

**CBCS SYLLABUS**  
**FOR**  
**THREE YEARS UNDER-GRADUATE COURSE**  
**IN**  
**NUTRITION (HONOURS)**  
*(w.e.f. 2022)*



**BANKURA UNIVERSITY**  
**BANKURA**  
**WEST BENGAL**  
**PIN 722155**

## STRUCTURE IN NUTRITION (HONOURS & GE)

### SEMESTER – I

Course Code	Course Title	Credit	Marks			No. of Hours		
			I.A.	ESE	Total	Lec.	Tu.	Pr.
SH/NUT/101/C-1	C1.T1 Food Science and Basic Nutrition I C1.P1 Food Science and Basic Nutrition I (Practical)	6 (4+2)	10	40 (25+15)	50	4	-	4
SH/NUT/102/C-2	C2.T2 Human Physiology I C2.P2 Human Physiology I (Practical)	6 (4+2)	10	40 (25+15)	50	4	-	4
SH/NUT/103/GE-1	<b>Any one of the following:</b> GE1A.T1A Fundamentals of Nutrition and Food Science <b>OR</b> GE1B.T1B Food Toxicity Diseases	6	10	40	50	5	1	-
ACSHP/104/AECC-1	Environmental Studies	4	10	40	50	4	-	-
<b>Total in Semester – I</b>		<b>22</b>	<b>40</b>	<b>160</b>	<b>200</b>			

### SEMESTER – II

Course Code	Course Title	Credit	Marks			No. of Hours		
			I.A.	ESE	Total	Lec.	Tu.	Pr.
SH/NUT/201/C-3	C3.T3 Food Science and Basic Nutrition II C3.P3 Food Science and Basic Nutrition II (Practical)	6 (4+2)	10	40 (25+15)	50	4	-	4
SH/NUT/202/C-4	C4.T4 Human Physiology II C4.P4 Human Physiology II (Practical)	6 (4+2)	10	40 (25+15)	50	4	-	4
SH/NUT/203/GE-2	<b>Any one of the following</b> GE2.T2A Food Groups and Cooking Methods GE2.P2A Food Groups and Cooking Methods (Practical) <b>OR</b> GE2B.T2B Food Allergies and Intolerance GE2B.P2B Food Allergies and Intolerance (Practical)	6 (4+2)	10	40 (25+15)	50	4	-	4
ACSHP/204/AECC-2	English/Hind/MIL	2	10	40	50	2		
<b>Total in Semester – II</b>		<b>20</b>	<b>40</b>	<b>160</b>	<b>200</b>			

### SEMESTER – III

Course Code	Course Title	Credit	Marks			No. of Hours		
			I.A.	ESE	Total	Lec.	Tu.	Pr.
SH/NUT/ 301/C-5	C5T5 Nutritional Biochemistry	6	10	40	50	5	1	-
SH/NUT/ 302/ C-6	C6T6 Food Commodities	6	10	40	50	5	1	-
SH/NUT/ 303/C-7	C7T7 Human Nutrition C7P7 Human Nutrition (Practical)	6 (4+2)	10	40 (25+15)	50	4	-	4
SH/NUT/ 304/GE-3	<b>Any one of the following</b> GE3A.T3A Nutrition through Lifespan GE3A.P3A Nutrition through Lifespan (Practical)	6 (4+2)	10	40 (25+15)	50	4	-	4
	<b>OR</b> GE3B.T3B Community Nutrition GE3B.P3B Community Nutrition (Practical)					4	-	4
SH/NUT/ 305/SEC1	SEC1. Food Adulteration	2	10	40	50	-	-	4
<b>Total in Semester – III</b>		<b>26</b>	<b>50</b>	<b>200</b>	<b>250</b>			

### SEMESTER - IV

Course Code	Course Title	Credit	Marks			No. of Hours		
			I.A.	ESE	Total	Lec.	Tu.	Pr.
SH/NUT/ 401/C-8	C8T8 Nutritional Biochemistry II	6	10	40	50	5	1	-
SH/NUT/402/ C-9	C9T9 Diet Therapy I C9P9 Diet Therapy I (Practical)	6 (4+2)	10	40 (25+15)	50	4	-	4
SH/NUT/403/ C-10	C10.T10 Diet Therapy II C10.P10 Diet Therapy II (Practical)	6 (4+2)	10	40 (25+15)	50	4	-	4
SH/NUT/ 404/GE-4	<b>Any one of the following</b> GE4A.T4A Food Safety and Standards GE4A.P4A Food Safety and Standards (Practical)	6 (4+2)	10	40 (25+15)	50	4	-	4
	<b>OR</b> GE4B.T4B Therapeutic nutrition GE4B.P4B Therapeutic nutrition (Practical)					4	-	4
SH/NUT/ 405/SEC2	SEC.2 Practical Approaches in Food and Nutrition (Practical)	2	10	40	50	-	-	4
<b>Total in Semester - IV</b>		<b>26</b>	<b>50</b>	<b>200</b>	<b>250</b>			

**SEMESTER – V**

Course Code	Course Title	Credit	Marks			No. of Hours		
			I.A.	ESE	Total	Lec.	Tu.	Pr.
SH/NUT/ 501/C-11	C11.T11 Community Nutrition C11.P11 Community Nutrition (Practical)	6 (4+2)	10	40 (25+15)	50	4	-	4
SH/NUT/ 502/C-12	C12.T12 Community Hygiene and Sanitation	6	10	40	50	5	1	-
SH/NUT/ 503/DSE-1	<b>Any one of the following:</b> DSE1.T1 Food safety and sustainable nutrition DSE1.P1 Food safety and sustainable nutrition (Practical) <b>OR</b> DSE1.T1 Food Service Management DSE1.P1 Food Service Management (Practical)	6 (4+2)	10	40 (25+15)	50	4	-	4
SH/NUT/ 504/DSE-2	<b>Any one of the following:</b> DSE2.T2 Maternal and Child Nutrition DSE2.P2 Maternal and Child Nutrition (Practical) <b>OR</b> DSE2.T2 Basic Principles of Biophysics DSE2.P2 Basic Principles of Biophysics (Practical)	6 (4+2)	10	40 (25+15)	50	4	-	4
<b>Total in Semester – V</b>		<b>24</b>	<b>40</b>	<b>160</b>	<b>200</b>			

## SEMESTER – VI

Course Code	Course Title	Credit	Marks			No. of Hours		
			I.A.	ESE	Total	Lec.	Tu.	Pr.
SH/NUT/ 601/C-13	C13.T13 Food Microbiology C13.P13 Food Microbiology (Practical)	6 (4+2)	10	40 (25+15)	50	4	-	4
SH/NUT/ 602/C-14	C14.T14 Epidemiology	6	10	40	50	5	1	-
SH/NUT/ 603/DSE- 3	<b>Any one of the following:</b> DSE3.T3 Public Health Nutrition DSE3.P3 Public Health Nutrition (Practical) <b>OR</b> DSE3.T3 Inborn Errors of Metabolism and Food Allergies DSE3.P3 Inborn Errors of Metabolism and Food Allergies (Practical)	6 (4+2)	10	40 (25+15)	50	4	-	4
SH/NUT/ 604/DSE- 4	<b>Any one of the following :</b> DSE4.T4 Nutrigenomics DSE4.P4 Nutrigenomics (Practical) <b>OR</b> DSE4.T4 NutritionEducation DSE4.P4 NutritionEducation (Practical)	6 (4+2)	10	40 (25+15)	50	4	-	4
<b>Total in Semester – VI</b>		<b>24</b>	<b>40</b>	<b>160</b>	<b>200</b>			

**SH=Science Honours, NUT = Nutrition, ACSHP= Arts Commerce Science Honours Pass  
C= Core Course, AECC= Ability Enhancement Compulsory Course, SEC= Skill  
Enhancement Course, GE= Generic Elective, DSE= Discipline Specific Elective IA=  
Internal Assessment, ESE= End-Semester Examination, Lec.=Lecture, Tu.= Tutorial, and  
Prc.=Practical**

