**

Alzheimer's, Parkinson's disease and Epilepsy, Anorexia nervosa and bulimia.

FNTACOR11P: CLINICAL NUTRITION ANDDIET FOR SPECIAL SITUATIONS IN LIFE(PRACTICAL)

TOTAL HOURS: 60 **2 CREDITS**

Planning and preparation of Diets for the following diseases: i) Peptic ulcer ii) Viral hepatitis iii) Fever iv) Acute and chronic renal failure

SUGGESTED READINGS

1. Anderson, L., Dibble, M.V., tukki, P.R., Mitchall, H.S., and Rynbergin H.J.: Nutrition in Health and Disease, 17th edition, J. B. Lipincott& Co. Philadelphia.
2. Antia F. P.: Clinical Dietetics and Nutrition, Second Edition, Oxford University Press, Delhi.
3. Mahan, L. K., Arlin, M. T.: Krause's Food, Nutrition and Diet Therapy. 8th edition, W. B. Saunders Company, London.
4. Robinson. C.H. Lawler, M.R. Chenoweth, W. L., and Garwick, A. E. (1986): Normal and Therapeutic Nutrition. 17th edition, MacMilian Publishing Co.
5. Williams. S. R.: Nutrition & Diet Therapy, 6th edition, Times Mirror/Mosby College Publishings, St. Louis.
6. Raheena, Begum: A textbook of food, nutrition and dietetics Sterling Publishers, New Delhi.
7. Joshi, S. A.: Nutrition and Dietetics, Tata McGraw Hill, Publications, New Delhi

FNTACOR12T: FOOD MICROBIOLOGY AND IMMUNOLOGY(THEORY)

TOTAL HOURS: 60 **4 CREDITS**

1. General Introduction to microbes (Bacteria, Fungus, and Algae) **No. of Hours 5**

Classification, Nomenclature and Morphology (external and internal features). Principles of staining.

2. Growth kinetics of bacteria **No. of Hours 6**

Growth kinetics, Factors affecting growth, different nutritional mediafor growth, methods of media sterilization.

3. Microbiology of food **No. of Hours 8**

Microbes commonly present in food and the diseases caused by them, microflora present in milk, cereals, vegetables, flesh food. Seafood and Shell fish poisoning. Mycotoxins, Foodborne Diseases, Prions.

4.Microbial Food Spoilage **No. of Hours 10**

Sources of Microorganisms in foods, Some important food spoilage microorganisms, Spoilage of specific food groups - Milk and dairy products, Meat, poultry and seafoods, Cereal and cereal products, Fruits and vegetables and Canned products.

5. Food Fermentations **No. of Hours 10**

Fermentation –definition and types, Microorganisms used in food fermentations, Dairy Fermentations-starter cultures and their types , concept of probiotics, Fermentated Foods-types, methods of manufacture for vinegar, sauerkraut, tempeh, miso , soya sauce, beer, wine and traditional Indian foods.

6. Immune system **No. of Hours 20**

Cells & Organs of the immune system, Innate and Acquired, Primary and secondary immune response, Active and Passive, Antigen, Antibody, Haptens, Adjuvants, Immunoglobulin- classification, polyclonal and monoclonal, basic structure and function**,** antigenand antibody reactions- RIA, ELISA, Immunoblot. Antibody production -processing and presentation of antigen, MHC, Humoral immune response. Cell mediated immunity, Formation, maturation and activation of B and T cells, Immune effectors system- cytokines complement system, K cells and NK cells, Cell mediated effectors response, Interferons, Immunopathology - basic principles of auto immune disease , Vaccine, toxins, toxoids, antiserum. Basic principles of immunological detection of pregnancy and immunohistochemistry.

FNTACOR12P: FOOD MICROBIOLOGY AND IMMUNOLOGY (PRACTICAL)

TOTAL HOURS: 60 **4 CREDITS**

1. Introduction to microbiology: Use of equipments Understanding and use of compound microscope Use of Autoclave Use of Incubator and Inoculation chamber
2. Preparation of different types of media (complex, differential and selective)
3. Preparation of slant, stab and plates using nutrient agar
4. Morphological study of bacteria and fungi using permanent slides
5. Gram staining
6. Bacteriological Analysis of Water by MPN method
7. Ouchterlony double diffusion test in agar-gel.

SUGGESTED READINGS

1. Frazier, W. C. and Westhoff, D. C. (1988): 4th edition, Food Microbiology, MaGraw Hill Inc.
2. Jay James. N. (1986) : 3rd edition, modern Food Microbiology, Van Nestrand Reinhold Company Inc.
3. Pelczar, M.I. and Reid, K. D. (1978): Microbiology, McGraw Hill Company, New York.
4. Benson Harold, J. (1990) : Microbiological Application, Publishers, U.S.A.
5. Colling, C.E. and Lyne, P.M. (1976) : Microbiological Methods Butterworth. London
6.Jay JM, Modern Food Microbiology, CBS Publication New Delhi 3rd Ed. 1987
7.Bamrart George J, Basic food Microbiology, CBS Publication, New Delhi, 1987
8.Brain J. Wood Elsierver, Microbiology of Fermented Foods, Vol II & I, Applied Science Publication.
9.Joshi, Biotechnology: Food Fermentation Microbiology, Biochemistry & Technology, Vol II
10. Pelczar MJ, Microbiology, Tata McGraw Hill Publishing Company Limited, New Delhi, 1993

FNTACOR13T: FOOD PROCESSING AND FOOD TECHNOLOGY(THEORY)

TOTAL HOURS: 60 **4 CREDITS**

1.Food Storage and Spoilage **No. of Hours 10**

Contamination and microorganisms in the spoilage of different kinds of foods and such as cereal and cereal products, vegetable and fruits, fish and other sea foods, meat and meat products, eggs and poultry, milk and products, canned foods. Classification of food based on pH, Food infection, food intoxication, definition of shelf life, perishable foods, semi perishable foods, shelf stable foods, Storage of different kinds of foods and such as cereal and cereal products, vegetable and fruits, fish and other sea foods, meat and meat products, eggs and poultry, milk and products, spices and canned foods.

