

**FIRST SEMESTER**  
**CORE COURSE (CC)**

[Total Credits: 6 (Theory-4, Practical-2)]

**C1T1: Basic Nutrition (theory)**

**(Credits: 4)**

1. Scientists and their contribution to nutrition Science: Baumann, Takaki, Hippocrates, Lavoisier, Coindet, MC & Davis, Dubois, James Lind and others.
2. Brief about nutrition pioneer Patwardhan, C. Gopalan, Rajammal P. Devdas and Swaminathan, M.S. on development of Nutrition and Research.
3. Basic Concept of nutrition – Basic definition, function, Classification and dietary sources of food, Nutrition and dietetics.
4. Balance Diet, Adequate Nutrition, Optimal Nutrition, concept of good nutrition and malnutrition.
5. Basic concept of health, Interrelationship between food, nutrition & health, visible symptoms of good health.
6. Food guide – Basic five food groups, How to use food guide (according to RDA).
7. Dietary Guidelines according to NIN.
8. Minimum nutritional requirements and RDA: Formation of RDA and dietary guidelines: Reference Man and Reference Woman.
9. Brief about Dietary Reference Intake (DRIs): Estimated Average Requirement (EAR), RDA, Adequate Intake (AI), Tolerable Upper Intake Level, Estimated Energy Requirement (EER).
10. Energy in Human Nutrition : Idea energy and its unit, energy balance, assessment of energy requirements, deficiency and Excess, Determination of energy in food, B.M.R & influencing factors, S.D.A.
11. Energy and other nutritional requirement of adult male and female engaged in different types of work (sedentary, moderate, heavy).
12. Processed supplementary foods.
13. Food sanitation in hygiene.
14. Dietetics and its scope.
15. Food habits and customs.
16. Methods of assessing nutrient Requirement.
17. Food choices: Factors regarding Biological, Environmental, Cultural, Personal.

**Books for Recommended Reading:**

1. Srilakshmi, B. 2000. Dietetics. Wiley Eastern Ltd. 4835/24, Ansari Road, Daryaganj. New Delhi.
2. Swaminathan, H. 1995, Essentials of Food and Nutrition Vol I & Vol. II Bappco. Bangalore.
3. Mahan, L.K. and Escott-Stump, S. (2000): Krause's Food Nutrition and Diet- Therapy, 10th Edition, W-13 Saunders Ltd.
4. Nutrition A life cycle approach Ravinden chadhe and pulkit mathur, published by Orient Black Swar.
5. Nutrition and Dietetics Shubangini A joshi, Mcwraw Hill
6. Text book of Human nutrition Agarwal of Udopd, Jay pee

**C1P1: Basic Nutrition (Practical)**

**(Credits: 2)**

1. Identification and characterization of various foods with local name, English name and scientific name from a market / field.
2. Measurement of volume (unit/unit & mm<sup>3</sup>) and weight of various foods (whole).
3. Measurement of volume (unit/unit & mm<sup>3</sup>) of various/different size of food prepared in household for daily cooking.
4. Measurement of weight and volume of different cooking food prepared in household for daily cooking.
5. Prepare a food nutritional chart using ICMR-NIN proposed portion size.  
(Note: using staple food(s) guide by food guide pyramid) [Any plate].
6. Food preparation and clarifying recipes a good, poor, sources of specific nutrients, amount of ingredients to be used in standard recipe.
7. Analysis and compare of nutrients (as per Gopalon /USDA Reference) of a cereal based food recipes.  
(Note: Nutritional representation must be maintained before &after cooking of foods).
8. Calculation of a meal (breakfast/lunch/dinner).

**C2T2: Food Biochemistry (Theory)**  
[Total Credits: 6 (Theory-4, Practical-2)]

(Credit-4)

1. **Carbohydrates chemistry:** Definition and function, Classification, Isomerism of monosaccharide, Properties of monosaccharide, Structure and functions of Modified monosaccharide, Disaccharides, Oligosaccharides, Polysaccharides & Mucopolysaccharides.
2. **Carbohydrates nutrition:** Sources, Functions, Daily requirement, Effect of too high and too low carbohydrate diet on health, Glycemic index.
3. **Lipids chemistry** – Definition and function, Classification, Classification of fatty acids (straight chain fatty acid, Substituted fatty acids, cyclic fatty acids), Isomerism of fatty acids, Properties of fatty acids, Glycerol, Properties of fats, Characterization of fats, Phospholipids, Micelle, Bilayer, Liposome, Glycolipids, Steroids and Sterols, Structure and Properties,
4. **Lipids nutrition:** Sources, functions of lipids. Daily requirement. Fatty acids: Role and nutritional significances of PUFA, MUFA, SFA, USFA, Omega - 3 fatty acid.
5. **Proteins chemistry** – Definition and Functions, Classification, Amino acids and their functions, Isomerism of amino acids, Classification of amino acids, Properties of amino acids, Properties of protein, Structure of proteins (Primary, Higher orders, Bonds stabilizing higher structures, secondary (alfa helix, beta pleated sheet, beta bend and omega loop and Triple helix supercoil, and tertiary supersecondary motifs with domain).
6. **Proteins nutrition:** Sources, functions, Daily requirement Protein quality (BV, PER, NPU).
7. **Nucleic acid-** Nucleotides and their bases, Deoxyribonucleic acid, Ribonucleic acid, Genetic codes.
8. **Dietary fibers** – Sources, Classification, Properties, Nutritional significance.
9. **Functional foods:** food as medicine: Therapeutic effects of food component other than nutrients.
10. **Nutraceuticals and Photochemicals:** Natural sources and function.
11. **Vitamins and Minerals:** Brief sources, Daily requirement, deficiency diseases and function of **Vitamin** A, D, E, K, B1, B2, B3, B5, B6, B9, B12,C & **Minerals** Calcium, Iron, Iodine, Magnesium, Zinc, Sodium, Potassium, Phosphorus, Copper, Manganese and Selenium.

**Recommended Reading:**

1. Nelson, D.L. and Cox, M.M. (2000): 31'd Ed. Lehningcl"s Principles of Biochemistry, Macmillan Worth Publishers.
2. Devlin, T.M. (1997): 4th Ed. Text book of Biochemistry with Clinical Correlations, Wiley LissInc
3. Stryer, L. (1998): 4th Ed. Biochemistry, WH Freeman and Co.
4. Conn, E.E., Stump: P.K., Bruening, G. and Doi, R.H. (2001): 5th Ed. Outlines of Biochemistry, John Wiley and Sons.
5. Voet, D. Voet, J.G. and Pratt, C.W. (1999). Fundamentals ofBiochemistry.
6. D. Das. Biochemistry, Academic Publishers.

**A. Qualitative Analysis**

1. Identification of unknown nutrients from an unknown sample.

(Note : Any one nutrient like: Cholesterol, Albumin, Gelatin, Peptone, Starch, Dextrin, Glucose / galactose, fructose, lactose/maltose, sucrose, glycerol etc).

2. Identification of unknown functional components in functional foods from an unknown sample.

(Note: Identify presence (+) or absence (-) of functional components from supplied solvent extraction of a functional food.

[Functional components include: Alkaloid, Glycosides, Flavonoids, Tanins etc.]

3. Identification of antioxidant potential of a food or food mixture. (Extraction of food (s) by various solvents by DPPH or other any new method).