**DETAILED SYLLABUS FOR NUTRITION HONOURS  
UNDER CHOICEBASED CREDIT SYSTEM, BANKURA UNIVERSITY**

SEMESTER	CORE PAPERS	FULL MARKS
<b>SEMESTER - I</b>	C1 Food Science and Basic Nutrition I (Theory & Practical)	50Marks
	C2 Human Physiology I (Theory & Practical)	50Marks
<b>SEMESTER - II</b>	C3 Food Science and Basic Nutrition II (Theory & Practical)	50Marks
	C4 Human Physiology II (Theory & Practical)	50Marks
<b>SEMESTER - III</b>	C5 Nutritional Biochemistry (Theory)	50Marks
	C6 Food Commodities (Theory)	50Marks
	C7 Human Nutrition (Theory & Practical)	50Marks
	SEC1. Food Adulteration (Practical)	50Marks
<b>SEMESTER – IV</b>	C8 Nutritional Biochemistry II (Theory)	50Marks
	C9 Diet Therapy I (Theory & Practical)	50Marks
	C10 Diet Therapy I (Theory & Practical)	50Marks
	SEC-2 Practical Approaches in Food and Nutrition (Practical)	50Marks
<b>SEMESTER – V</b>	C11 Community Nutrition (Theory & Practical)	50Marks
	C12 Community Hygiene and Sanitation (Theory)	50Marks
<b>SEMESTER – VI</b>	C13 Food Microbiology (Theory & Practical)	50Marks
	C14 Epidemiology (Theory)	50Marks

**DISCIPLINE SPECIFIC ELECTIVES**

(Any Two to be chosen in each Semester V and Semester VI)

SEMESTER	DISCIPLINE SPECIFIC ELECTIVES	FULL MARKS
<b>SEMESTER – V</b>	<b>Any one of the following:</b> DSE1 Food safety and sustainable nutrition (Theory & Practical) <b>OR</b> DSE1 Food Service Management (Theory & Practical)	50Marks
	<b>Any one of the following:</b> DSE2 Maternal and Child Nutrition (Theory & Practical) <b>OR</b> DSE2 Basic Principles of Biophysics (Theory & Practical)	50Marks
<b>SEMESTER – VI</b>	<b>Any one of the following:</b> DSE3 Public Health Nutrition (Theory & Practical) <b>OR</b> DSE3 Inborn Errors of Metabolism and Food Allergies (Theory & Practical)	50Marks
	<b>Any one of the following:</b> DSE4 Nutrigenomics (Theory & Practical) <b>OR</b> DSE5 Nutrition Education (Theory & Practical)	50Marks

# CURRICULUM FOR NUTRITION HONOURS COURSES

## SEMESTER - I

### C1.T1 Food Science and Basic Nutrition I

**1. Basic concept on food and nutrition:** Definition and classification of food and nutrients; Meaning of nutrition and balanced diet.

**2. Carbohydrates:** Definition, Classification, General physical properties of sugars and non-sugars; General chemical properties of carbohydrates –

- Structure and configuration of glucose, fructose and galactose.
- Isomerisms: epimers, anomers, D & L sugars, aldoses and ketoses, pyranoses and furanoses with proper examples and configurations.
- Optical activity and mutarotation of glucose.
- Chemical reactions of glucose – oxidation, reduction, acetylation, cyanohydrins formation, oxime formation, osazone reaction (glucose and fructose).
- Chain lengthening of aldoses: Killiani synthesis.
- Chain shortening of aldoses: Ruff degradation.
- Conversion of aldose to isomeric ketose and ketose to isomeric aldose.
- Molecular structure of disaccharides: sucrose, lactose and maltose.
- Reducing and non-reducing sugar.

Dietary sources, functions, role in human health and disease, requirements of carbohydrates.

**3. Lipids:** Definition, Classification, General physical properties, General chemical properties–

- General structure of glycerides.
- Simple and mixed glycerides.
- Distinction between fats and oils.
- Hydrolysis, hydrogenation, hydrogenolysis, drying and rancidification of fats & oils.
- Analysis of fats and oils: Saponification number, Iodine number, Acid number, Reichert-Miessl number, soaps and detergents, Acetyl number.

Dietary sources, functions, role in human health and disease, requirements of fats and lipids.

**4. Amino acids and Proteins:** Definition, Classification;

- General properties of amino acids and proteins – Zwitterion, isoelectric point, peptide linkage, colloidal nature, denaturation.
- General chemical properties of proteins – formation of salts, hydrolysis, oxidation.
- Colour reaction of proteins – Xanthoproteic test, Biuret test, Milon's test, Ninhydrin test, Hopkins-Cole test.

- Quality of proteins – BV, NPU, PER, Net Dietary Protein Energy Ratio, Amino Acid Score, PDCAAS.

Dietary sources, functions, role in human health and disease, requirements of proteins.

1. **Dietary fibre:** Sources, classification and nutritional significance.

### **C1.P1 Food Science and Basic Nutrition I (Practical)**

1. Colorimetric estimation of carbohydrate (Anthrone method), Protein (Lowry method).
2. Qualitative detection of carbohydrates: Molisch's test, Benedict's test, Barfoed's test, Seliwanoff's test, Iodine test, Fehling's test.
3. Qualitative detection of fats.
4. Biuret test, xanthoproteic test, ninhydrin test.

#### **Suggested reading:**

1. U. Satyanarayan, U. Chakrapani. Biochemistry. ELSEVIER.
2. MN Chatterjea, Rana Shinde. Textbook of Medical Biochemistry. JAYPEE.
3. Antonio Blanco, Gustavo Blanco. Medical Biochemistry. Academic Press.
4. Debajyoti Das. Biochemistry. Academic Publishers.
5. Shivananda Nayak B. Handbook of Biochemistry & Nutrition. JAYPEE.

### **C2.T2 Human Physiology I**

1. **Eukaryotic cell:** Structure and functions cell membrane, nucleus, endoplasmic reticulum, mitochondria, ribosomes, centromere; Cellular transport.
2. **Blood and Cardiovascular System:** Composition of blood; Abnormal constituents of blood; Clotting time and Bleeding time, Blood groups, Blood coagulation. Structure and function of heart, Heart rate, Cardiac cycle, Cardiac output, Systemic, portal and cerebral circulation; Blood pressure and its regulation.
3. **Alimentary System:** Structure and functions of various organs of the GI Tract; Digestive juices; Digestion and absorption of food.
4. **Respiratory System:** Structure and functions of lungs and gaseous exchange (Oxygen and carbon dioxide transport); Lung volumes and capacities; Acclimatization.
5. **Excretory System:** Structure and Function of Kidney; Structure of nephron; Glomerular filtration and tubular functions; Formation of Urine; Role of kidney in homeostasis.

### **C2.P2 Human Physiology I (Practical)**

2. Preparation of blood film and blood analysis: T.C., D.C.
3. Determination of bleeding time and clotting time of blood.
4. Detection of Blood group.
5. Estimation of blood pressure by Sphygmomanometer.



**Suggested reading:**

1. C. C. Chatterjee. Human Physiology, Volume I, CBS publishers
2. Anil Baran Sighamahapatra, Gargi Sighamahapatra. Essentials of Medical Physiology. Current Book International
3. K. Sembulingam, Prema Sembulingam. Essentials of Medical Physiology. JAYPEE
4. Indu Khurana, Arushi Khurana. Textbook of Medical Physiology. ELSEVIER
5. G. K. Pal. Textbook of Medical Physiology. ELSEVIER
6. L. Prakasam Reddy. Practical Physiology. Paras Medical Publisher

## **SEMESTER – II**

### **C3.T3 Food Science and Basic Nutrition II**

1. **Vitamins:** Fat soluble vitamins A, D, E & K and water-soluble vitamins B complex and C -- Dietary sources, requirements, functions and effects of deficiencies and excesses. Anti-vitamin, provitamin, pseudovitamins and vitamers.
2. **Minerals:** Calcium, Phosphorus, Sodium, Potassium, Iron, Iodine, Selenium, Zinc, Fluoride, Magnesium, Chromium and Copper -- Dietary sources, requirements, functions and effects of deficiencies and excesses. Absorption of Calcium and Iron.
3. **Water:** Requirement, functions, deficiencies and excesses. Water balance and its regulation.

### **C3.P3 Food Science and Basic Nutrition II (Practical)**

1. Estimation of calcium using EDTA by titration.
2. Estimation of ascorbic acid by using 2, 6 dichlorophenol indophenol method.

**Suggested reading:**

1. U. Satyanarayan, U. Chakrapani. Biochemistry. ELSEVIER
2. MN Chatterjea, Rana Shinde. Textbook of Medical Biochemistry. JAYPEE
3. Antonio Blanco, Gustavo Blanco. Medical Biochemistry. Academic Press
4. Debajyoti Das. Biochemistry. Academic Publishers
5. B. Srilakshmi. Nutrition Science. New Age International Publisher
6. Shivananda Nayak B. Handbook of Biochemistry & Nutrition. JAYPEE

### **C4.T4 Human Physiology II**

1. **Endocrine System:** Structure of pituitary, thyroid and adrenal gland and endocrine pancreas. Functions, deficiency and excess of hormones releasing from pituitary – GH, TSH, prolactin, LH, gonadotrophins, ADH, oxytocin; hormones of the thyroid gland – thyroxine and tri-iodothyronine, calcitonin; hormones of adrenal cortex and adrenal medulla, endocrine pancreas- insulin and glucagon, somatostatin.