2.Food preservation **No. of Hours 12**

Definition, objectives and principles of food preservation. Different methods of food preservation. **:** Freezing and Refrigeration:Introduction to refrigeration, cool storage and freezing, definition, principle of freezing, freezing curve, changes occurring during freezing, types of freezing i.e. slow freezing, quick freezing, introduction to thawing, changes during thawing and its effect on food. Thermal Processing- Commercial heat preservation methods: Sterilization, commercial sterilization, Pasteurization, and blanching. Drying and Dehydration - Definition, drying as a means of preservation, differences between sun drying and dehydration (i.e. mechanical drying), heat and mass transfer, factors affecting rate of drying, normal drying curve, names of types of driers used in the food industry. Evaporation – Definition, factors affecting evaporation, names of evaporators used in food industry. Units of radiation, kinds of ionizing radiations used in food irradiation, mechanism of action, uses of radiation processing in food industry, concept of cold sterilization.

3.Preserved Products **No. of Hours 13**

Jam, Jelly, Marmalade, Sauces, Pickles, Squashes, Syrups types, composition and manufacture, selection, cost, storage, uses and nutritional aspects.

4. Food Standards and Food Laws **No. of Hours 15**

Introduction on Food standards and Food Laws, FSSAI, ISI, Agmark, FPO, MPO, PFA, HACCP, Codex Aulimentaurius.

5.Food Adulteration **No. of Hours 5**

Definition, Classification, Different types of adulterants

6.Food Packaging **No. of Hours 5**

Packaging Functions and Requirements,, Printing of packages .Barcodes & other marking, Labeling Laws

FNTACOR13P: FOOD PROCESSING AND FOOD TECHNOLOGY(PRACTICAL)

TOTAL HOURS: 60 **2 CREDITS**

1. Study on Blanching and Browning Process.
2. Preparation of Fruit preserves(Jam, Jelly).
3. Preparation of vegetable preserves.(Pickles)

4. Dehydrated Products – tray drying, sun drying etc.
5. Tomato Processing.
6. Fruit Pulping/Juice/Beverages production.
7. Preparation and Standardisation of Traditional Indian Fermented Food.
8. Visit to Food Processing and Preservation unit.
9. Detection of Adulterants in common Food Stuffs like Milk, Oil, Laddu, Turmeric etc.

SUGGESTED READINGS

1. Subalakshmi, G and Udipi (2001), S.A. Food processing and preservation; New Age International Publishers, New Delhi.
2. Srilakshmi, B. (2003), Food Science. New Age International Publishers, New Delhi.
3. Potter, N.N. and Hotchkiss J. H. (1996), Food Science. CBS publishers and distributors.
4. Srivastava, R.P.O. and Kumar, S. (1994) Fruit and vegetable preservation, International Book distribution Company, Lucknow.
5. MC Williams, M and Paine, H. (1994), Modern Food preservation. Surjeet Publications, Delhi.
6. Cruess, W.V.(1997), Commercial Fruits and Vegetable Products, Anees Offset press, New Delhi.

FNTACOR14T: RESEARCH METHODOLOGY AND BIOSTATISTICS(THEORY)

TOTAL HOURS: 60 **4 CREDITS**

1. Research Methodology **No. of Hours 5**

Meaning, objectives and Significance of research. Types of research, research approaches and scientific methods, Research process, Criteria of good research.

2. Research problem **No. of Hours 10**

Definition and identification of a research problem, Selection of research problem. Technique Involved in Defining a Problem.

3. Study design **No. of Hours 15**

Meaning and needs of design, important concepts relating to research design, variables, experimental and control groups. (Use examples from epidemiology and clinical trials). Different research designs-exploratory, descriptive, analytical and diagnostic (epidemiology and clinical trials). Pilot studies. Qualitative vs quantitative research**.**

4. Sampling of dataand analysis **No. of Hours 15**

Variable, parameter, statistics. Frequency distribution. Cumulative frequency. Graphical presentation techniques including Histogram, Bar chart, Pie chart along with the concepts of frequency polygon. Mean, median, mode, Standard Deviation and Standard Error of mean .Probability. Normal distribution. Student's t-distribution. Testing of hypothesis - Null hypothesis, errors of inference, levels of significance, Degrees of freedom.

5.Preparation of report **No. of Hours 15**

a. Graphical and diagrammatic presentation.
b. Interpretation of – Meaning of interpretation, Technique of interpretation,
c. Precaution in interpretation- Interpretation of tables and figures.
d. Report writing – Significance of report writing, Steps in writing report, Types of reports.

FNTACOR14P: RESEARCH METHODOLOGY AND BIOSTATISTICS(PRACTICAL)

TOTAL HOURS: 60 **2 CREDITS**

1. Assignment for calculation of mean, median, mode, standard deviation, standard error of mean and students' 't' test with provided data.