4. Identification of quality of fats/oils (rancidity) by quantity the acid number.

(Note: supply various type of oil/fat by food to groups of food)

5. Identification of fats / oils accordingly Short chain-Medium chain-Long chain fatty acid present on fats/oils by saponification number.

(Note: supply various types of oils/fat by foods to groups of students).

**B. Quantitative analysis**

6. Estimation of carbohydrate content in food in terms of total content of glucose by Benedict Quantative reagents using titration method.

(Note : Using various type of cereals / millets etc)

7. Estimation of protein content in food by Biuret method.

(Note: Using various types of foods like – Milk, Legumes or other protein rich foods)

8. Estimation of fat percentage in food. ( Note: Fishes, nuts, oils)

9. Quantify the total Ash content in foods.

10. Quantify the total moisture content in food.

11. Extraction method of foods by various solvents.

**Generic Elective**  
**GE-1/3 [Interdisciplinary for other department]**

**GE-1/3 : BASIC HUMAN NUTRITION Credits 06**

**GE-1/3 T: BASIC HUMAN NUTRITION**

**(Credits: 4)**

1. Concept and definition of terms-Nutrition, Malnutrition and Health. Brief history of nutrition science. Scope of Nutrition.
2. Dietary guidelines for Indians. Food exchange list, Factors affecting meal planning and food related behavior
3. Minimum Nutritional Requirement and RDA. Reference Man and Reference Woman.
3. Energy and its unit, Energy assessment and balance, BMR and its regulation, SDA of food.
4. Integrated Child Development Services (ICDS), Mid Day Meal Programme (MDMP), Vit A prophylaxis Prophylaxis programme, Anemia prophylaxis programme, Iodine deficiency disorders control programme.
5. Function of nutrients- Carbohydrate, dietary fibre, protein, fat, vitamins, minerals, anti-oxidants, water.
6. Effect of cooking and heat processing on the nutritive value of foods.

**GE-1/3 P: BASIC HUMAN NUTRITION**

**(Credits: 2)**

1. Measurement of body weight, body height, MUAC, Wais-hip ratio and BMI.
2. Calculation of energy requirement by factorial and 24 hrs recall methods.
3. Qualitative analysis of cooked foods.

**SECOND SEMESTER**  
**[TOTAL CREDITS: 6 (THEORY-4, PRACTICAL-2)]**

**CT3: NUTRITIONAL BIOPHYSICS AND BIOCHEMISTRY 4 CREDITS**

1. Diffusion, absorption, osmosis, viscosity, surface tension, colloids – Physiochemical properties and their biological (Nutritional) importance.
2. Principles and uses of colorimetry, chromatography, photometry and electrophoresis.
3. Biological importance of acid, base, buffer, pH and acid-base balance
4. Enzymes: Definition, classification, specificity of enzymes, enzyme kinetics including factors affecting enzyme activity, enzyme inhibition, and coenzyme in metabolism, isoenzyme.
5. Biological Oxidation: Role of oxygenases, oxidases, hydroperoxidases and dehydrogenases on oxidation and removing reducing equivalents. Redox potential, mitochondrial respiratory chain. Electron transport chain (ETC) and its mechanism. Oxidative phosphorylation and its mechanism. Oxidative phosphorylation and its mechanism and substrate level phosphorylation.
6. Carbohydrate metabolism: Glycolysis, TCA Cycle, gluconeogenesis, glycogenolysis and pentose phosphate pathway. Energy generation in glycolysis and TCA cycle.
7. Protein Metabolism: Transamination, deamination, transmethylation, amino acid derivatives, urea cycle.
8. Lipid metabolism: Biosynthesis of palmitic acid, ketone bodies. Beta, omega and alfa oxidation of fatty acids.
9. Nucleic acid: Genetic code-its characteristics, function. Purine and pyrimidine synthesis. Structure of purine and pyrimidine.

**CP3: NUTRITIONAL BIOPHYSICS AND BIOCHEMISTRY (PRACTICAL)**  
**2CREDITS**

1. **Determination of pH:** in acids, alkalis and buffers using pH meter and indicators.
2. **Colorimeters:** Use of colorimeter in UV and visual range, (principle to be explained and demonstrated with one example for each).
3. **Separation techniques:** Chromatography-
4. Thin layer Chromatography. (**Amino acids or Fatty acids-** One example for each may be demonstrated from extraction of any food item).
5. **Enzyme Assays:** Serum Alkaline phosphatase (ALP), Serum Glutamate Oxaloacetate Transaminase (SGOT), Serum Glutamate Pyruvate Transaminase (SGPT).
6. Estimation of creatinine and urea in plasma.
7. Estimation of Serum cholesterol and triglyceride.
8. Estimation of plasma glucose.
9. Estimation of Serum protein.

**CT4: HUMAN PHYSIOLOGY****4 CREDITS**

- 1. Cellular system:** Cell and sub cellular components prokaryotic cells, eukaryotic cells, comparison of features of prokaryotic and eukaryotic cells, structure outside the cell membrane, cell membrane transport system,
- 2. Digestive system:** Structure and function - secretory, digestive and absorptive functions – stomach, intestine, liver, pancreas and gall bladder. Hormones of gastro intestinal tract. Digestion and absorption of carbohydrate, protein, lipid and nucleic acids.
- 3. Nervous System:** Structure and function of neuron and synapses. Conduction of nerve impulse. Neurotransmitters and its role. Organization of central and peripheral nervous system. Hypothalamus, cerebellum, cerebral cortex, thalamus, midbrain and its role in various body functions. Neuromuscular junction-its role. ANS.
- 4. Endocrine system:** Structure and function of endocrine glands (pituitary gland, thyroid, parathyroid, islets of langerhans, adrenals, ovary and testis, thymus, pineal gland). Role of hormones, regulation of hormonal secretion, stress hormones. Excess and deficiency symptoms of hormones.
- 5. Reproductive system:** Structure of male and female reproductive system. Spermatogenesis, oogenesis, folliculogenesis. Hypothalamo-hypophysis-gonal axis. Fertilization and implantation.
- 6. Respiratory system:** Structure and function respiratory tract. Role of lungs in the exchange of gases. Transport of oxygen and carbon dioxide. Lungs volume and capacity. Lungs compliances. Regulation of respiration.
- 7. Circulatory and Cardio Vascular system:** Blood - formation, composition, clotting and haemostasis. Formation and function of plasma proteins. Erythropoiesis. Blood groups and histocompatibility. Blood indices - use of blood for investigation and diagnosis of specific disorders, Structure and function of heart and blood vessels - Regulation of cardiac output and blood pressure.
- 8. Excretory system:** Structure of kidney and nephron. Urine formation. Non-excretory function of kidney.
- 9. Skin:** Structure and function of skin. Regulation of sweat secretion.
- 10. Musculoskeletal system:** Structure and function of skeletal, smooth and cardiac muscles. Properties and contraction of skeletal muscle.
- 11. Immune system:** Cell mediated and humoral Immunity. Structure and function of immunoglobulin. Complement system. Role of macrophages in immunity. Cytokines and lymphokines. Hypersensitivity reactions. Vaccines.

**Recommended Reading:**

1. Guyton, A.C. and Hall, J.E. (1999): Textbook of Medical Physiology, 9th Edition,
2. W.B. Saunders Co. Stuart Ira Fox, Human Physiology 11<sup>th</sup> Ed. William F Ganong, Review of Medical Physiology
3. Text Book of Medical Physiology, Indu Khurana, Elsevier (2016).