- 2. Reproductive System:** Structure and functions of gonads, male and female sex hormones; gametogenesis, menstrual cycle, brief idea of implantation, pregnancy, parturition, lactation and menopause.
- 3. Musculoskeletal System:** Structure and function of voluntary muscles (skeletal muscles) and involuntary muscles (smooth and cardiac muscles); properties of skeletal muscles; muscle contraction and relaxation.
- 4. Nervous System:** Neuron and neuromuscular junction, the CNS and PNS, sympathetic and parasympathetic nervous system, cerebrospinal fluid, blood brain barrier. Brief anatomy and functions of cerebrum, cerebellum, hypothalamus; general idea of reflex arc.
- 5. Immune system:** Basic concept on lymphoid organs and cells of the immune system; Types of immunity.

#### **C4.P4 Human Physiology II (Practical)**

1. Identification with reasons of histological slides: lung, liver, kidney, small intestine, stomach, thyroid, adrenal, pancreas, testis, ovary and muscle of mammals, blood corpuscles of human.
2. Haemoglobin estimation (Cyanomethaemoglobin Method).

#### **Suggested reading:**

1. C. C. Chatterjee. Human Physiology, Volume II, CBS Publisher
2. Veena V Kulkarni, Rakesh Kumar. Practical Manual and workbook of Histology. CBS Publisher
3. Dr. Seema Prakash, Dr. Parveena Ojha. Histology Manual. Himanshu Publication
4. Anil Baran Sighamahapatra, Gargi Sighamahapatra. Essentials of Medical Physiology. Current Book International
5. K. Sembulingam, Prema Sembulingam. Essentials of Medical Physiology. JAYPEE
6. Indu Khurana, Arushi Khurana. Textbook of Medical Physiology. ELSEVIER
7. G. K. Pal. Textbook of Medical Physiology. ELSEVIER

## **SEMESTER – III**

#### **C5.T5 Nutritional Biochemistry I**

- 1. Enzymes:** Classification, properties, factors affecting enzyme activity, kinetics, inhibitions, isozymes.
- 2. Carbohydrate Metabolism:** Glycolysis, TCA cycle, Cori cycle, biological oxidation, gluconeogenesis, glycogenesis, glycogenolysis.
- 3. Lipids Metabolism:** Synthesis of fatty acids, beta oxidation of fatty acids, ketone bodies, lipoproteins
- 4. Proteins Metabolism:** Deamination, transamination, urea cycle.

### **Suggested reading:**

1. B. Srilakshmi. Nutrition Science. New Age International Publisher.
2. U. Satyanarayan, U. Chakrapani. Biochemistry. ELSEVIER.
3. MN Chatterjea, Rana Shinde. Textbook of Medical Biochemistry. JAYPEE.
4. Antonio Blanco, Gustavo Blanco. Medical Biochemistry. Academic Press.
5. Debajyoti Das. Biochemistry. Academic Publishers
6. Shivananda Nayak B. Handbook of Biochemistry & Nutrition. JAYPEE

### **C6.T6 Food Commodities**

1. **Basic concept on food science:** Food groups, food guide pyramid, Food exchange list.
2. **Cereals:** General structure of cereal grains. Nutritional aspects, storage and processing of wheat, rice and oats. cereal cookery; breakfast cereals – ready-to-eat & ready-to-cook, fermented and non-fermented cereals and cereal products.
3. **Pulses & Legumes:** Nutritional contribution, processing and storage. Toxic constituents.
4. **Milk & Milk products:** Nutritive value, composition, processing and storage. Milk products -- butter, curd, cheese, paneer.
5. **Eggs:** Different parts; Nutritional aspects and uses; Quality of eggs; Egg white foam.
6. **Meat, Fish and Poultry:** Nutritional contribution, post-mortem changes, ageing, tenderisation, curing of meat, preservation and storage, spoilage of meat. Classification of fish, nutritive value, selection, spoilage, preservation and storage of fish.
7. **Vegetables & Fruits:** Nutritional contribution, processing and storage, spoilage.
8. **Sugar:** Properties and nutritional aspects; Crystallisation and factor regulating sugar crystallisation; sugar cookery. Types of natural sweeteners; artificial sweeteners.
9. **Salts:** Types, nutritional aspect, uses.
10. **Fats and Oils:** Classification and types, sources, uses and nutritional aspects.
11. **Beverages:** tea - types, processing and gradation, coffee – composition and processing, alcoholic beverages, aerated beverages.
12. **Spices:** Chillies, turmeric, garlic, ginger, fenugreek, cumin, ajwain, cloves – active principle, medicinal properties, culinary uses.

### **Suggested reading:**

1. B. Srilakshmi. Food science. New Age International Publisher
2. H. K. Chopra, P.S. Panesar. Food Chemistry. Narosa
3. T. P. Coultate. Food- the chemistry of its components. Royal Society of Chemistry
4. N. Shakuntala Manay, M. Shadaksharaswamy. Foods, Facts and Principles. New Age International Publisher
5. Prasanta Mukherjee. Textbook of Food Commodities. Aman Publications

### **C7.T7 Human Nutrition**

- 1. Fundamentals of nutrition:** Concept and definition of terms, ACU, RDA – definition and formulation; general dietary recommendations.
- 2. Growth & Development:** Growth and development from infancy to adulthood; Factors affecting growth and development.
- 3. Body Composition:** Changes through lifecycle.
- 4. Energy in human nutrition:** Units, bomb calorimeter, physiological fuel value, energy balance, SDA, BMR, REE.
- 5. Nutrition during different stages of life:**
  - Nutrition during pregnancy: Nutritional requirements; Common problems & complications of pregnancy; Impact of nutritional deficiency on the outcome of pregnancy.
  - Nutrition during lactation: Nutritional requirements; Factors affecting the volume and composition of breast milk
  - Nutrition during infancy: Nutritional requirements; breastfeeding, formula feeding and weaning.
  - Nutrition during preschool age: Nutritional requirements; Nutrition related problems of preschoolers;
  - Nutrition during school age: Nutritional requirements; school lunch.
  - Nutrition during adolescence: Nutritional requirements; nutritional problems of adolescence.
  - Nutrition during adulthood: Nutritional requirements based on different activity level; Reference Man and Woman.
  - Geriatric nutrition: Physiological and metabolic changes in ageing; Nutritional requirements; Nutrition related problems of old age.

### **C7.P7 Human Nutrition (Practical)**

1. Planning and preparation of normal diet for infants.
2. Planning and preparation of normal diet for preschool child.
3. Planning and preparation of normal diet for school child.
4. Planning and preparation of normal diet for college student.
5. Planning and preparation of normal diet for adult.
6. Planning and preparation of normal diet for elderly.
7. Planning and preparation of normal diet for pregnant woman and lactating mother.

#### **Suggested reading:**

1. B. Srilakshmi. Dietetics. New Age International Publisher
2. B. Srilakshmi. Nutrition Science. New Age International Publisher
3. Kumud Khanna. Sharda Gupta. Santosh Jain Passi. Rama Seth. Ranjana Mahna. Seema Puri. Textbook of Nutrition and Dietetics. Elite Publishing House Pvt Ltd
4. Suryatapa Das. Textbook of Human Nutrition. Academic Publishers
5. Anjana Agarwal, Shobla A Udipi. Textbook of Human Nutrition. JAYPEE

6. Ravinder Chadha. Pulkit Mathur. Nutrition. Orient BlackSwan

### **SEC1. Food Adulteration (Practical)**

1. **Food Adulteration:** Types of food adulteration, common adulterants in food and their effects on health. Common methods to detect adulterants in foods
2. **Detection of common adulterants in following foodstuff:**
  - Detection of vanaspati in ghee/butter
  - Detection of khesari flour in besan
  - Detection of Metanil yellow in turmeric/coloured sweet products
  - Detection of argemone oil in edible oil
  - Detection of artificial colour/ foreign matter in tea
  - Detection of molasses in honey
  - Detection of dried papaya seeds in black pepper
  - Detection of starch in khoa

#### **Suggested reading:**

1. B. Srilakshmi. Food science. New Age International Publisher
2. Food Safety and Standards Authority of India. Detect Adulteration with Rapid Test.

## **SEMESTER – IV**

### **C8.T8 Nutritional Biochemistry II**

1. **Nucleic acids:** DNA and RNA, Central dogma of life, Replication, Transcription, Translation and Protein Synthesis
2. **Biochemical roles of Vitamins:** Thiamine, Riboflavin, Niacin, Folic acid, Vitamin B12, vitamin C
3. **Biochemical roles of Minerals:** Calcium, Magnesium, Iron and Zinc.