SUGGESTED READINGS

1. Best, JW and Kahn, JV (1992) Research in Education.6th ed. New Delhi, Prentice Hall of India Pvt. Ltd,

2. Kothari, CR (2004) Research Methodology, Methods & Techniques, 2nd ed. New Age International Publishers.

3. Goode, WJ and Hatt, PK (1981) Methods in Social Research, McGraw Hill International Editions, Sociology Series.

4. Kerlinger, FN (1983) Foundations of Educational Research. 2nd ed.

5. Marjory L. Joseph, William D Joseph (1996) Research Fundamentals in Home Economics / Human Ecology. Plycon Press.

6. WHO (2001) Health Research Methodology – A Guide for Training in Research Methods.

7. Gilbert N. (1981). Statistics. 2nd ed. CBS College Publishing. Japan

8. Moser CA, Kalton G (1979). Survey methods in social investigation. 2nd ed. Heinemann Educational Books Ltd. London.

DSE SYLLABUS
FNTADSE01T:SPORTS NUTRITION (THEORY)

TOTAL HOURS: 60 **CREDITS: 4**

1. Introduction **No. of Hours 6**

Introduction, Nutritional considerations for sports / exercising person as compared to normal active person. Determination of energy expenditure in sports and exercise using various methods. Physiology of energy systems.

2. Activities. **No. of Hours 6**

Energy substrate for activities of different intensity and duration, aerobic and anaerobic activities.

3.Carbohydrate needs **No. of Hours 8**

Macro nutrients-Carbohydrate as an energy source for sport and exercise. Carbohydrate stores, Fuel for aerobic and anaerobic metabolism, Glycogen re-synthesis, CHO Loading, CHO composition for pre exercise, during and recovery period.

4. Fat needs **No. of Hours 6**

Role of Fat as an energy source for sports and exercise. Fat stores, regulation of fat metabolism , factors affecting fat oxidation (intensity, duration , training status, CHO feeding) , effect of fasting and fat ingestion.

4. Protein needs **No. of Hours 6**

Protein and amino acid requirements, Factors affecting Protein turnover, Protein requirement and metabolism during endurance exercise, resistance exercise and recovery process. Protein supplement.

6. Micronutrient needs **No. of Hours 6**

Important micronutrients for exercise. B complex vitamin and specific minerals. Exercise induced oxidative stress and role of antioxidants.

7. Fluid needs **No. of Hours 4**

Fluid balance in sports and exercise, importance, symptoms and prevention of dehydration, Sports drink

8. Nutritional guideline for different sports **No. of Hours8**

Nutritional guidelines for different sports and games: Nutritional requirements- carbohydrates, fats, proteins and micronutrients in different sports events: strength sport, weight class sport, racket sport, field sports, court sports. General training Diet. Meal planning (Pre & post game)

9.Management of selected nutritional problems among sportsperson **No. of Hours 6**

Management of selected nutritional problems among sportsperson:Anaemia - causes, consequences and role of nutrition in the prevention and management. Osteoporosis - Bone Physiology, Effect of Nutrition, age, sex and exercise on bone health, Preventive and curative strategies of osteoporosis. Nutritional management of Exercise Injuries, Nutrition for Weight Management in Sports. Disorders among sports persons, Types of Sports with weight restrictions -Need for weight loss and weight gain, Negative aspects of weight loss and recovery strategies -Dietary & Lifestyle Approaches for weight and fat loss and gain. Chronic dieting and eating disorder. Female athletic triad

10.Dietary Supplements **No. of Hours 4**

Dietary Supplements: Definition and regulations of dietary Supplements (country-specific). Classification of Dietary or Nutritional supplements and its composition, Benefits and applications of nutritional supplements and macronutrient supplements like pure proteins (*e.g.,* whey, casein, egg albumen, soy protein, pea protein and other vegan proteins or protein blends), protein bars. Weight gainers like amino acid supplements, glutamine, arginine, carbohydrate supplements and EFAs, glycerol. Meal replacement powders, ready to drink protein shakes (RTDs), sports drinks & Sports gels. Anti-doping regulations and harmful effects of use of steroids and other banned substances.

FNTADSE01P: SPORTS NUTRITION (PRACTICAL)

TOTAL HOURS: 60 **CREDITS: 2**

1. Calculation of energy requirement according to physical activity level of sports person.
2. Nutritional assessment of athletes.
3. Review on ergogenic nutritional products and supplements available in market.

SUGGESTED READINGS

1. I CampBell(2014), Sports Nutrition: Enhancing Athletic Performance Bill. CRC Press, Taylor& Francis.
2. G. Gregory Haff(2008), Essentials of Sports Nutrition Study Guide, , Humana Press.
3. M. Dunford and J. A. DoyleThomson(2008), Wadsworth Nutritionfor Sport and Exercise.
4. Bucci, L., 1993 Nutrients as Ergogenic Aids for Sports and Exercise. Boca Raton, FL.:CRC Press.
5. Don MacLaren. , ChPublished by Churchhill Livingstone (2007), Advances in Sport and Exercise Science : Nutrition and Sport, Elsevier.
6. Bruce Reider(1996), Sports Medicine: The school age athlete, Published by W.B. Saunders.
7. Dan Banardot (2000), Nutrition for Serious Athletes.Human Kinetics.
8. by Judy A Driskell , Ira Wolinsky(2000), Energy-Yielding Macronutrients and Energy Metabolism in Sports Nutrition. CRC Press.
9. Satyanarayan, K; Nageshwar Rao. C; NarsingaRao,B.S.; Malhotra, M.S. (1985), Recommended Dietary Intakes for Indian Sportsman and Women., Hyderabad, National Institute of Nutrition.

FNTADSE02T: ENTREPRENEURSHIP IN FOOD INDUSTRY (THEORY)

TOTAL HOURS: 60 **CREDITS: 4**

1. Entrepreneurial Development **No. of Hours 15**

Case studies of successful entrepreneurs, Exercises on ways of sensing opportunities – sources of idea, creating efforts, SWOT 49 Analysis, Entrepreneurial skill assessment test, Techniques of development of entrepreneurial skills, positive self image and locus of control.