**CP4: NUTRITIONAL PHYSIOLOGY (PRACTICAL)****2 CREDITS**

1. Study on microscopes.
2. Identification of prepared slides: a) Lungs, b) Thyroid, c) Pancreas, d) Testis, e)Ovary, f) Kidney, g)Liver, h) Duodenum, i) Jejunum, j) Ilium k) Spinal cord, l) cerebellum.
3. Preparation of blood film and identification of WBCs.
4. Estimation of haemoglobin by cyanomethoglobin test.
5. Blood grouping.
6. Measurement of blood pressure by different postures.
7. Measurement of pulse rate by different postures.

**Generic Elective**

**GE-2/4 [Interdisciplinary for other department]**

**GE-2/4 : NUTRITION: LIFE CYCLE APPROACH**

**Credits : 04**

**GE-2/4 T :**

1. **Nutrition during infancy:** Breast feeding, Formula feeding, Weaning, Supplementary foods, Nutritional management of Preterm baby.
2. **Nutrition for children:** Diet in early childhood, elementary school age, high school age.
3. **Nutrition during pregnancy and lactation:** Nutritional demands of Pregnancy, Food selection during Pregnancy, Complications of pregnancy and dietary management, Diet during Lactation.
4. **Nutrition to athletes:** Nutritional requirements and dietary management in sports man and athletes, Meal planning for athletes.
5. **Geriatric nutrition:** Planning of meals for older people, Nutrition of aged persons, Physiological complications in geriatric group and dietary modifications required, Oxidative stress and aging and role of antioxidative nutrients for preventing aging.

**GE-2/4 P:**

**Credit:2**

1. 1.Preparation of normal diet chart for infant (6-12 months).
2. Preparation of normal diet chart for preschool children.
3. Preparation of normal diet chart for college student.
4. Preparation of normal diet chart for pregnant lady and lactating mother.

**Note:** In laboratory note book, calculation of nutritive value should be recorded according to portion size of specific diet for particular individual.

**THIRD SEMESTER**  
**Core Course (CC)**  
**[TOTAL CREDITS: 6 (THEORY-4, PRACTICAL-2)]**

**C5T: Food Microbiology (Theory)**

**Credits 04**

**Course Contents:**

**1. History of Microbiology:**

General characteristics of bacteria, fungi, virus, protozoa and algae. Bacterial structure: Cell walls of Gram positive and Gram negative, Bacteria capsule, Flagella-composition, structure and types, Cell membrane-structure, composition and Properties, Bacterial spore.

General characteristics of viruses, concept of viroids and prions.

**2. Food contamination:**

Primary and secondary sources of food contamination .

**3. Nutrition and culture of microorganisms:**

Bacterial growth-Extrinsic and intrinsic factors affecting growth. Binary fission of bacterial growth, Bacterial growth curve, Types of culture media, Methods of isolation. Physical and chemical methods used in sterilization and disinfection.

**4. Fermented Foods:** Bacterial cultures, Yeast cultures, Mold cultures. Beneficial effect of microorganisms-concept of probiotics and related factors. Dietary different fermented products, importance of fermented foods.

**5. Medical Microbiology and Pathology:**

Host pathogen interaction: Definitions - Infection, Invasion, Pathogen, Pathogenicity, Virulence, Toxicogenicity, Carriers and their types, Opportunistic infections, Nosocomial infections. Transmission of infection.

Predominant normal microbial flora of human body: Skin, Respiratory Tract, gastrointestinal Tract, Urinogenital Tract.

Bacterial Diseases: Name of pathogen, symptoms, pathogenesis, mode of action & preventive measures of following diseases: Typhoid, Cholera and Tuberculosis, Tetanus.

**6. Antibiotic and chemotherapeutic agents:** Sulfur drugs, Antibiotics and their classification, Mode of action, antibiotic assay and sensitivity test.

**C5P: Food Microbiology (Practical)**

**Credits 02**

1. Study of equipments in a microbiology lab.
2. General procedures for aseptic work.
3. Staining of bacteria (gram staining).
4. Preparation of nutrient broth and media with agar,
5. Preparation of bacterial smears.
6. Culture transfer techniques
7. Technique for isolation of pure culture, plating by pour plate and streak plate methods.
8. Bacteriological examination of water, milk, dried fish and fish meal and canned foods.



## Core Course (CC)

[TOTAL CREDITS: 6 (THEORY-4, PRACTICAL-2)]

**C6T: Food Science and food commodities (Theory)**

**Credits 04**

### Course Contents:

#### 1. Concept and definition of terms:

Food in relation to health.

#### 2. Cereals, Millets, Pulses and legumes:

Products of wheat, Rice products,

Nutritional aspects of wheat, rice, oats, rye, barley, millets, maize or corn, jowar, ragi and bajra.

Fermented products, unfermented products,

Types of pulses and legumes, uses, and nutritional aspects.

Pulse in cookery (effects of cooking of pulse, factors affecting cooking quality)

#### 3. Milk and milk Products:

Nutritive value and composition of milk,

Types of processed milk, milk products (butter, curd, paneer and cheese).

Role of milk products in cookery,

Milk in cookery (effect of heat in various milk component ).

#### 4. Egg, Fish and meat:

Nutritional aspects and uses,

Nutritional aspects of edible fish and meat, concept of red and white meat,

Cookery of egg, fish and meat (effect of heat in various component of egg, changes during cooking of meat ),role of egg in cookery.

#### 5. Vegetables and fruits:

Uses and nutritional aspect of commonly available vegetables.

Fresh fruits and dry fruits– raw and processed product.

Vegetable cookery (preliminary preparation, changes during cooking, loss of nutrient during cooking, effects of cooking on pigment)

#### 6. Salts:

Uses and nutritional aspects of various salts.

#### 7.Fats and oils:

Types, sources, use and nutritional aspects of fats and oils.

Specific fats and oils (lard, butter, margarine, cotton seed oil, groundnut oil, coconut oil, soyabean oil, olive oil, rice bran oil, sesame oil, rape seed oil and mustard oil, palm oil), Effect of heating on fat (smoke point, flash point and fire point, changes in fat on heating) Role of fat/oil in cookery (fat or oil used as medium of cooking, fat improves the texture of foods, fat improves palatability, improves quality of the product).

#### 8.Nuts and oil Seeds :

Specific nuts and oil seeds (almonds, coconut, flaxseed, garden cress seeds, groundnut, soyabean, sunflower seeds, walnuts, oilseed cakes)

#### 9. Beverages:

Common types (tea, coffee and wines) and their uses, nutritional aspect.

#### 10.Raising and Leavening agents:

Types, Constituents, Uses in cookery and bakery, Storage.

#### 11. New food:

fast food, junk food, GM food, Free food.

**C6P: Food Science and food commodities (Practical)**

**Credits 02**

1. Preparation and analysis of nutritive value:

i)Breakfast cereals

ii) Milk and milk products

iii)Poultry products

iv)Vegetables

v)Fruits

2. Determination of colour for various food grains, fruits, vegetables, spices and processed foods.

3.Visit to local Food processing plants like, flour mill, dal mill, rice mill, oil extraction mill etc.

**Core Course (CC)**  
**[TOTAL CREDITS: 6 (THEORY-4, PRACTICAL-2)]**

**C7T Food processing, preservation, spoilage and adulteration Credits 04**

**Course Contents:**

**1. Methods of cooking:**

Dry, moist, frying and microwave cooking.