#### **Suggested reading:**

1. B. Srilakshmi. Nutrition Science. New Age International Publisher
2. U. Satyanarayan, U. Chakrapani. Biochemistry. ELSEVIER
3. MN Chatterjea, Rana Shinde. Textbook of Medical Biochemistry. JAYPEE
4. Antonio Blanco, Gustavo Blanco. Medical Biochemistry. Academic Press
5. Debajyoti Das. Biochemistry. Academic Publishers
6. Shivananda Nayak B. Handbook of Biochemistry & Nutrition. JAYPEE

### **C9.T9 Diet Therapy I**

1. **General idea of diet therapy:** Principles of diet therapy; therapeutic adaptations of normal diet, classification of therapeutic diets.
2. **Role of dietitian:** Types of dietitian and their role; Code of ethics; Role of dietitian in hospital management.

3. **Routine hospital diets:** Oral feeding, tube feeding, parenteral nutrition, pre and post operative diets, diets in surgical conditions and burn injuries.
4. **Energy modification of diet:** Contributing factors, complications, measurement, nutritional care and prevention of overweight, obesity and underweight.
5. **Diets for febrile conditions:** Mechanism and Types of fever; Metabolic changes in fever; Diet in typhoid, tuberculosis and malaria; Immuno-nutrients and their role in diet, immunity boosting foods.
6. **Diseases of gastro-intestinal tract:** Aetiology, symptoms, diagnostic tests, management and nutritional care of peptic ulcer, diarrhoea, constipation, irritable bowel syndrome, inflammatory bowel disease, flatulence, haemorrhoids, diverticular disease.

### **C9.P9 Diet Therapy I (Practical)**

1. Planning and preparation of special diets: clear fluid, full fluid soft, semi solid, high protein, low fat and low calorie, high fibre diet
2. Preparation of diet chart of patient suffering from the following:
  - Obesity
  - Peptic ulcer

#### **Suggested reading:**

1. B. Srilakshmi. Dietetics. New Age International Publisher.
2. Staci Nix, William's Basic Nutrition and Diet Therapy. ELSEVIER.
3. F. P. Antia, Philip Abraham. Clinical Dietetics and Nutrition. Oxford.
4. Sumati R. Mudambi, MV Rajagopal. Fundamental of Food, Nutrition and Diet Therapy. New Age International Publisher.
5. Luxita Sharma. A Textbook of Clinical Nutritional. WILEY.
6. Subhangini A Joshi. Nutrition and Dietetics. Mc Grow Hill.
7. C. Gopalan. Nutritive Value of Indian Foods. ICMR, NIN.
8. V. Vimla. Advances in Diet Therapy. New Age International Publisher.

### **C10.T10 Diet Therapy II**

1. **Nutritional anaemia:** Types, Pathogenesis, Diagnosis and dietary management.
2. **Diseases of liver and gall bladder:** Aetiology, symptoms, diagnostic tests, management and nutritional care of viral hepatitis, cirrhosis of liver and cholelithiasis; Liver function test.
3. **Diabetes mellitus:** Aetiology, symptoms, diagnostic tests, management and nutritional care. Complications of diabetes mellitus.
4. **Diseases of the cardiovascular system:** Aetiology, symptoms, risk factors, lifestyle modifications and nutritional care for atherosclerosis, hypertension, dyslipidemia and ischaemic heart disease.
5. **Renal diseases:** Aetiology, symptoms, diagnostic tests, management and nutritional care of Glomerulonephritis, nephrosis, renal failure; haemodialysis.

### **C10.P10 Diet Therapy II (Practical)**

1. Planning and preparation of diet chart of patient suffering from the following:
  - Cardiovascular diseases
  - Diabetes Mellitus
  - Hypertension
  - Glomerulonephritis
  - Anaemia

#### **Suggested reading:**

1. B. Srilakshmi. Dietetics. New Age International Publisher
2. Staci Nix, William's Basic Nutrition and Diet Therapy. ELSEVIER
3. F. P. Antia, Philip Abraham. Clinical Dietetics and Nutrition. Oxford
4. Sumati R. Mudambi, MV Rajagopal. Fundamental of Food, Nutrition and Diet Therapy. New Age International Publisher
5. Luxita Sharma. A Textbook of Clinical Nutritional. WILEY
6. Subhangini A Joshi. Nutrition and Dietetics. Mc Grow Hill
7. C. Gopalan. Nutritive Value of Indian Foods. ICMR, NIN
8. V. Vimla. Advances in Diet Therapy. New Age International Publisher

### **SEC-2 Practical Approaches in Food and Nutrition (Practical)**

1. Recording of self diet by 24 hour recall method and its nutritional analysis.
2. Concept of food exchange list.
3. Planning of meals for adults of different activity levels for various income groups.
4. Market survey on consumer behavior of food purchase and awareness regarding nutritional labelling of food products and deciphering nutrition label of packaged food and beverages.

#### **Suggested reading:**

1. Ravinder Chadha. Pulkit Mathur. Nutrition. Orient BlackSwan
2. M. Swaminathan. Food & Nutrition. Vol-2. The Bangalore Printing & Publishing Co Ltd
3. C. Gopalan. Nutritive Value of Indian Foods. ICMR, NIN.

## **SEMESTER – V**

### **C11.T11 Community Nutrition**

1. **Community:** Concept of community, factors affecting community health, Secondary Sources of Community Health data: vital statistics, infant, child and maternal mortality rates
2. **Nutritional Status Assessment:** Direct and indirect methods of assessment
  - Nutritional Anthropometry

- Biochemical and biophysical methods of Nutritional status assessment
  - Clinical Assessment of Nutritional deficiencies
  - Diet Survey
3. **Nutrition Monitoring and Nutrition Surveillance:** Meaning, objectives and processes; Growth monitoring and growth chart.
  4. **Malnutrition:** Causes, consequences and preventive measures.
  5. **International and National Agencies:** Role of WHO, FAO, UNICEF, CARE, NIN, ICMR, ICAR and CFTRI to combat malnutrition.
  6. **National Nutrition Intervention Programmes:** Objectives, beneficiaries and activities of ICDS, Midday meal and Public Distribution System. Current intervention programmes to combat malnutrition in India.

### **C11.P11 Community Nutrition (Practical)**

1. Anthropometric measurement – height, weight, BMI circumference of head and chest, MUAC, Waist-Hip ratio, measurement of fat using skin fold thickness.
2. Clinical assessment and sign of nutrient deficiency: PEM, vitamin A, Anaemia, Rickets, vitamin B complex
3. Growth chart: plotting and interpretation
4. Diet Survey

#### **Suggested reading:**

1. Suryatapa Das. Textbook of Community Nutrition. Academic Publishers
2. B. Srilakshmi. Nutrition Science. New Age International Publisher
3. Rajvir Bhalwar. Textbook of Community Medicine. Wolters Kluwer
4. K. Park. Park's textbook of preventive and social medicine. M/s Banarsidas Bhanot publishers
5. Roy, R and Saha, Mahajan & Gupta Textbook of Preventive and Social Medicine. Jaypee Brothers Medical Publishers

### **C12.T12 Community Hygiene and Sanitation**

1. **Hygiene and sanitation:** Concept of hygiene and sanitation and relation to nutrition, personal hygiene.
2. **Community water and waste management:** Different sources of water, toxic agents in water and their adverse effects on health, purification of water; Management of solid waste and biomedical waste.
3. **Food borne diseases:** Food borne infection, food borne intoxication and food poisoning; Symptoms, mode of transmission and prevention of Salmonellosis, Shigellosis and Listeriosis, Staphylococcal infection, Botulism and Aflatoxicosis.



- 4. Water borne diseases:** Causative agent, mode of transmission, prevention & control of Cholera and amoebiasis.

**Suggested reading:**

1. R. Bansal. Food, Nutrition and Hygiene. SBPD Publishing House.
2. Rajvir Bhalwar. Textbook of Community Medicine. Wolters Kluwer
3. K. Park. Park's textbook of preventive and social medicine. M/s Banarsidas Bhanot publishers
4. Roy, R and Saha, Mahajan & Gupta Textbook of Preventive and Social Medicine. Jaypee Brothers Medical Publishers
5. S. Roday. Food Hygiene and Sanitation. Tata McGraw Hill, New Delhi

**DSE1.T1 Food safety and sustainable nutrition**

1. **Food Standards:** ISI, Agmark, PFA, FPO, MPO, Codex Alimentarius, HACCP, FSSAI.
2. **Food preservation:** General idea of food preservation and processing. Uses of high and low temperature, dehydration, freezing, freeze drying, irradiation and preservatives in food preservation. Convenience foods.
3. **Preserved products:** Jams, jellies, pickles, syrup, squash – uses and nutritional aspects.
4. **Nutrient losses and enhancing nutritional quality of foods:** Nutrient losses in cooking; Enhancing nutritional quality by supplementation, germination, fermentation, fortification, enrichment.
5. **Organic and genetically modified foods:** Basic concept; Advantages and disadvantages.
6. **Functional foods:** Prebiotics and probiotics, nutraceuticals.