2.Food Business management **No. of Hours 25**

Case studies of Food Processing Business and its aspects, Business opportunity Identification and Assessment techniques, Business Idea Generation and evaluation exercise, Market Assessment study Analysis of competitive situation, SWOT Analysis for business and for competitors, Preparation of business plan, Preparation of project report, Methods of Arrangement of inputs – finance and material, Tax planning.

3. Personality development and communication skills **No. of Hours 20**

Communication skills and Personality Development, Intra personal communication and Body Language, Inter personal Communication and Relationships , Leadership Skills , Team Building and public speaking, Corporate Grooming, Dressing Etiquette, Preparing for Interview, Emotional Quotient.

FNTADSE02P: ENTREPRENEURSHIP IN FOOD INDUSTRY(PRACTICAL)

TOTAL HOURS: 60 **CREDITS: 2**

1. Preparation of business plan.
2. Preparation of project report.
3. Tax Planning under the head Salary.
4. Visit to a food industry.

SUGGESTED READINGS

1. Acharya S S and Agarwal N L (1987), Agricultural Marketing in India, Oxford & ISH Publishing Co., New Delhi.
2. Chandra, Prasanna(1996), Projects, Planning, Analysis, Selection, Implementation and Review, Tata McGraw-Hill Publishing Company Limited, New Delhi.
3. D. David and S Erickson (1987), Principles of Agri Business Management, McGraw Hill Book Co., New Delhi.
4. David H. Holt (2002),Entrepreneurship – Anew Venture Creation, Prentice Hall of India, New Delhi.
5. Phillip Kottler Marketing Management (1994), Prentice Hall of India Private Limited, New Delhi.
6. Vasant Desai (2011), The Dynamics of Entrepreneurial Development and Management, Himalya Publishing House Pvt. Ltd., Mumbai.
7. Vasant Desai (2012), Fundamentals of Entrepreneurship and Small Business Management, Himalya Publishing House Pvt. Ltd., Mumbai.

FNTADSE03T: FOOD BORNE DISEASES AND FOOD TOXICOLOGY(THEORY)

TOTAL HOURS: 60 **CREDITS: 4**

1.Food borne diseases **No. of Hours 15**

Definition related to food borne diseases, types of diseases with example (Pandemic, Endemic and Epidemic). Infection, contamination, decontamination, disinfection, transmission (direct and indirect). Brief idea about different vector borne diseases, mode of transmission prevention and control of following diseases: *Salmonella*, *Shigella*, *Typhoid*, *Botulism*, Cholera, *E. coli* food poisoning, Staphylococcal food poisoning, *Clostridium* infection, Bacillary infection.

2.Lactose intolerance **No. of Hours 3**

Lactose intolerance-its mechanism and enzyme deficiency.

3. Mechanism of food borne diseases **No. of Hours 6**

Molecular mechanism of food borne diseases.

4. Food safety **No. of Hours 10**

Definition: Food safety, types of hazards (Biological, chemical and physical hazards), impact on health, control measures, factors affecting food safety.

5.Hygiene and sanitation **No. of Hours 9**

Hygiene and sanitation: Contamination, control methods using physical and chemical agents, use of preservatives, pest control management, personal hygiene.

6. Food safety management **No. of Hours 7**

Food safety management: Concept of safety management, prerequisites- GHPs, GMP, HACCP etc.

7. Toxic agents in food **No. of Hours 10**

Toxic agents in food: Botulism, lathyrism, Ciguatoxins, Tetrodotoxins, Saxotoxins, conotoxins, Antivitamins, Haemagglutins, Cyanogenicglycosides, Strychnine, Solanine, atropine, Muscarine

FNTADSE03P: FOOD BORNE DISEASES AND FOOD TOXICOLOGY(PRACTICAL)

TOTAL HOURS: 60 **CREDITS: 2**

1. Assessment of surface sanitation by swab and rinse method.
2. Assessment of personal hygiene.
3. Designing of various food processing systems and food service areas.
4. Design and layout of cold storage and ware house.
5. Assessment of physico chemical properties of waste water.
6. Isolation and enumeration of bacteria from rotten food bread and vegetables.
7. Testing of sanitizers and disinfectants.
8. Study of phenol coefficient of sanitizers.
9. Visit to Food industry and preparation of report.

SUGGESTED READINGS

1. Infections Diseases and Clinical Microbi0logy 2014, Amber Arnold, George E. Griffin, Oxford.
2. Fundamentals of Food Process Engineering 2000, Romeo T. Toledo, CBS PUB & DIS.
3. Food Processing and Preservation 2008, G. Subhalakshmi, S. A. Udipi, New Age.
4. Fruit and Vegetable Preservation 2016, R. P. Srivastava, Sanjeev Kumar, CBS, PUB & DIS.
5. Food Toxicology, DebasisBagchi, AnandSwaroop.

6. Principles of Food Toxicology 3rded, TonuPussa.
7. Introductory Food Toxicology, Lokesh K. Mishra.

FNTADSE04T: FOOD & BEVERAGE MANAGEMENT (THEORY)

TOTAL HOURS: 60 **CREDITS: 4**

1. Introduction to Food Service **No. of Hours 10**

Introduction to food service industry in India, factors contributing to the growth of food service industry, sectors of food service industry, food service operations, Kinds of food service establishments, environmental factors influencing food service operations, styles of food service

2. Food Production & Menu Planning **No. of Hours 20**

Food production methods, food production process, cooking methods ,Menu planning: Importance of menu, Factors affecting menu planning, Menu planning for different kinds of food service units , Food Purchase and Storage, Quantity Food production: Standardization of recipes, quantity food preparation - techniques, recipe adjustments and portion control ,Hygiene and Sanitation

3. Resources of food service establishments **No. of Hours 20**

Food and beverage staff, organization structure, qualities of food service staff, training; food service equipment; food & beverage pricing, revenue control.