Effect of various methods of cooking on foods, nutrient losses in cooking.

Objectives of cooking, preliminary preparation (cleaning, peeling and straining, cutting and grating, sieving, soaking, processing, blanching, marinating, sprouting or germination, fermentation, drying, filtering, grinding, roasting).

**2. Food processing:**

Significance, principles of different methods of food processing: thermal processing- Cooking (moist heat, dry heat, combination method of cooking), blanching, pasteurization, sterilization, canning. Principles of microwave cooking and solar cooking.

**3. Food preservation and food Spoilage:**

General principles of food preservation, Food preservation by use of high and low temperature include freezing and freeze drying, dehydration, food additives, use of preservatives and irradiation. Contamination of micro organisms in the spoilage of different kinds of foods, such as cereal and cereal products, vegetable and fruits, fish and other sea foods, meat and meat products, eggs and poultry, milk and milk products, canned foods.

**4. Food infections:**

Bacterial food infections-Salmonellosis, Shigellosis and Listeriosis.

Food poisoning (Staphylococcal and Botulism) - Symptoms, mode of transmission and methods of prevention, Concept of aflatoxin intoxication.

**5. Food additive:**

Food additives-various types and their effects on health.

**6. Food adjuncts and preserved products:**

Spices (Chilies, Turmeric, Garlic and Ginger), use and nutritional aspect.

Jams, Jellies, Pickles, Syrup, Squashes—uses and nutritional aspects.

**7. Food adulterants:**

PFA definition of food adulteration, adulterants in commonly consumed food items.

Common adulterants in food and their effects on health.

Common household methods to detect adulterants in food

**C7P Food processing, preservation, spoilage and adulteration (Practical) Credits 02**

**1. Detection of adulterants in food:**

- i) Detection of vanaspati in Ghee.
- ii) Detection of vanaspati in Butter.
- iii) Detection of Khesari flour in Besan.
- iv) Detection of Argemone oil in Edible oil.
- v) Detection of Metanil yellow in Turmeric.

**2. Post harvesting food process for later use**

- i) Foods include vegetables and fruits (Beans, Radish, cabbage, potato, cauliflower, leafy vegetables and pickle, squash.) dried by sun drying and mechanical drying.
- ii) To determine the moisture content in fresh and processed products .
- iii) To determine the ash content in fresh and processed products.
- iv) To determine the pH of food samples.
- v) To estimate the salt contents in given samples by using Mohr method.
- vi) Estimation of sodium Benzoate in Food Sample.
- vii) Estimation of Sulphur Dioxide.

**Skill Enhancement Course (SEC)**  
**[TOTAL CREDITS: 4 (THEORY-2, PRACTICAL-2)]**

**SEC-1:**

**Credits 04**

**SEC1T: Food safety and food standard**

**Credits 02**

**Course Contents:**

**1.Food safety**

Concept of food safety, factors affecting food safety.

Food safety measures: basic concept of HACCP, Safe food handling practices and storing food safely.

**2.Food laws and regulatory authority:**

Prevention of Food Adulteration (PFA) Act.

Regulating authority-Codex Alimentarius, ISI, Agmark, Fruit Products Order (FPO), Meat Products Order (MPO), Bureau of Indian Standards (BIS), MMPO, FSSAI.

**3.Evaluation of food quality**

Sensory characteristic of food, Sensory tests,

**SEC1P: Food safety and food standard (Practical)**

**Credits 02**

A Report to be submitted on a training programme (Food safety and food standard) from authorized trainers.

**FOURTH SEMESTER**  
**Core Course (CC)**

**CC8: Nutritional Assessment And Nutrition Programme [Total Credits: 6 (Theory-4, Practical-2)]**

**C8T: Nutritional Assessment And Nutrition Programme (Theory) Credits: 4**

**1. Assessment of Nutritional Status:**

Direct Nutritional status assessment of human groups - Biochemical, Biophysical and anthropometric methods. Indirect assessment: Secondary sources of community health data.

**2. Concept of Surveillance systems:**

Role of international and national organizations and agencies (WHO, FAO, UNICEF, CARE, NIN, CFTRI, ICMR).

**3. Communication in Nutrition and Health Education:**

Type, process and media of communication. Interpersonal, Group and Mass communication. Importance and relevance of Information, Education and communication (IEC) in Nutrition and Public Health. Impact of Education on Knowledge, Attitude and Practice development in the field of Nutrition and Health. Approaches and Strategies of Nutrition Education in Community – Women to women strategy, child to parent strategy.

**4. National Nutritional Intervention Programmes:**

Objective, Target group, Scheme details - Integrated Child Development Services (ICDS), Mid Day Meal Programme (MDMP), Vit A prophylaxis Programme, Anemia prophylaxis programme, Iodine deficiency disorders control programme. ANP, SNP, CNP, BFP – Aims and Objectives, Target group, Service provided, Advantages, Limitation, Concept on public distribution system.

**5. Immunization Programme:**

Preliminary concept of immunity-innate, acquired, active and passive immunity.

Immunization: National Immunization schedule for children and adults, Immunization for foreign travelers.

**C8T: Nutritional Assessment And Nutrition Programme (Practical): Credits: 2**

1. Anthropometric measurement of Weight, height and its comparison with reference value.
2. Determination of BMI and comments on results.
3. Measurement of circumference of chest, upper arm, waist - hip ratio.
4. Measurements of fat using skin fold thickness.
5. Weight for age, Height for age, Weight for height, and its comparison with reference value
6. Growth chart preparation (WHO, NCHS & ICMR).

**CC-9: Family meal management and meal planning****Credits 06****C9T: Family meal management and meal planning (Theory)****Credits 04****Course Contents:**

1. Nutrition during Pregnancy: Physiology of pregnancy, factors (non-nutritional) affecting pregnancy outcome, importance of adequate weight gain during pregnancy, antenatal care and its schedule, Nutritional requirements during pregnancy and dietary management. Deficiency of nutrients and impact- energy, iron, folic acid, protein, calcium, iodine. Common problems of pregnancy and their managements- nausea, vomiting, pica, food aversions in pregnancy, pregnancy induced hypertension, gestational diabetes.
2. Nutrition during Lactation: Physiology of Lactation, nutritional requirements during lactation, dietary management, food supplements, galactogogues. Care and preparation of nipples during breast feeding.
3. Nutrition during infancy: Infant physiology relevant to feeding and care. Breast feeding - colostrums, its composition and importance in feeding. Initiation of breast-feeding and duration of breast-feeding, Advantages of exclusive breast-feeding, Nutritional and other advantages of breast-feeding. Introduction of complementary foods, initiation of management of weaning, breast feeding etc. Bottlefeeding circumstances under which bottle-feeding is to be given. Care and sterilization of bottles. Preparation of formula. Mixed feeding, breast feeding and artificial feeding. Teething and management of problems.
4. Nutrition to toddlers / preschool/school going children or adolescent.
5. Management of preterm and low birth weight children – their special needs.
6. Geriatric nutrition – Dietary requirement, Geriatric health problems, Nutritional care.
7. Sports Nutrition- nutritional demand on different sports and dietary recommendations.