**DSE1.P1 Food safety and sustainable nutrition (Practical)**

1. Visit to any food processing industry and submission of report.
2. Preparation of preserved food products: jam, jelly, squash, pickle.

**Suggested reading:**

1. G. Subbulakshmi, Shoba A Udipi. Food Processing and Preservation. New Age International Publishers
2. B. Srilakshmi. Food science. New Age International Publisher
3. Robert E. C. Wildman. Handbook of Nutraceuticals and Functional foods. CRC Press
4. N. Shakuntala Manay, M. Shadaksharaswamy. Foods, Facts and Principles. New Age International Publisher

***OR***

**DSE1.T1 Food Service Management**

1. **Concept of food service management:** Definition and principles of food service management; Tools of food service management; Hygiene and sanitation in food service management.
2. **Menu planning:** importance of menu, factors affecting menu planning.
3. **Cooking:** Methods of cooking; kinds of fuel – uses, advantages and disadvantages.
4. **Kitchen:** Ideal kitchen in domestic level, industry level and hospitals.

5. **Methods of service:** Different methods of food service; Criteria for selection of dieticians and food handlers.

### **DSE1.P1 Food Service Management (Practical)**

1. Quantity cooking – concepts, principles and techniques, portion controlling
2. Planning of meals for institutional feeding for college canteen and hostel
3. Planning and preparation of cyclic menu

#### **Suggested reading:**

1. Mohini Sethi. Institutional Food Management. New Age International Publisher
2. June Payne-Palacio. Monica Theis. Food service Management: Principles and Practices. Prentice Hall.

### **DSE2.T2 Maternal and Child Nutrition**

1. **Maternal and child health:** Indicators of maternal and child health; Maternal and age specific mortality rates; Causes of poor maternal and child health; Schedule of antenatal care.
2. **Physiology of pregnancy and lactation:** Physiological changes and hormonal regulation of pregnancy; Lactation – hormonal regulation of milk production and secretion, let down reflex.
3. **Pre-term and low birth weight infants:** Definitions; Causes of pre-term birth and low birth weight; Developmental problems; Nutritional management.
4. **Children with special needs:** Relationship of Nutrition with disability. Feeding problems and management of children with autism spectrum disorder, cerebral palsy, Down syndrome, Prader-Willi Syndrome cleft palate and lip.
5. **Nutritional problems of infancy:** Causes and nutritional management of growth faltering, obesity, GERD.

### **DSE2.P2 Maternal and Child Nutrition (Practical)**

1. Planning and preparation of weaning food.
2. Planning and preparation of supplementary nutritious dishes for children, pregnant woman and lactating mother.

#### **Suggested reading:**

1. K. Park. Park's textbook of preventive and social medicine. M/s Banarsidas Bhanot publishers
2. V. Jain. Review of preventive and Social Medicine, 8/e. New Delhi. Jaypee Brothers Medical Publishers.
3. Roy, R and Saha, Mahajan & Gupta Textbook of Preventive and Social Medicine. Jaypee Brothers Medical Publishers
4. Ravinder Chadha. Pulkit Mathur. Nutrition. Orient BlackSwan
5. Anil Baran Sighamahapatra, Gargi Sighamahapatra. Essentials of Medical Physiology. Current Book International.

## **OR**

### **DSE2.T2 Basic Principles of Biophysics**

1. **Biophysical process:** Physicochemical properties and biological applications of the Viscosity, Surface tension, Absorption, Adsorption, Osmosis, Diffusion; Colloids – definition and importance.
2. **Acids, bases, salts, pH, buffers:** Chemistry and biological application; Homeostasis
3. **Chromatography:** Principle, process and biological application of Gas chromatography, High pressure liquid chromatography, paper chromatography and thin layer chromatography.

### **DSE2.P2 Basic Principles of Biophysics (Practical)**

1. Journal club presentation

#### **Suggested reading:**

1. N. Arumugam, V. Kumaresan. Principles and Techniques of Biophysics. Saras Publication
2. Dr. Pranab Kumar Banerjee. Introduction to Biophysics. S. Chand Publishing.
3. Cotterill R. Biophysics: An introduction. John Wiley
4. Debajyoti Das. Biophysics and biophysical Chemistry. Academic Publishers

## **SEMESTER – VI**

### **C13.T13 Food Microbiology**

1. **Sources of microorganisms in food:** Primary sources – soil, water, air, animal hides, animal feed.
2. **Cellular structure of bacteria, moulds and virus.**
3. **Sterilisation and disinfection:** Physical and Chemical methods; Advantages and disadvantages.
4. **Nutritional requirements of microorganisms:** Requirements of macro and micro nutrients; Types of culture media; Isolation of pure culture.
5. **Bacterial growth:** Bacterial growth curve; Extrinsic and intrinsic parameters affecting bacterial growth; Generation time and TDT.
6. **Food Spoilage and Contamination:** Cereal and cereal products, vegetables and fruits, fish and other sea foods, meat and meat products, milk and milk products.
7. **Microbiological examination:** Microbiological examination of water and milk.

### **C13.P13 Food Microbiology (Practical)**

1. Gram Staining of bacteria
2. Preparation of liquid and solid media for routine cultivation of bacteria
3. Preparation of slant and stab culture
4. Methylene blue reduction test of milk
5. Determination of potability of water by presumptive coliform test

**Suggested reading:**

1. William C. Frazier, Dennis C. Westhoff. Food Microbiology. Mc Grow Hill
2. James M Jay. Modern Food Microbiology. CBS Publishers
3. J. M. Banwart. Basic Food Microbiology. CBS Publishers
4. M.J. Pelzar, E. C. S. Chan, N. R. Krieg NR. Microbiology. Tata McGraw Hill.
5. I. Kannan. Essentials of Microbiology for Nurses. ELSEVIER.
6. Ananthanarayan and Paniker's, Textbook of Microbiology. Universities Press.

**C14.T14 Epidemiology**

1. **Concept of Health:** Changing concepts (Biomedical, Ecological, Psychosocial and Holistic); Dimension of health; Determinants of health.
2. **Concept of disease:** Endemic, epidemic and pandemic diseases; Acute and chronic diseases; Communicable and non-communicable diseases; Zoonosis, epizootic, enzootic, vector-borne and nosocomial diseases; Theories of disease causation; Transmission of disease.
3. **Concept of epidemiology:** Definition, objectives and principles of Epidemiology; Epidemiological methods (descriptive, analytical and experimental).
4. **Epidemiology of communicable diseases:** Chickenpox, mumps, measles, influenza, tuberculosis, typhoid, the dengue syndrome, malaria, Japanese encephalitis and AIDS.
5. **Immunization:** Active and passive immunization; Immunizing agents; Herd immunity; National immunization schedule.
6. **Demographic Cycle:** Concept of demography; Different phases of demographic cycle.

**Suggested reading:**

1. K. Park. Park's textbook of preventive and social medicine. M/s Banarsidas Bhanot publishers
2. V. Jain. Review of preventive and Social Medicine, 8/e. New Delhi. Jaypee Brothers Medical Publishers.
3. Roy, R and Saha, Mahajan & Gupta Textbook of Preventive and Social Medicine. Jaypee Brothers Medical Publishers
4. R. Bhalwar. Textbook of Community Medicine, Wolters Kluwer (India) Pvt. Ltd.
5. M. Alderson. An introduction of Epidemiology. Macmilan. London
6. WHO (1996), International travel and Health, Vaccination requirements and Health advice.
7. S. Rajagopalan, M. A. Shiffman. Guide to simple sanitary measures for the control of enteric Diseases, Geneva, WHO
8. David D. Celentano, Moyses Szklo. Gordis Epidemiology. ELSEVIER

**DSE3.T3 Public Health Nutrition**

1. **Nutritional Deficiency diseases:** Protein energy malnutrition, vitamin A deficiency, iron deficiency anaemia, Iodine deficiency disorders, vitamin D deficiency and fluorosis,
2. **Nutrition for special conditions:** sports nutrition, nutrition during emergencies, space nutrition.

- 3. Nutrition in extreme climates:** Physiological changes and nutrition in high altitude and cold/polar environment.
- 4. Public health related issues:** Causes, symptoms and nutritional management of cancer, thalassemia, HIV-AIDS.
- 5. Nutrition Security:** Meaning of food and nutrition security; Determinants of nutrition security; Factors affecting nutrition security; Food and nutrition security in India.

### **DSE3.P3 Public Health Nutrition (Practical)**

1. Preparation of educational tools like chart/poster/model/flash cards etc. for nutrition awareness in the community. Demonstration with prepared tools.
2. Visit to any National Nutrition Programme/PHC/Anganwadi and Preparation of Project Report.