4. Personnel Management **No. of Hours 10**

Personnel Management, Recruitment, selection, induction, employee facilities& benefits, safety at work

FNTADSE04P: FOOD & BEVERAGE MANAGEMENT (PRACTICAL)

TOTAL HOURS: 60 **CREDITS: 2**

Planning of A Food Service Unit : Preliminary Planning, Survey of types of units, identifying clientele, menu, operations and delivery Planning the set up a) Identifying resources b) Developing Project plan c) Determining investments d) Project Proposal.

SUGGESTED READINGS

1. West B Bessie & Wood Levelle (1988) Food Service in Institutions 6th Edition Revised By Hargar FV, Shuggart SG, &Palgne Palacio June, Macmillan Publishing Company New York.
2. SethiMohini (2005) Institution Food Management New Age International Publishers
3. Knight J B &Kotschevar LH (2000) Quantity Food Production Planning & Management 3rd edition John Wiley & Sons
4. Philip E Thangam (2008) Modern Cookery for teaching and Trade Part I & II Orient Longmam
5. Taneja S and Gupta SL (2001) Enterpreneurship development, Galgotia Publishing

FNTADSE05T: DAIRY TECHNOLOGY (THEORY)

TOTAL HOURS: 60 **CREDITS: 4**

1. Introduction **No. of Hours 2**

Status of dairy industry in India

2. Physical properties of milk **No. of Hours 8**

Color, taste, pH and buffering capacity, refractive index, viscosity, surface tension, freezing, boiling point, specific heat, OR, electrical conductivity.

3. Lactose **No. of Hours 4**

Lactose (alpha and beta forms and their differences) Significances of lactose in dairy industry.

4. Milk fat **No. of Hours 10**

Composition and structure, factors affecting melting point, boiling point, solubility and Refractive Index, fat constants (saponification value, iodine value, RM value, Polenske value, peroxide value). Chemical reactions of fat (hydrolysis, auto-oxidation), condition favouring auto-oxidation, prevention, measurement of auto-oxidation.

5. Protein and Enzymes **No. of Hours 10**

General structure, amphoteric nature, difference between casein and serum protein, different types of casein (acid and rennet), uses of casein, fractionation of protein. Enzymes- catalase, alkaline phosphatase, lipases and proteases.

6 .Market milk industry **No. of Hours 12**

Systems of collection of milk Reception, Platform testing Various stages of processing Filtration, Clarification, Homogenization, Pasteurization, Description and working of clarifier, cream separator, homogenizer and plate heat exchanger.

7. Milk products **No. of Hours 14**

Butter, ghee, flavored milk, yoghurt, dahi, shrikhand, ice-cream, condensed milk, milk powder, channa, paneer, cheese (cheddar).

FNTADSE05P: DAIRY TECHNOLOGY (PRACTICAL)

TOTAL HOURS: 60 **CREDITS: 2**

1. To perform platform tests in milk.(Acidity,COB,MBRT,specificgravity,SNF).
2. To estimate milk protein by Folin method.
3. To estimate milk fat by Gerber method.
4. Preparation of flavoured milk/. Pasteurization of milk.
5. To prepare casein and calculate its yield.
6. Visit to a milk industry.

SUGGESTED READINGS

1. De Sukumar (2007), Outlines of Dairy Technology, Oxford University Press, Oxford.
2. Shahidi F and Botta JR,(1994),Seafoods: Chemistry, Processing, Technology and Quality, Blackie Academic &Professional,London.
3. Webb and Johnson (1988), Fundamentals of Dairy Chemistry, 3rd ed., CBS Publishers, New Delhi.

FNTADSE06T: NUTRITIONAL MANAGEMENT AND COUNSELLING (THEORY)

TOTAL HOURS: 60 **CREDITS: 4**

1. Basics of diet counselling **No. of Hours 10**

Diet Counselling-meaning, significance, process, types Goals of counselling, individuals, group and family counselling, Basic sequence in counselling, Materials needed for counselling –models, charts, posters, AV aids, Hand outs etc, Communication process in counselling and linguistics in clinical dietary practices, problems in communication Role of Counsellor & Counselee, Techniques of obtaining relevant information- 24 Hour Dietary recall, List of food likes and dislikes, Lifestyle Dietician as a part of medical team and research team, Impact of counselling on health and disease of individuals – discussion of hospital case studies.

2. Introduction on Psychology and counselling No. of Hours 15

Introduction to psychology – Definition , Nature and Scope Attention and perception – Types of attention and factors influencing attention , principles of perceptual organization and abnormalities in perception learning and memory- Types of learning, Types of memory, Forgetting and its causes motivation and emotion- Types of motives, types of emotions, emotional expression, Personality- nature and definition , factors influencing personality, Psycho analytic theory of personality Nature and goals of counselling Principles of counselling, Characteristics of a good counsellor, Ethical principles of counselling, Special areas of counselling: Educational, family, health, community and counselling of alcoholic, and drug addicts.

3. Counselling Skills No. of Hours 15

Approaches to counselling – Psycho analytic approach, Behaviouristic, Humanistic approach, Pre – Helping phase: Rapport building skills, Attending and listening skills, Stage I skills: Empathy, respect, Genuineness and concreteness, Stage II skills: Advanced empathy, self disclosure, Immediacy and Confrontation. Stage III skills: Goal setting, Action plan Programme and Brainstorming.