**C9P: Family meal management and meal planning (practical) Credits 02**

1. Planning and preparation of balanced diet for a pregnant women
2. Diet during complication of pregnancy
3. Planning and preparation of balanced diet for a lactating women
4. Preparation of weaning food
5. Planning and preparation of balanced diet for a pre-school children
6. Planning and preparation of balanced diet for school going child. Preparation of packed lunch
8. Planning and preparation of balanced diet for adolescents
9. Planning and preparation of balanced diet for adult men and women of different Physical activity and economic status.
10. Planning and preparation of balanced diet for senior citizen.

**CC-10: Diet atherapy-1**  
**CC10T: Diet atherapy-1**  
**Course Contents:**

**Credits 06**  
**Credits 04**

1. Basic Concepts of diet therapy: Transformation of normal diet to therapeutic diet, classification of therapeutic diets.
2. Team approach to health care: Assessment of patients' needs.
3. Routine Hospital Diets: Regular, light, soft, fluid, parenteral and enteral feeding
4. Inborn error of metabolism – Lactose Intolerance, Galactosamia, Phenylketonuria and its dietary management.
5. Etiology, symptoms, diagnostic tests and dietary management of intestinal diseases: Diarrhea, Steatorrhoea, Diverticular disease, Inflammatory bowel disease, Ulcerative Colitis, Flatulence, Constipation, Irritable Bowel Syndrome, Haemorrhoids.
6. Etiology, symptoms, diagnostic tests and dietary management of Malabsorption syndrome, Celiac sprue, tropical sprue, Intestinal brush border deficiencies (Acquired disaccharide intolerance), Protein losing enteropathy.
7. Disease of the liver, Exocrine Pancreas and Biliary System. Liver function tests, application of diet therapy and nutritional care in liver disease. Dietary care and management in Viral Hepatitis, Cirrhosis of liver, Wilson's diseases. Dietary care and management in diseases of Gall Bladder and Pancreas Cholelithiasis, Cholecystitis, Cholecystectomy, Pancreatitis.
8. Anaemias: Pathogenesis and dietary management - Nutritional Anaemias, Sickle Cell Anaemias, Thalassemia, Anaemia resulting from Acute Haemorrhage.
9. Arthritis and gout: Etiology, symptoms, diagnostic tests and dietary management.

**C10P: Diet atherapy-1 (Practical) Credits 02**

**Practical:**

1. Planning and preparation of clear fluid/ full fluid diet for diarrhoea patient.
2. Planning and preparation of soft/semi solid diet for Steatorrhoea patient.
3. Planning and preparation of diet for Diverticular disease patient.
4. Planning and preparation of diet for Ulcerative Colitis patient.
5. Planning and preparation of diet for Flatulence patient.
6. Planning and preparation of diet for Constipation patient.
7. Planning and preparation of diet for Irritable Bowel Syndrome patient.
8. Planning and preparation of diet for Haemorrhoids patient.
9. Planning and preparation of diet for Celiac sprue patient.
10. Planning and preparation of diet for Anaemia patient.
11. Planning and preparation of diet for Arthritis and gout patient.

**Skill Enhancement Course (SEC)**  
**[TOTAL CREDITS: 4 (Community Nutrition)]**

**SEC-2: Community Nutrition: (Theory)**

**Credits 02**

Basic knowledge on types of community survey. Diet survey- Need and importance, methods of dietary survey with merit and demerits. Concept of consumption unit. Clinical Signs-Need & Importance's, identifying signs of PEM, vitamin A deficiency and iodine deficiency, Interpretation of descriptive list of clinical signs.

**SEC-2: Community Nutrition: (Practical)**

**Credits 02**

- a. Clinical assessment and signs of nutrient deficiencies specially PEM (Kwashiorkor, marasmus) I vitamin A deficiencies, Anaemia, Rickets, B-Complex deficiencies.
- b. 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.
- c. Community field survey-A report submission on a and b separately.

**FIFTH SEMESTER**  
**Core Course (CC)**

**CC11: Public Health and Hygiene [Total Credits: 6 (Theory-4, Practical-2)]**

**C11T: Public Health and Hygiene (Theory)**

**Credits: 4**

1. **Community:** Concept of community, types of community, factors affecting health of Community.
2. **Community Water and Waste Management:** Importance of water to the community, etiology and effects of toxic agents, water borne infectious agents, sources of water, safe drinking water/portability and tests for portability, sewage disposal, solid waste disposal, liquid waste disposal and treatment.
3. **Demography & Population Control:** Introduction, Definition, Demographic cycle, Population Pyramid, Fertility, Factors affecting fertility, Indicators of fertility, Population explosion as a public health problem, Approaches for population control, Family planning methods.
4. **Principles of Epidemiology:** Concept of disease, rate of a disease in a population (attack rate, morbidity rate, mortality rate, incidence and prevalence rate).
5. **Study of the epidemiologic approach:** Time, place, person distribution. Determinants of disease. Vital statistics and their significance.
6. **Malnutrition and Infection vicious cycle:** Nutritional problem in the community, UNICEF conceptual model of Malnutrition

**C11P: Public Health and Hygiene ( Lab) Credits 02**

**List of Practical**

1. Assignment programme on public health, nutrition and disease – covering any one of the following fields among students group wise ( Note: Don't repeat same field)
  1. Protein under nutrition and its recovery.
  2. Vitamin or Mineral under nutrition and its recovery.
  3. Dietary management of non-communicable disease.
  4. Dietary management of growing child.
  5. Impact of nutrition education on awareness development in the field of personal health.
2. Educational excursion in research hospital/ nutrition research related higher learning center **(Compulsory for 10 marks):**
  - a. Submitted a typed report considering minimum following.
  - b. Description of the Institute.
  - c. Principle of different instruments with uses.
  - d. Overall idea about excursion.



## **CC-12: Diet Therapy-2 Credits 06 [Total Credits: 6 (Theory-4, Practical-2)]**

### **C12T: Diet Therapy-2 Credits 04**

1. **Diet in disease of the endocrine pancreas** : Diabetes Mellitus -Classification, symptoms, diagnosis, management - Insulin therapy, oral hypoglycemic agents, glucose monitoring at home, dietary care and nutritional therapy, meal plan (with and without insulin), special diabetic foods, sweeteners and sugar substitute.
2. **Diseases of the cardiovascular system**: Etiology and risk factors of various types of heart diseases-dietary management. Hyperlipidemias- cause and nutritional aspects. Hypertension - etiology, prevalence, nutritional management. Emphasis on DASH diet and NCEP.
3. **Renal Diseases**: Types of renal diseases (Acute, chronic and ESRD)-dietary management.
4. **Allergies**: Definitions, symptoms, diagnosis and dietary management and food selection.
5. Diets for febrile conditions, infections and surgical conditions.
6. Nutrition in cancer and Immune system dysfunction.
7. Gastric and duodenal ulcers and dietary management.

### **C12P: Diet Therapy-2 (Practical) Credits 02**

1. Planning and preparation of diets for diabetes mellitus
2. Planning and preparation of diet for hypertension and atherosclerosis
3. Planning the preparation of diets for nephritis and nephrotic syndrome
4. Planning and preparation of diets for Peptic Ulcers.