#### **Suggested reading:**

1. B. Srilakshmi. Exercise Physiology, Fitness and Sports Nutrition. New Age International Publishers
2. Dan Benardot. Advanced Sport Nutrition
3. B. Srilakshmi. Nutrition Science. New Age International Publisher
4. Suryatapa Das. Textbook of Community Nutrition. Academic Publishers
5. Ravinder Chadha. Pulkit Mathur. Nutrition. Orient BlackSwan
6. Kumud Khanna. Sharda Gupta. Santosh Jain Passi. Rama Seth. Ranjana Mahna. Seema Puri. Textbook of Nutrition and Dietetics. Elite Publishing House Pvt Ltd

**OR**

### **DSE3.T3 Inborn Errors of Metabolism and Food Allergies**

- 1. Malabsorption syndrome:** Aetiology, symptoms, diagnostic tests and management of tropical sprue, celiac disease and steatorrhea.
- 2. Inborn errors of metabolism:** Aetiology, symptoms, diagnostic tests and management of –
  - Disorders of carbohydrate metabolism: lactose intolerance, galactosemia, fructosuria, glycogen storage disorders.
  - Disorders of amino acid metabolism: phenylketonuria, MSUD
  - Disorders of fatty acid metabolism: MCADD
  - Disorders of organic acid metabolism: Alcaptonuria
- 3. Food allergies:** Aetiology, symptoms, diagnostic tests and management.

### **DSE3.P3 Inborn Errors of Metabolism and Food Allergies (Practical)**

1. Planning of diet for lactose intolerance, fructosuria, phenylketonuria and MSUD

#### **Suggested reading:**

1. B. Srilakshmi. Dietetics. New Age International Publisher

2. Kumud Khanna. Sharda Gupta. Santosh Jain Passi. Rama Seth. Ranjana Mahna. Seema Puri. Textbook of Nutrition and Dietetics. Elite Publishing House Pvt Ltd
3. M. Swaminathan. Food & Nutrition. Vol-2. The Bangalore Printing & Publishing Co Ltd
4. U. Satyanarayan, U. Chakrapani. Biochemistry. ELSEVIER.

#### **DSE4.T4 Nutrigenomics**

1. **Concept of Nutrigenomics:** Meaning of the term nutrigenomics and nutrigenetics; Basic tenets of nutrigenomics; Nutrient gene interaction; Application of nutrigenomics.
2. **Pharmacogenomics:** Basic concept; Meaning of the term pharmacodynamics and pharmacokinetics; Application of Pharmacogenomics.
3. **Health Informatics:** Key elements, importance and application.
4. **Biological database:** Features and classification of biological database; Nucleic acid and protein data base.
5. **Phylogenetic tree:** Different parts, types and limitations.
6. **Sequence similarity searching by BLAST:** Features and types of BLAST; Sequence alignments by BLAST.

#### **DSE4.P4 Nutrigenomics (Practical)**

1. Retrieval of Nucleic acid or Protein sequence from data bases, storing of sequence.
2. Retrieval of protein structure from Protein Data Bank, Protein Structure Visualisation.
3. Sequence alignment by BLAST.

#### **Suggested reading:**

1. Mark Lucock. Molecular Nutrition and Genomics. WILEY.
2. M. A. Lesk M.A. Introduction to Bioinformatics. Oxford Publication.
3. S. C. Rastogi. N. Mendiratta. P. Rastogi Bioinformatics: methods and applications, genomics, proteomics and drug discovery, 2nd ed. Prentice Hall India Publication.
4. Primrose and Twyman. Principles of Genome Analysis & Genomics. Blackwell.

**OR**

#### **DSE4.T4 Nutrition Education**

1. **Basic concept of Nutrition Education:** Meaning, importance and objectives of nutrition education.
2. **Behaviour Change Communication (BCC):** Meaning; Components -- Sender, Message, Channel, Receiver.
3. **Methods of Nutrition Education:** Individual methods, group methods and mass methods – advantages and disadvantages; Audio-visual aids
4. **Types of communication:** Interpersonal, mass media, visual, verbal/ non-verbal.

**5. Nutrition Education Programme:** Planning, implementation and evaluation.

**DSE4.P4 Nutrition Education (Practical)**

1. Demonstration of different methods of nutrition education.
2. Planning of effective BCC programme for specific nutrition and/or health scenario prevalent in the community.

**Suggested reading:**

1. Suryatapa Das. Textbook of Community Nutrition. Academic Publishers
2. M. Swaminathan. Food & Nutrition. Vol-2. The Bangalore Printing & Publishing Co Ltd
3. B. Srilakshmi. Nutrition Science. New Age International Publisher

## **CURRICULUM FOR NUTRITION GENERIC ELECTIVE COURSES**

### **SEMESTER – I**

**GE1A.T1A Fundamentals of Nutrition and Food Science**

1. Basic terms used in food and nutrition
2. Functions, dietary sources, clinical manifestations of deficiency/ excess of the following nutrients:
  - Carbohydrates, lipids and proteins
  - Fat soluble vitamins – A, D, E and K
  - Water soluble vitamins – thiamine, riboflavin, pyridoxine, folate, vitamin B12 and vitamin C
  - Minerals – calcium, iron and iodine
3. Food groups and Food pyramid. Concept of balanced diet. Reference man and woman
4. Concept of dietary reference intakes
5. Dietary guidelines for Indians

**Suggested reading:**

1. B. Srilakshmi. Nutrition Science. New Age International Publishers
2. U. Satyanarayan, U. Chakrapani. Biochemistry. ELSEVIER.
3. Ravinder Chadha. Pulkit Mathur. Nutrition. Orient BlackSwan

***OR***

**GE1B.T1B Food Toxicity Diseases**

1. Naturally occurring toxicants in foods
2. Causes, sign and symptoms, prevention and treatment – lathyrism, aflatoxicosis, botulism, epidemic dropsy, dental and skeletal fluorosis, arsenic intoxication through foodstuffs and drinking water

**Suggested reading:**

1. M. Swaminathan. Food & Nutrition. Vol-2. The Bangalore Printing & Publishing Co Ltd
2. B. Srilakshmi. Food science. New Age International Publisher
3. B. Srilakshmi. Nutrition Science. New Age International Publisher

## **SEMESTER – II**

### **GE2A.T2A Food Groups and Cooking Methods**

1. Nutritional contribution and changes during cooking of the following food groups:
  - Cereals
  - Pulses
  - Fruits and Vegetables
  - Milk and Milk products
  - Eggs
  - Meat, Poultry and Fish
  - Fats and Oils
2. Food Adjuncts: Spices and Herbs; Food Additives
3. Different methods of cooking: Dry heat, Moist heat, Shallow fat frying, Deep fat frying, Braising
4. Effects of cooking on nutritive value of foods

### **GE2A.P2A Food Groups and Cooking Methods (Practical)**

1. Weight measurement
2. Different Methods of Cooking – understanding the principles involved and nutritional quality and portion size
3. Preparation of dishes involving each food group

**Suggested reading:**

1. B. Srilakshmi. Food science. New Age International Publisher
2. N. Shakuntala Manay, M. Shadaksharaswamy. Foods, Facts and Principles. New Age International Publisher
3. Prasanta Mukherjee. Textbook of Food Commodities. Aman Publications

***OR***

### **GE2B.T2B Food Allergies and Intolerance**

1. Food allergy: Allergen, mechanism of development of food allergic reactions, classification, diagnosis, symptoms, treatment, elimination diet.
2. Food Intolerance: Common diseases like celiac disease, lactose intolerance, favism
3. Inborn errors of metabolism: Phenylketonuria, alcaptonuria, maple syrup urine disease

### **GE2B.P2B Food Allergies and Intolerance (Practical)**

1. Planning of diet for celiac disease, lactose intolerance, phenylketonuria and MSUD.



**Suggested reading:**

1. B. Srilakshmi. Dietetics. New Age International Publisher
2. Kumud Khanna. Sharda Gupta. Santosh Jain Passi. Rama Seth. Ranjana Mahna. Seema Puri. Textbook of Nutrition and Dietetics. Elite Publishing House Pvt Ltd
3. M. Swaminathan. Food & Nutrition. Vol-2. The Bangalore Printing & Publishing Co Ltd

**SEMESTER – III**

**GE3A.T3A Nutrition through Lifespan**

1. Physiological changes, RDA, nutritional guidelines, nutritional concerns and healthy food choices for:
  - Adult man and woman
  - Pregnant woman
  - Lactating mother
  - Elderly
2. Growth and development, RDA, nutritional guidelines, nutritional concerns and healthy food choices for:
  - Infants
  - Preschool children
3. RDA, nutritional guidelines, nutritional concerns and healthy food choices for:
  - School children
  - Adolescents
4. Undernutrition – Protein energy malnutrition, nutritional anaemias, Vitamin A deficiency, Iodine deficiency disorders

**GE3A.P3A Nutrition through Lifespan**

1. Introduction to meal planning
2. Planning and preparation of diets and dishes for Young adult, Pregnant and Lactating woman, Preschool child, School child and adolescents, Elderly.