4. Diet Counselling at Hospital and Community Level No. of Hours 20

Role of counselling in hospital, Role of counselling in community, Organizing health camps and patient feedback – at hospital level, Organizing health camps and patient feedback – at community level, Diet counselling for obese people, Diet counselling for Diabetics, Diet counselling for CVD, Diet counselling for mother and child care, Diet counselling for adolescent, Patient follow up / home visits,geriatric counselling with specific diseases like HIV/AIDS.

FNTADSE06P: NUTRITIONAL MANAGEMENT AND COUNSELLING (PRACTICAL)

TOTAL HOURS: 60 CREDITS: 2

1. Organizing health camps and patient feedback – both at hospital level and community level
2. Diet counselling for mother and child care,adolescent, obese people, Diabetic patient CVD.
3. Patient follow up / home visits.

SUGGESTED READINGS

1. Gibson, R.L., Mitchell, M.H.(2005). Introduction to counselling and guidance (6th Ed).
2. Gelso, C.J., Fretz, B.R.(1995). Counselling Psychology, Bangalore, Prism Books Pvt Ltd.
3. Sharma, T.C.(2002). Modern Methods of Guidance and Counseling, New Delhi, sarup& sons.
4. Beena and Parweshwaran- Invitation to Psychology, Neel Kamal Publications.

SEC SYLLABUS

FNTSSEC01M: INSTRUMENTATION

TOTAL HOURS: 30 **CREDITS: 2**

1. Microscopy **No. of Hours: 4**
Brightfield and darkfield microscopy, Optical Microscopy, Phase contrast Microscopy, Inverted Microscopy

2. Chromatography **No. of Hours: 7**
Principles and applications of paper chromatography (including Descending and 2-D), Thin layer chromatography, HPLC.
Separation of mixtures by paper / thin layer chromatography

3. Spectrophotometry **No. of Hours: 7**
Principle and use of study of absorption spectra of biomolecules, Analysis of biomolecules using UV and visible range, Colorimetry.
Protein concentration of spectrophotometer/ colorimeter.

4. Electrophoresis **No. of Hours: 3**
Principle and applications of native polyacrylamide gel electrophoresis

5. Centrifugation **No. of Hours: 7**
Preparative and analytical centrifugation, density gradient centrifugation and ultracentrifugation
Separation of components of a given mixture using a laboratory scale centrifuge

6. ECG and EEG **No. of Hours: 1**
Principles of ECG and EEG, application of ECG and EEG

7. ELISA **No. of Hours: 1**
Principle and applications of ELISA test

SUGGESTED READINGS

1. Wilson K and Walker J. (2010). Principles and Techniques of Biochemistry and Molecular Biology. 7th Ed., Cambridge University Press.
2. Nelson DL and Cox MM. (2008). Lehninger Principles of Biochemistry, 5th Ed., W.H. Freeman and Company.
3. Willey MJ, Sherwood LM &Woolverton C J. (2013). Prescott, Harley and Klein's Microbiology. 9thEd., McGraw Hill.
4. Karp G. (2010) Cell and Molecular Biology: Concepts and Experiments. 6th edition. John Wiley & Sons. Inc.
5. Nigam A and Ayyagari A. 2007. Lab Manual in Biochemistry, Immunology and Biotechnology. Tata McGraw Hill.
6. Mahapatra A.B.S. 2007.Essentials of Medical physiology Practical. Current books International

7. Jain A. K. 2007. Textbook of practical physiology for MBBS. Arya Publications.

FNTSSEC02M: FIELD STUDY IN CLINICAL / COMMUNITY SETTING

TOTAL HOURS: 30 **CREDITS: 2**

1. TheoryNo. of Hours 10

Introduction to clinical nutrition, clinical conditions requiring dietary intervention, role of dietitian in hospitals/clinics, staff training, RD –requirements, procedure, functioning.

2. Practical **No. of Hours 20**

1. Visit to an ongoing program in ICDS: one rural, one urban. (eg. mahilamandal meeting or nutrition week celebration .
2. Visit to a health centre (ANC clinic run by Government health department and observe quality of counseling imparted to pregnant women (especially awareness of anemia, importance of IFA).
3. To visit an NGO either rural or urban and observe one intervention program implemented for 59 women, school children or adolescence (For all the above observation appropriate observation check lists will be made and used)
4. Visit to old age home/Nutrition Rehabilitation Centre/slum area and prepare report on nutritional status /health concern(at least 10 case studies to be done)
5. Internship in any hospital/nursing home -case study of diseases
6. Preparation of visual aids indicating clinical problems related to nutrition – Charts, posters, models etc. and demonstration

SUGGESTED READINGS

1. Antia, F.E. (1989), Clinical Dietetics and Nutrition, Oxford University Press, New Delhi, 1973, 1989.
2. Copper, et al. (1963),. Nutrition in Health and Disease 4th edition, BippincoltCompl.
3. Davidson passmore, P. and Brock J.P. (1986). Human Nutrition and Dietetics. The English Language Book Society, Livingstone.
4. Gopalan, C., Ramasastri, B.V. and Balasubramaniam, S.C. (1994). Nutritive value of Indian Foods. National Institute of Nutrition, Hyderabad.
5. Howa, R. (1971). Basic Nutrition in Health and Disease, W.B. Saunders Co., Philadelphia.
6. Krause, M.V. Horsch, M.A. (1972). Food Nutrition and Diet Therapy, W.B. Saunders Company, Philadelphia.
7. Mehan, L.K. and Arlin, M.T.(1992). Krause's Food Nutrition and Diet Therapy, W.B. Saunders Company, Philadelphia.
8. Robbinson, H. (1987). Normal and Therapeutic Nutrition, Oxford and IBH Publishing, Calcutta, Bombay.
9. Shils, E.M., Olson, A.J. and Shike M.C. (1994). Modern Nutrition and Health and Diseases Vol.II, Lea and Febriger, Philadelphia.
10. Sue Rod Williams(1989). Nutrition and Diet therapy, Times Mirror mosby college, St. Louis, Toronto, Bosion.
11. Swaminathan, M. (1974). Essentials of Food and Nutrition, Vol. I & II, Ganesh and Company, Madras.