### **Internship (Compulsory for 10 marks)**

A report on the basis of internship in a hospital dietary department or diet clinic to be submitted. Aspects to be covered for general knowledge to :

- a. Establish rapport with patients - assess the nutritional status and diet history of patients.
- b. Plan diet sheets after careful study of patients' case sheets - prepare and provide guidance in the production of therapeutic diets.
- c. Supervise preparation of diets, assist and guide in tray setting with special emphasis on portion control and therapeutic modifications.
- d. Supervise delivery of trays to patients.
- e. Get feedback from patients regarding diets.
- f. The modification of diet through consultation doctors.
- g. Undertake case study at hospital situations.
- h. Visits to different dietary departments of various hospitals.
- i. Updating knowledge of presentation and participation through seminars and projects.
- j. Gain experience in the administrative set up of a dietary department.
- k. The role of dietician in hospital management.

**Discipline Specific Electives (DSE)**

**DSE-1: Food Sanitation and Hygiene Total Credits: 6 (Theory-4, Practical-2)]**

**DSE1T: Food Sanitation and Hygiene**

**Credits 04**

**Course Contents:**

1. The relationship of micro organisms to sanitation. Role of microbiology – Environmental effects of microbial growth. Effects of micro- organisms on food degradation and food borne illnesses- bacteria, virus, molds, yeasts, and parasites.
2. Other food hazards – chemicals, antibiotics, hormones, metal contamination poisonous foods.
3. Food contamination- sources and transmissions. Water, air, sewage and soil as reservoirs of infection and ways of spread. Other agents of contamination - Humans, domestic animals, vermins, birds.
4. Importance of personal hygiene of food handler - habits -clothes, illness. Education of food handler in handling and serving food.
5. Safety in food procurement, storage, handling and preparation – control of spoilage – safety of left over foods.
6. Cleaning methods – sterilization, and disinfection –products and methods –use of detergents, heat, chemicals, and tests for sanitizer strength.
7. Control of infestation: rodent control- rats, mice; vector control- use of pesticides
8. Food sanitation, control and inspection-planning and implementation of training programme for health personnel.

**DSE1P: Food Sanitation and Hygiene (Lab) Credits 02**

**Practical:**

1. Study of personal and environmental hygiene habits of street food handlers. Intervention and result analysis. Project submission and presentation.
2. Preservation of fruits and vegetables for later use-peas, carrots, cauliflower, chutney, soup, pickle, jam, jelly, marmalade, squash.

**or**

**DSE-1: Quality Assurance in Food Sectors Credits 06**

**DSE1T: Quality Assurance in Food Sectors Credits 04**

**Course Contents:**

1. 1.Food laboratories : need for food analysis, accreditation of food laboratory, referral laboratories, functions of food analysts, hierarchy of food safety authorities, analysis of food samples and reports, other regulatory provisions pertaining to analysis of food.
2. 2.Validation of analytical methods: Good Laboratory Practices (GLP)- history of GLP, areas of application, facilities, test systems, test and reference items, Standard Operating Procedure (SOP), study performance and reporting.
3. 3.Analytical method used for quality determination: chemical and physical, microbiological, biochemical and sensory analysis.
4. 4.Analytical methods of determination of basic food components: protein, saccharides, lipids, vitamins, water, minerals and trace elements, sensory active compounds, anti-nutritive and natural toxic compounds, food additives and food contaminants.
5. 5.Advanced laboratory techniques: principle, working and application of GC, HPLC, HPTLC, LC/MS, inductively coupled Plasma Mass Spectroscopy and PCR, real time PCR, ELISA.

**DSE1P: Quality Assurance in Food Sectors Credits 02**

Preparation of Standard Operating Procedure (SOP) of any one laboratory instruction  
(Separate group of students)

**Or**

**DSE-1: Quality Control and Food Standards Credits 06**

**DSE1T: Quality Control and Food Standards Credits 04**

**Course Contents:**

1.Principal aspects of sampling of food: Importance of sample collection, sampling tools and containers, sample collection techniques, sampling for microbiological analysis of food, routine versus investigational sampling, quantity of sample to be collected, packaging and sealing of sample, dispatch of sample, documentation and commodity specific sampling procedure.

2.Codex Alimentarius Commission (CODEX): Introduction, standards, codex of practice, guidelines and recommendations, applying codex standards, Codex India, core functions of National Codex Contact Point, National Codex Committee of India

3.International Organization of Standardization (ISO): Overview, structure, interpretation and case studies of food safety and Quality management including ISO-22000, ISO-9001:2000, ISO22000:2005, ISO 17025/CODES/GLP, Retailers standards: BRC food and BRC IOP standards, IFS, SQF: 1000, SQF: 2000.

4.Hazard Analysis Critical Control Point (HACCP): History, structure, pre- requites and principles, HACCP applications, HACCP based SOPs.

5.Good Manufacturing Practices (GMP), Good Hygienic Practices (GHP), Good Agricultural Practice(GAP), Good Veterinary Practice (GVP),Storage and distribution of food, sanitation and safety in food services.

**DSE1P: Quality Control and Food Standards Credits 02**

Preparation of Standard Operating Procedure (SOP) of HACCP (Separate group of students)

**DSE-2:Nutritional Knowledge for management and Consumer Issues Credits 06**  
**DSE-T2: Nutritional Knowledge for management and Consumer Issues Credits 04**

1. **Nutritional Knowledge for management:** concept, approaches, management of time, energy, money, space, motivating factors, motivation theories, decision making.
2. **Resources and nutritional issues:** classification, characteristics, factors affecting use, resource conservation, time management, work simplification techniques, classes of change, fatigue and its management.
3. **Money management and nutritional issues:** family income, types, supplementation, budgeting, household accounts, family savings and investment.
4. **Consumer-**definition, role, rights and responsibilities, consumer behavior, consumer problems, nutrition education and empowerment.
5. **Consumer protection-** consumer organization, cooperatives, alternative redressal, standardization, standard marks, quality control, buying aids, consumer legislation.
6. Effect of nutritional issues on family budget.

**DSE-P2: Nutritional Knowledge for management and Consumer Issues Credits 02**

Prepare a report on income and expenditure of a family (various socioeconomic aspects) followed nutritional issues of every family members (budget allocation for nutrition and health).

**or**

**DSE-2:Family Studies and nutrition concept      Credits 06**  
**DSE-T2:Family Studies and nutrition concept      Credits 04**

1. Affect of marriage and family relationships on diet and nutritional aspects.
2. Domestic violence, marital disharmony, conflict, resolution of conflict and affect on health and nutrition.
3. Parent education, positive parenting, community education and nutritional issues.
4. Family studies-family in crisis, family therapy, initiatives for child development and nutritional issues.
5. Human rights, rights of children, rights of women, status of women, gender roles effect on nutritional intake and nutritional status.
6. Health and well being across life span development-vital role of nutrition.

**DSE-P2:Family Studies and nutrition concept      Credits 02**

Prepare a report on a family (various socioeconomic aspects) followed nutritional issues of every family members (special emphasis on family in crisis/ Parent education/ marriage and marital disharmony / rights of women).

**or**

**DSE-2: Nutrition Education and Communication For Development Credits 06**

**DSE-T2: Nutrition Education and Communication For Development 04**

1. Basics of communication- nature, characteristics, functions, process, models, elements, principles, barriers, perception, persuasion and empathy, types of communication, levels (settings) of communication transactions, process of listening.