**Suggested reading:**

1. B. Srilakshmi. Dietetics. New Age International Publisher
2. Kumud Khanna. Sharda Gupta. Santosh Jain Passi. Rama Seth. Ranjana Mahna. Seema Puri. Textbook of Nutrition and Dietetics. Elite Publishing House Pvt Ltd
3. Suryatapa Das. Textbook of Human Nutrition. Academic Publishers
4. Ravinder Chadha. Pulkit Mathur. Nutrition. Orient BlackSwan

**OR**

**GE3B.T3B Community Nutrition**

1. Definition, Factors affecting community health.

2. Infant Mortality rate, Under 5 mortality rate, Maternal mortality rate – definition, causes, preventive measures.
3. Nutritional status assessment: nutritional anthropometry – height, weight, BMI, MUAC, head and chest circumference, Diet survey by recall method, Clinical assessment.
4. National programmes to combat malnutrition: ICDS, Mid day meal, Special nutrition programme.
5. National and International agencies to combat malnutrition: NIN, ICMR, ICAR, CFTRI, WHO, FAO, UNICEF, CARE.

### **GE3B.P3B Community Nutrition (Practical)**

1. Growth chart: plotting and interpretation
2. Project report on diet survey by 24-hour recall method
3. Nutritional anthropometry and clinical assessment of primary school children

#### **Suggested reading:**

1. Suryatapa Das. Textbook of Community Nutrition. Academic Publishers
2. B. Srilakshmi. Nutrition Science. New Age International Publisher
3. Rajvir Bhalwar. Textbook of Community Medicine. Wolters Kluwer
4. K. Park. Park's textbook of preventive and social medicine. M/s Banarsidas Bhanot publishers
5. Roy, R and Saha, Mahajan & Gupta Textbook of Preventive and Social Medicine. Jaypee Brothers Medical Publishers

## **SEMESTER – IV**

### **GE4A.T4A Food Safety and Standards**

1. Concept of food safety, factors affecting food safety.
2. Basic concept of HACCP.
3. Safe food handling practices.
4. Food adulteration, Food additives.
5. Food laws – PFA, Agmark, Codex alimentarius, BIS, FPO, MPO, FSSAI.
6. Food contamination and related health hazards – botulism, aflatoxin and staphylococcal intoxication, Arsenic and lead poisoning

### **GE4A.P4A Food Safety and Standards (Practical)**

1. Simple tests for Food Adulteration.
2. Market Survey of preserved fruit and vegetable products.

#### **Suggested reading:**

1. B. Srilakshmi. Food science. New Age International Publisher
2. Food Safety and Standards Authority of India. Detect Adulteration with Rapid Test
3. N. Shakuntala Manay, M. Shadaksharaswamy. Foods, Facts and Principles. New Age International Publisher

**OR**

**GE4B.T4B Therapeutic nutrition**

1. Therapeutic adaptations of normal diet.
2. Clear fluid, full fluid, soft and regular diet.
3. Aetiology, clinical features and nutritional management of
  - GI Tract Disorders – Peptic ulcer, diarrhoea, constipation, flatulence, celiac disease
  - Liver – Viral hepatitis
  - Obesity
  - Diabetes mellitus
  - Hypertension and coronary heart disease
  - Fever

**GE4B.P4B Therapeutic nutrition (Practical)**

1. Planning, preparation and service of diets for the following:
  - Therapeutic diets – Normal, soft, clear and full fluid
  - Obesity
  - Type 2 diabetes mellitus
  - CHD
  - Viral hepatitis

**Suggested reading:**

1. B. Srilakshmi. Dietetics. New Age International Publisher
2. F. P. Antia, Philip Abraham. Clinical Dietetics and Nutrition. Oxford
3. Sumati R. Mudambi, MV Rajagopal. Fundamental of Food, Nutrition and Diet Therapy. New Age International Publisher
4. Subhangini A Joshi. Nutrition and Dietetics. Mc Grow Hill
5. C. Gopalan. Nutritive Value of Indian Foods. ICMR, NIN
6. V. Vimla. Advances in Diet Therapy. New Age International Publisher

<b>PROGRAMME OUTCOME (PO)</b>		
<b>Program Outcome (PO)</b>		<b>Description</b>
<b>PO 1</b>	Sound knowledge in different domains of nutrition	After completion of this programme, the student will learn the fundamental concepts, principles and processes underlying the academic field of Nutrition and its different subfields (such as human physiology, biochemistry, food science, dietetics, food microbiology, epidemiology and public health).
<b>PO 2</b>	Development of professional skill in the field of nutrition	The students will be able to develop the professional skill in the field of nutrition and other associated fields such as food preservation, preparation of low cost locally available food, preparation of normal as well as therapeutic diet.
<b>PO 3</b>	Academic and scientific endeavor	The student will be able to find out the nutritional status of the people of the community and able to suggest the way to prevent the wide prevalence of malnutrition.
<b>PO 4</b>	Conducting research and testing a hypothesis	The programme will fortify the students to conduct research in different fields of nutrition and will be able to test the hypothesis.
<b>PO 5</b>	Job opportunity	After successful completion of this programme, the students will get job opportunity in hospitals or health care institution (as dietitian/nutritionist), in food industries, in academic institutions.

## PROGRAMME SPECIFIC OUTCOME (PSO)

<b>PSO</b>	<b>Description</b>
<b>PSO 1</b>	The core courses will help the student to develop knowledge on human physiology, nutritive value of different food, role of food and nutrients on human nutrition, role of nutrition in maintaining health and diseases.
<b>PSO 2</b>	The discipline specific electives will add additional knowledge about applied aspects of the program as well as its applicability in maintaining good health and nutritional status.
<b>PSO 3</b>	The skill enhancement courses would further add additional skills related to the subject.
<b>PSO 4</b>	Students become highly cognizant of the expansion of the learning in their respective field which enables them to get admitted to the premier institutes of the country. An aptitude to research is also stimulated in the minds of this budding generation which prompts them to take up some projects in good laboratories of the country after completing the programme.
<b>PSO 5</b>	Students will be able to analyze and solve the nutrition related problems.
<b>PSO 6</b>	Students will be able to prepare diet chart for normal person as well as for the person in diseased condition
<b>PSO 7</b>	Students will be able to the functions of different nutrients at molecular level, the nutrient gene inter action and modulation of gene expression by nutrients.
<b>PSO 8</b>	The programme will strengthen the students to understand the structure and function of the gene, cell, tissue, organ and organ-system.
<b>PSO 9</b>	Research Motivation is also another significant outcome that the students are endowed with on the completion of the programme.

## COURSE OUTCOME

Papers	Title	Course outcome
<b>Semester-I</b>		
<b>C1 T1</b>	<b>Human Physiology I</b>	It will help the students to acquire knowledge about the cells and different systems (Cardiovascular system, digestive system, respiratory system and excretory system) in our body.
<b>C2 T2</b>	<b>Food Science and Basic Nutrition I</b>	The students will be able to gain basic knowledge on foods, nutrients (carbohydrate, protein and fat) and dietary fibres – their classifications and functions.
<b>C1 P1</b>	<b>Human Physiology I (Practical)</b>	This practical course will enable the students to measure blood pressure, to determine blood group and to analyze blood for TC & DC, bleeding time, clotting time etc.
<b>C2 P2</b>	<b>Food Science and Basic Nutrition I (Practical)</b>	It will provide knowledge about colorimetric estimation of carbohydrate and protein and qualitative detection of carbohydrates.
<b>GE1A</b>	<b>Fundamentals of Nutrition and Food Science</b>	The students will be able to know about macro and micro nutrients – their sources, functions, consequences of deficiency and excess. It will also help to gain knowledge on foods, food groups and balanced diet.
<b>GE1B</b>	<b>Food allergies and intolerance</b>	The students will be able to know the development, types, clinical manifestations, diagnosis and dietary management of food allergies and intolerance.
<b>Semester-II</b>		
<b>C3 T3</b>	<b>Human Physiology II</b>	It will help the students to acquire knowledge about endocrine system, reproductive system, musculo-skeletal system in our body.