GE SYLLABUS

FNTHGEC01T: FOOD AND NUTRITION (THEORY)

TOTAL HOURS: 60 **CREDITS: 4**

1. **Introduction to Food and Nutrition** **No. of Hours 4**
   Definition of Food, Nutrition, Nutrient, Nutritional status, Dietetics, Balance diet, Malnutrition, Energy (Unit of energy – Joule, Kilocalorie).
2. **Food and Nutrients** **No. of Hours 8**
   Carbohydrate, Protein, Fat, Vitamins and Minerals (calcium, phosphorus, sodium, potassium, iron, iodine, fluorine)- sources, classification, functions, deficiencies of these nutrients. Functions of water and dietary fibre.
3. **Five food groups** **No. of Hours 10**
   Basic 5 food groups: Types, composition, nutritional significance, role of cookery of cereals, pulses, milk & milk products, meat, fish, egg, vegetables & fruits, nuts, oil & sugar.
4. **Food Chemistry** **No. of Hours 10**
   Chemistry of carbohydrate, proteins and fats. Vitamins and minerals
5. **Nutrients Metabolism** **No. of Hours 15**
   Elementary idea of metabolism, enzymes and hormones- name and their important functions. Metabolism in brief (Glycolysis, Glycogenesis, Gluconeogenesis, Cori's cycle, Kreb's cycle, Deamination, Transamination. Role of hormones in carbohydrate metabolism.
6. **Basic Metabolism Rate (B.M.R)** **No. of Hours 6**
   B.M.R: Definition, factors affecting B.M.R. and Total Energy Requirement (Calculation of energy of individuals).
7. **Deficiency diseases** **No. of Hours 7**
   Deficiency diseases (Nutritional anaemia, PEM, IDD, VAD)- Aetiology, Prevalence, Clinical findings, Prevention & Treatment.

FNTHGEC01P: FOOD AND NUTRITION(PRACTICAL)

TOTAL HOURS: 60 **CREDITS: 2**

1. Elementary idea of weights & measures.
2. Preparation of cereals, pulses, vegetable, egg, milk, fish, nuts dishes.
3. Planning and preparation of diet of an adult male/female.
4. Planning of a day's diet for pregnant & lactating mother.
5. Preparations of supplementary foods for infants.

SUGGESTED READINGS

1. B.Srilakshmi : Nutrition Science, New Age International Publishers
2. Guthrie, A.H.: Introductory Nutrition, 6th Ed. The C.V. Mosby Company
3. Robinson, C.H.Lawer, M.R.; CheiToweth, W.L. and Garwick, A.E.: Normal and Therapeutic Nutrition.17th Ed. Mac Milan Publishing Co.

4. Swaminathan, M : Essentials of Foods and Nutrition, Vols-1and II. Ganesh and Co. Madras.
5. Ghosh, S.: The Feeding and Care of Infants arid Young Children, VHAI. 6th Ed. Delhi.
6. Mann and Truswell: Essentials of Human Nitration, Oxford University press.

FNTHGEC02T: HUMAN BODY AND NUTRITION(THEORY)

TOTAL HOURS: 60 **CREDITS: 4**

1. **Animal cell** **No. of Hours 5**
   Animal cell: definition, structure and functions of different parts. Organelle
2. **Blood and body Fluids:** **No. of Hours 10**
   Blood, composition, blood corpuscles, functions, blood groups and its importance in transfusion, hazards of mismatch blood transfusion. Rh factor, bloodcoagulation. Lymph: composition and function.
3. **Cardiovascular and Respiratory system** **No. of Hours 10**
   Heart :Junctional tissues and functions. Cardiac cycle, cardiac output, blood pressure and its regulation.
   Mechanism of respiration, Respiratory centre. Respiratory regulation.
4. **Digestive system and Digestion** **No. of Hours 20**
   Digestive system: Structures involved in digestive system (mouth, oesophagus, stomach, small intestine, large intestine,liver pancreas, gallbladder), and their functions, composition of different digestive juices & their functions. Digestion and absorption of carbohydrate, protein and fat.
5. **Excitable cells** **No. of Hours 05**
   Brief description about the mechanism of muscular contraction. Neuro-muscular transmission.
6. **Regulatory systems** **No. of Hours 10**
   General idea about the Hormones in human body and their significance on nutrition. Brief idea about brain and sinal cord. somatic and autonomic control of body.

FNTHGEC02P: HUMAN BODY AND NUTRITION (PRACTICAL)

TOTAL HOURS: 60 **CREDITS: 2**

1. Determination of pulse rate in Resting condition and after exercise (30 beats/10 beats method)
2. Determination of blood pressure by Sphygmomanometer (Auscultatory method).
3. Identification of permanent slides (Blood cells, Stomach, Small intestine, large intestine, Liver, pancreas).
4. Determination of Bleeding Time (BT) and Clotting Time (CT).
5. Detection of Blood group (Slide method).