2. Communication systems and communication theories- human interaction theories, mass communication theories, message design theories, communication systems, culture and communication.
3. Concept of development- theories, models, measurement and indicators of development.
4. Concept of development- communication models and approaches, diffusion and innovation, mass media, social marketing.
5. Role of communication in development- need and importance, development journalism, writing for development-print, radio, television and internet.
6. Concerns of development communication- gender, health, environment, sustainability, human rights, population, literacy, rural and tribal development.
7. Advocacy and behavior change communication- concept, theories, models, approaches, application and challenges.
8. Traditional, modern and new media for development - folk forms of songs, art, dance, theatre, puppetry, advertisement, cinema, ICTs for development-community radio, participatory video, social media and mobile phones.

### **DSE-P2: Nutrition Education and Communication For Development Credits 02**

Preparation of visual aids to highlight community nutrition, nutritional awareness, nutritional surveillance

**Semester-VI**  
**Core Course (CC)**

**CC13: Research Methodology [Total Credits: 6 (Theory-4, Practical-2)]**

**C13T: Research Methodology (Theory) Credits: 4**

**1. Fundamentals of research**

Meaning and objective of research, types of research (basic, applied and patent oriented), defining research problem, research process and steps involved in research process, research proposal or synopsis.

**2. Literature survey and documentation**

Methods of literature survey, use of library, books, journals, e-journals, thesis, chemical abstracts and patent database, importance of documentation, documentation techniques, use of computer programs/packages (online resources such as scientific search engines and online servers) in literature survey and documentation.

**3. Data collection, analysis and hypothesis**

Classification of data, methods of data collection, sample size, sampling procedure and methods. Data processing and graphical representation of data. Hypothesis: Types of hypothesis (experimental and nonexperimental). Hypothesis testing (parametric and non-parametric tests), types of errors and their control.

**4. Research ethics, plagiarism and impact of research**

Research ethics, responsibility and accountability of the researchers, Plagiarism

**5. Technical writing and reporting of research**

Types of research report: Dissertation and thesis, research paper, review article, short communication, conference presentation, meeting report etc. Structure and organization of research reports: Title, abstract, key words, introduction, methodology, results, discussion, conclusion, acknowledgement, references, footnotes, tables and illustrations. Use of reference managing software (such as MENDELEY, ENDNOTE). Impact factor, rating, indexing and citation of journals.

**C13P: Research Methodology Practical Credits 02**

Review/ Project/ Field Survey Report – Under the guidance of respective teachers.

(Format of Review - Title, abstract, key words, introduction, methodology, results, discussion, conclusion, acknowledgement, references, footnotes, tables and illustrations)  
General outline about how to conduct research work on a particular topic and formulate a research design with a strong hypothesis and mention the gap in the chosen research area and prepare a report as per a standard SJR journal (Preparation of Manuscript). Present your research output by ppt.

**CC-14: Health Statistics and Computer -2 Credits 06 [Total Credits: 6 (Theory-4, Practical-2)]**

**C14T: Health Statistics and Computer -2**

**Credits 04**

1. Definition, Meaning of importance of Statistics, Bio-statistics, Descriptive and Inferential Statistics, Hypothesis and their types, Level of significance, Critical region and accepting region, Variable and their types.
2. Tabulation of data – Frequency distribution and its types, Cumulative, Bivariate and Multivariate frequency distribution, Graphical presentation of frequency distribution – Histogram, Bar diagram, Polygram, Pie diagram.
3. Measurement of central tendency, standard deviation and standard error – Definition, Calculation, Kurtosis, Skewness.
4. Test of significance – Null hypothesis, Alternative hypothesis, degree of freedom, t-test – one tail-t test, two tail-t test, pair observation, standard mean of observation, test of significance,

**C. Computer**

1. Computer fundamental – Basic anatomy of computer, generation of computer, application of computer.
2. Hardware and Software concept – Storage devices, system software, multi programming operating system, multi tasking operating system.
3. Computer viruses: Computer viruses, working of viruses, network viruses, antivirus, common antivirus software.
4. Data Processing – Types of data, types of data processing, step in data processing, application of data processing.
5. Basic knowledge on Google and google drive, Pubmed, Wikipedia, E-mail, Research gate, LinkedIn, OrcID .

**C14P: Health Statistics and Computer -2 (Practical) Credits 02**

1. Graphical presentation of data.
2. Computation of Mean, Median, Mode, SD & SE.
3. Significance of testing by 't' test with interpretation – Paired observation, standard/population mean.
4. Tabular form of data presentation in computer.
5. Use of Microsoft Word and Excel with specific problem.
6. Open an email ID.

### **Discipline Specific Electives (DSE)**

#### **DSE-3: Dietetics and Counselling [Total Credits: 6 (Theory-4, Practical-2)]**

##### **DSE3T: Dietetics and Counselling**

**Credits 04**

##### **Course Contents:**

1. Introduction to psychology – Definition, Nature and Scope.
2. Attention and perception – Types of attention and factors influencing attention, principles of perceptual organization and abnormalities in perception.
3. Learning and memory- Types of learning, Types of memory, Forgetting and its causes.
4. Motivation and emotion- Types of motives, types of emotions, emotional expression.
5. Personality- nature and definition , factors influencing personality, Psycho analytic theory of personality.
6. 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.
7. 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.

##### **DSE 3 P: Dietetics and Counselling (Practical) Credits 02Practical**

1. Computer application for collection of data of different diseases. Submitting computed data.
2. Preparations of teaching aids in the field of nutrition.
3. Understanding the use of conventional and non-conventional methods of counseling
  - i. Face to face counseling.
  - ii. Use of software for counseling e.g Dietcal.
  - iii. Use of any oneDiet App for counseling and assessing food intake.
4. Planning Nutrition counseling sessions and identifying ways to adhere to dietary changes forthe following conditions:  
Lactation counseling, SAM. Eating disorders. Overweight / Obesity in School children, adolescentand adults. Metabolic syndrome. Diabetes- Gestational Diabetes. Renal disease, Liver disorders.
5. Organizing health camps and patient feedback – both at hospital level and community level.
6. Project planning for any one disease.

**or**

##### **DSE-3: Entrepreneurship and small catering units Credits 06DSE3T: Entrepreneurship and small catering units Credits 04Course Contents:**

1. **Entrepreneurship development-** Entrepreneurship - concept, definition, need and significance of entrepreneurship development in India, entrepreneurship growth process, barriers, entrepreneurship education model.
2. Entrepreneur- their characteristics, types, gender issues, role demands and challenges. Entrepreneurial motivation. Challenges faced by Women Entrepreneurs.



3. **Enterprise Planning and Launching**-Types of enterprises classification based on capital, product, location, ownership pattern and process. Sensing business opportunities and assessing market potential; market research. Appraising of project and feasibility. Role of MSMEs, Role of banks and other financing institutions in enterprise building. E-commerce (online marketing).
4. **Personnel management**-Functions of a personnel manager, Factors to consider while planning the kind and number of personnel: Menu, type of operations, Type of service, Job description and job specification.
5. **Food service units**- Origin of Food Service units. Kinds of food service units.
6. **Food Production Process**- Food purchase and receiving, Storage. Quantity food production: Standardization of recipes, Recipe adjustments and portion control, Quantity food production techniques. Food service. Food hygiene and sanitation.
7. **Space and Equipment**: Types of kitchen areas, Flow of work and work area relationship. Equipment a) Factors affecting selection of equipment, b) Equipment needs for different situations
8. **Planning of a small food service unit**-Survey of types of units, identifying clientele, menu, operations and delivery.