<b>C4 T4</b>	<b>Food Science and Basic Nutrition II</b>	The students will be able to gain basic knowledge on vitamins, minerals and water – their classifications, functions and consequences of deficiency & excess.
<b>C3 P3</b>	<b>Human Physiology II (Practical)</b>	This practical course will help the students to know the histological structure of different organs of our body from the practical knowledge. The students will be able to estimate the haemoglobin level.
<b>C4 P4</b>	<b>Food Science and Basic Nutrition II (Practical)</b>	This practical course will enable the students to know the presence of specific nutrient in a specific food (calcium in milk, ascorbic acid in citrus foods).
<b>GE2A T2A</b>	<b>Food Groups and Cooking Methods</b>	It will provide knowledge on nutritional contribution of different foods included in food groups. It will also provide knowledge on different methods of cooking.
<b>GE2A P2A</b>	<b>Food Groups and Cooking Methods (Practical)</b>	It will provide practical knowledge on different methods of cooking and preparation of dishes involving each food group.
<b>GE2B</b>	<b>Food Toxicity Diseases</b>	It will provide knowledge on toxicological effects of some food due to the presence of naturally occurring toxicants present in foods.
<b>Semester-III</b>		
<b>C5 T5</b>	<b>Nutritional Biochemistry I</b>	The course would strengthen the students with in-depth knowledge on enzyme (classification, properties, kinetics etc.), and metabolism of carbohydrates, proteins and fats.
<b>C6 T6</b>	<b>Food Commodities</b>	This core course will provide the knowledge on nutritional aspects of different food commodities (such as cereals, pulses & legumes, milk & milk products, meat, fish, egg, vegetables & fruits, beverages etc.).

<b>C7 T7</b>	<b>Human Nutrition</b>	It will provide knowledge on human nutrition during different stages of life. It will also provide knowledge on Recommended Dietary Allowances and energy in human nutrition.
<b>C7 P7</b>	<b>Human Nutrition (Practical)</b>	This practical course will enable students to plan and prepare diets for different age groups and different physiological conditions.
<b>SEC 1</b>	<b>Food Adulteration (Practical)</b>	This course provides practical knowledge of detecting the presence of adulterant in different food stuffs.
<b>GE3A T3A</b>	<b>Nutrition through Lifespan</b>	This course provides knowledge on physiological changes during different stages of life and nutritional requirements at these stages.
<b>GE3A P3A</b>	<b>Nutrition through Lifespan (Practical)</b>	It will provide practical knowledge to plan and prepare diets for different age groups and different physiological conditions.
<b>GE3B T3B</b>	<b>Community Nutrition</b>	This practical course will enable students to determine the nutritional status of the people of the community and to know the different factors that affect the community health.
<b>GE3B P3B</b>	<b>Community Nutrition (Practical)</b>	The students will be able to determine the nutritional status of the people by anthropometric measurement, clinical assessment and diet survey.
<b>Semester-IV</b>		
<b>C8 T8</b>	<b>Nutritional Biochemistry II</b>	The course would strengthen the students with in-depth knowledge in nucleic acids (DNA & RNA), central dogma of life (replication, transcription and translation), biochemical roles of vitamins and minerals).



<b>C9 T9</b>	<b>Diet Therapy I</b>	The course will enable students to learn about the different aspects of therapeutic diet and its application in weight management, fever & infection, surgical conditions and gastrointestinal diseases.
<b>C10 T10</b>	<b>Diet Therapy II</b>	The course will enable students to learn about the application of therapeutic diet in anaemias, diabetes mellitus, cardiovascular diseases, liver diseases and renal diseases.
<b>C9 P9</b>	<b>Diet Therapy I (Practical)</b>	This practical course will enable students to plan and prepare different types of therapeutic diet. It will also help the student to prepare diet chart for obese persons and patients with peptic ulcer.
<b>C10 P10</b>	<b>Diet Therapy II (Practical)</b>	This practical course will enable students to plan and prepare diet chart for patients with cardiovascular diseases, diabetes mellitus, glomerulonephritis and anaemia.
<b>SEC2</b>	<b>Practical Approaches in Food and Nutrition (Practical)</b>	It will provide knowledge on planning meals for adults of different activity level of different income groups. It will also provide knowledge on assessing self diet (by 24 hours recall method) provide practical knowledge on market survey.
<b>GE4A T4A</b>	<b>Food safety and standards</b>	It will provide knowledge on different aspects of food safety, food laws, food handling practices and food contamination with its hazards.
<b>GE4A P4A</b>	<b>Food safety and standards (Practical)</b>	This course will provide practical knowledge of detecting the presence of adulterant in different food stuffs and helps to conduct market survey.
<b>GE4B T4B</b>	<b>Therapeutic Nutrition</b>	The course will enable students to learn about the different aspects of therapeutic diet and its application in weight management, diabetes mellitus, fever, liver diseases and gastrointestinal diseases.

<b>GE3B P3B</b>	<b>Therapeutic Nutrition (Practical)</b>	This practical course will enable students to plan and prepare different types of therapeutic diet for patients with obesity, type II diabetes, fever, viral hepatitis and cardiovascular diseases.
<b>Semester-V</b>		
<b>C11 T11</b>	<b>Community Nutrition</b>	The course will provide knowledge on the different aspects of community nutrition such as community health including its modulating factors, nutritional status assessment, nutritional monitoring & surveillance. It will help to know the causes and consequences of malnutrition and the role of different national and international agencies to combat malnutrition. It will also provide knowledge on different nutritional intervention programme (ICDS, Midday Meal Programme etc.).
<b>C12 T12</b>	<b>Community Hygiene and Sanitation</b>	The course provides knowledge of basic concept on hygiene & sanitation, community water & waste management and food borne & water borne diseases (causes, mode of transmission and prevention & control).
<b>C11 P11</b>	<b>Community Nutrition (Practical)</b>	This practical course will enable students to assess nutritional status of the people of the community by anthropometric measurement & clinical assessment, to prepare growth chart and to conduct diet survey.
<b>DSE1 T1</b>	<b>Food Safety and Sustainable Nutrition</b>	The course provides knowledge on food preservation, food standards & food laws, organic foods & genetically modified foods and functional foods.
<b>DSE1 P1</b>	<b>Food Safety and Sustainable Nutrition (Practical)</b>	The students will be able to prepare preserved food products such as jam, jelly, squash and pickles.
<b>DSE2 T2</b>	<b>Food Service Management</b>	The student will be able to know the different aspect of food service management including food hygiene & sanitation, menu planning, methods of cooking and

		food services.
<b>DSE3 T3</b>	<b>Maternal and Child Health</b>	It will provide knowledge on different indicators of maternal and child health, physiology of pregnancy & lactation, feeding problems and management of preterm and low birth weight baby and feeding problems and management of children with special needs.
<b>DSE3 P3</b>	<b>Maternal and Child Health (Practical)</b>	The students will be able to plan and prepare weaning foods, supplementary foods for children, pregnant women and lactating mothers.
<b>DSE4 T4</b>	<b>Basic Principles of Biophysics</b>	It will provide knowledge on different biophysical processes (surface tension, viscosity, absorption, adsorption, diffusion and osmosis), chemistry of acids, bases, pH and buffer.
<b>Semester VI</b>		
<b>C13 T13</b>	<b>Food Microbiology</b>	The course will help students to know the sources of microorganisms in foods, the growth of microorganisms, spoilages of different food commodities, microbial examination of water and milk.
<b>C14 T14</b>	<b>Epidemiology</b>	The course will provide knowledge about health & diseases, principles & methods of epidemiology and epidemiology of different communicable diseases.
<b>C13 P13</b>	<b>Food Microbiology (Practical)</b>	The course will provide practical knowledge on Gram staining of bacteria and preparation of culture media. It will also help the student to determine the potability of water.
<b>DSE5 T5</b>	<b>Public Health Nutrition</b>	The course will help students to acquire knowledge on nutritional deficiency disorders, sports nutrition, space nutrition and nutrition during emergencies it will also provide knowledge on nutritional management of

		cancer, thalassemia and AIDS.
<b>DSE5 P5</b>	<b>Public Health Nutrition (Practical)</b>	The practical course will enable students to plan and prepare dishes to treat nutritional deficiencies and will help to gather knowledge on national nutrition programme.
<b>DSE6 T6</b>	<b>Inborn Error of Metabolism and Food Allergies</b>	The students will be able to know the development, types, clinical manifestations, diagnosis and dietary management of food allergies and intolerance.
<b>DSE7 T7</b>	<b>Nutrigenomics</b>	The course will help students to acquire basic concept on nutrigenomics, pharmacogenomics, health informatics, nucleic acid and protein data bases and BLAST.
<b>DSE7 P7</b>	<b>Nutrigenomics (Practical)</b>	The practical course will enable students to retrieve nucleic acid and protein sequence from databases and to align the sequences by BLAST.
<b>DSE8 T8</b>	<b>Nutrition Education</b>	The students will be able to know the objectives, methods and importance of nutrition education.