SUGGESTED READINGS

1. Chatterjee CC (1988). Text Book of Physiology – Vol I & II.
2. Chaudhuri SK (2000). Concise Medical Physiology. New Central Book Agency (P) Ltd.
3. Guyton AC, Hall JE (1966). Text book of Medical Physiology. 9th Ed. Prism Books (Pvt.) Ltd. Bangalore.
4. Guyton AC (1985). Function of the Human Body, 4th Edition, W.B. Sanders Company, Philadelphia.
5. Hadley ME (2000). Endocrinology. 5th ed. Pearson Education.
6. Hoar WS (1984). General and comparative Physiology. 3rd ed. Prentice-Hall of India.

7. Wilson (1989). Anatomy and Physiology in Health and Illness. Edinburgh, Churchill Livingstone.
8. Winword (1988): Sear's Anatomy and Physiology for Nurses. London, Edward Arno ll.

FNTHGEC03T: COMMUNITY, NUTRITION AND HEALTH ASSESSMENT (THEORY)

TOTAL HOURS: 60 **CREDITS: 4**

1. **Concept on Community** **No. of Hours 5**
   Concept and types of Community. Concept of community nutrition.
2. **Nutritional Assessment** **No. of Hours 15**
   Nutritional Assessment: Meaning, need, objectives and importance. Method of assessment of nutritional status – Anthropometry, Clinical, Biochemical, Dietary surveys, Vital health statistics.
3. **Health agencies** **No. of Hours 15**
   Elementary idea of health agencies - FAO, WHO, ICMR, ICDS, ICAR, CSIR, ANP, VHAI, NIN and CFTRI. Role of voluntary health organisation in the improvement of Community health.
4. **Nutrition Intervention Programmes** **No. of Hours 15**
   Current National Nutrition Intervention Programmes in India- SNP, ANP, ICDS, Mid-day meal, NIDDCP, NPPNB, NNAPP.
5. **Nutrition Education** **No. of Hours 10**
   Nutrition Education: Definition, objectives of nutrition education. Methods of imparting nutrition education.

FNTHGEC03P: COMMUNITY, NUTRITION AND HEALTH ASSESSMENT(PRACTICAL)

TOTAL HOURS: 60 **CREDITS: 2**

1. Anthropometric Measurement of infant - Height, weight, circumference of chest, mid - upper arm circumference. Calculation of BMI.
2. Clinical assessment and signs of nutrient deficiencies.
3. Diet survey by 24 hours recall method.
4. Preparation of homemade ORS.
5. Preparation of low cost and medium cost school tiffin.

SUGGESTED READINGS

1. Jelliffe, D. B. : Assessment of the Nutritional Status of the Community; World Health Organisation.
2. Sain, D. R. Lockwood, R., Scrimshaw, N. S.: Methods the Evaluation of the Impact of Food and Nutrition Programmes, United Nations University.
3. Ritchie, J.A.S. : Learning Bettor Nutrition FAO, Rome.
4. Gopalon. C. : Nutrition Foundation of India, Special Publication service.
5. Beghin, 1. Cap. M: Dujardan. B. : A Guide to Nutrition Status Assessment. W.H.O. Geneva.
6. Gopaldas, t. Seshadri, S. : Nutrition Monitoring a Assessment: Oxford University Press.
7. Mason, J. B., Habicht, J. P.; Tabatabai. H. Valverde. U.: Nutritional Surveillance, W.H.O.

FNTHGEC04T: DIETETICS (THEORY)

TOTAL HOURS: 60 **CREDITS: 4**

1. **Concept on Diet therapy** **No. of Hours 8**
   Definition and objective of dietetics, Definition- diet therapy, Dieticians;principles and classification of the therapeutic diet. Responsibility of dieticians.
2. **RDA, Meal planning and Dietary guidelines** **No. of Hours 12**
   RDA- Definition, Nutritional requirements (RDA), Principles and objectives of meal planning, Dietary guidelines of pregnant & lactating women, infants(Weaning, supplementary food), pre-school children & school children(School lunch programme), adult males and females, old age people.
3. **Hospital diet** **No. of Hours 8**
   Hospital diet: regular, soft, fluid, special feeding methods- advantages, disadvantages
4. **Dietary management of different diseases** **No. of Hours 24**
   Dietary management in Gastro intestinal diseases (diarrhoea, constipation, gastritis, peptic ulcer & flatulence), Fever (short term), Diabetes mellitus (Type II - NIDDM), Heart diseases (hypertension, atherosclerosis, hyperlipidaemia), Liver diseases (infective hepatitis, cirrhosis of liver), Gout, Obesity (including assessment indices), Underweight.
5. **Food Allergy** **No. of Hours 8**
   Food allergy- Definition, sources, symptoms, diagnosis, treatment, food intolerance.

FNTHGEC04P: DIETETICS(PRACTICAL)

TOTAL HOURS: 60 **CREDITS: 2**

1. Planning and Preparation of fluid diet, soft and solid diet.
2. Planning & preparation of a day's diet for the following conditions: Peptic ulcer, Fever, Hypertension, Diabetes mellitus (Type II NIDDM), Hepatitis, Obesity.

SUGGESTED READINGS

1. Barbara Luke (19860 Principles of Nutrition and Diet Therapy, Little, Brown and Company, Boston
2. Eva Medved (1986) Food – Preparation and theory, Prentice – Hall, Inc. Englewood Cliffs, New Jersey.
3. Shakuntal N. Manay and Shadaksharaswamy M. (1987) Foods – Facts and Principles, Wiley Eastern Limited.
4. Anderson, L., Dibble, M.V., Tukki, P.R., Mitchall, H.S., and Rynbergin H.J.: Nutrition in Health and Disease, 17th edition, J. B. Lipincott& Co. Philadelphia.
5. Antia F. P.: Clinical Dietetics and Nutrition, Second Edition, Oxford University Press, Delhi.
6. Joshi, S. A.: Nutrition and Dietetics, Tata McGraw Hill, Publications, New Delhi