**DSE 3P: Entrepreneurship and small catering units (Practical) Credits 02 Practical**

1. SWOT analysis with respect to entrepreneurial competencies through case profiling of successful entrepreneurs and enterprises.
2. Achievement Motivation lab-development of entrepreneurial competencies.
3. Survey of an institution facilitating entrepreneurship development in India.
4. Preparation of business plan.
5. Market survey for food items both raw and processed. Survey of food service units.
6. Planning menus for the following:
  - a. Packed meals for office employees.
  - b. Nutritious Tiffin for school children.
  - c. School/college canteens.
7. Develop a checklist for good hygiene practices.

**Or**

**DSE-3: Bakery and Mushroom Products Credits 06**

**DSE3T: Bakery and Mushroom Products Credits 04**

**Course Contents:**

1. Bakery industry: Current status, growth rate, and economic importance of Bakery Industry in India. Product types, nutritional quality and safety of products, pertinent standards & regulations.
2. Bread, Buns and Pizza base - Ingredients & processes for breads, buns, pizza base, Equipments used, product quality characteristics, faults and corrective measures
3. Cakes - Ingredients & processes for cakes, Equipments used, product quality characteristics, faults and corrective measures. Different types of icings.
4. Biscuits, Cookies & Crackers - Ingredients & processes, Equipments used, product quality characteristics, faults and corrective measures.
5. Modified Bakery Products - Modification of bakery products for people with special nutritional requirements e.g. high fibre, low sugar, low fat, and gluten free bakery products.
6. Breakfast Cereals, Macaroni Products and Malt - Production and quality of breakfast

cereals, macaroni products and malt.

- 7. Mushroom Products:** **a.** Definition and characteristics of mushroom. **b.** Morphology and life cycle of Mushroom. **c.** Identification and classification of mushroom **d.** Nutritional and medicinal value of edible mushrooms; poisonous mushrooms. **e.** Types of edible mushrooms available in India- *Volvariella volvacea*, *Pleurotus citrinopileatus*, *Agaricus bisporus*. **f.** Process of mushroom cultivation. **g.** Storage and nutrition: short term storage (Refrigeration- upto 24 hours), long term storage (canning, pickles, papads), drying, storage in salt solutions.

**DSE3P: Bakery and Mushroom Products (Practical) Credits 02** **List of Practical:**

1. Preparation of pizza base and assessment of its quality
2. Preparation of bread and assessment of its quality
3. Preparation of buns and assessment of quality
4. Preparation of butter cake and assessment of its quality.
5. Preparation of sponge cake with icing and assessment of its quality.
6. Preparation of cookies and assessment of quality.
7. Preparation of biscuits and assessment of quality.
8. Visit to Mushroom Culture Centres/ Farms for:  
Process involved in mushroom cultivation Types and varieties of mushroom. Visual Identification of edible and poisonous mushroom Marketing.
9. Different Food preparation from mushroom.

#### **DSE-4: Sea food and Dairy Products Credits 06**

#### **DSE4T: Sea food and Dairy Products Credits 04**

##### **Course Contents:**

1. Chilling and Freezing of fish. Relationship between chilling and storage life, MAP, general aspects of freezing, freezing systems (air blast freezing, plate or contact freezing spray or immersion freezing, freezing on board, onshore processing, changes in quality in chilled and frozen storage, thawing).
2. Fish Curing and Smoking - Drying and salting of fish, water activity and shelf-life, salting process, salting methods (brining, pickling, kench curing, gaspe curing), types of salts, dried and salted fish products- pindang, fishwood, dried shrimp. Preservation by smoking, smoke production, smoke components, quality, safety and nutritive value of smoked fish, processing and equipment, pre-smoking processes, smoking process control. Traditional chimney kiln, modern mechanical fish smoking kiln, examples of smoked and dried products.
3. **Canning of fish:** Principles of canning, classification based on pH groupings, effect of heat processing on fish, storage of canned fish, pre-process operations, post process operations, cannery operations for specific canned products.(Tuna,Mackerel,Sardine).
4. **Fishery by-products - Surimi-** Introduction, fish muscle proteins, the surimi process, traditional and modern surimi production lines, quality of surimi products, comparison of surimi and fish mince products. Fish protein concentrates (FPC), fish protein extracts (FPE), fish protein hydrolysis (FPH)
5. **Fermented fish-** Flowchart of Indigenous products- Fish sauce and Paste
6. **Concept of other Sea foods -** Crabs, lobsters, prawns, shrimps, shell- fish.
7. **Physical properties of milk :** Color, taste, pH and buffering capacity, refractive index, viscosity, surface tension, freezing, boiling point, specific heat, OR, electrical conductivity.
8. **Lactose -** Lactose (alpha and beta forms and their differences) Significances of lactose in dairy industry.
9. **Milk fat:** 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 autooxidation, prevention, measurement of auto-oxidation.
- 10 **Protein and Enzymes -** 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.
11. **Market milk industry and milk products:** 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. Flow diagram of following milk products - Butter, ghee, flavored milk, yoghurt, dahi, shrikhand, ice- cream, condensed milk, milk powder, channa, paneer, cheese (cheddar).

#### **DSE4P: Sea food and Dairy Technology (Practical) Credits 02List of Practical:**

1. Perform platform tests in milk.(Acidity, COB, MBRT, specific gravity, SNF)
2. Estimate milk protein by Folin method.
3. Estimate milk fat by Gerber method.
4. Preparation of flavoured milk. Pasteurization of milk.
5. Prepare casein and calculate its yield.
6. Quality evaluation of fish/prawn.
7. Subjective evaluation of Fresh Fish.

8. Cut out examination of canned fish.(Sardine, Mackerel, Tuna)
9. Fish product formulation/canning.or

Or

#### **DSE-4: Food packaging Credits 06**

#### **DSE4T: Food packaging Credits 04**

##### **Course Contents:**

1. Introduction to Food Packaging -Packaging Functions and Requirements,, Printing of packages. Barcodes & other marking, Labeling Laws
2. Food Packaging Materials -Paper and paper-based materials, corrugated fiber board (CFB). Plastics, formation- Injection molding, Blow molding, Types of plastics, Lamination, Biodegradable plastics, Edible packaging and Bio-composites. Environmental Concerns recycling and disposal of plastic waste Metal packaging- Metals: Tinfoil, tinning process, components of tinfoil, tin free can (TFC) types of can, metallic films, lacquers Glass: Composition, Properties, Methods of bottle making, Types of closures.
3. Package Designing for Foods - Package design for fresh horticultural produce and animal foods, dry and moisture sensitive foods, frozen foods, fats and oils, thermally processed foods and beverages.
4. Testing and Regulatory Aspects of Food Packaging- Testing Procedures for Packaging Materials- thickness, tensile strength, puncture resistance, bursting strength, seal strength, water vapor permeability, CO permeability, oxygen permeability, grease resistance, Testing Procedures for Packaged Foods - Compatibility and shelf life studies, evaluation of transport worthiness of filled packages. Food Packaging Laws and Regulations.
5. Packaging Machinery and Systems - Bottling machines, Cartoning systems, Seal and Shrink packaging machine; Form, Fill and Sealing machine (FFS). Vacuum, Controlled and Modified atmosphere packaging systems; Aseptic packaging systems; Retort packaging, Active and Intelligent packaging systems

#### **DSE4P: Food Packaging (Practical) Credits 02**

##### **List of Practical:**

1. Testing of physical/mechanical properties of food packaging material.
2. Testing of thermal shock resistance of glass.
3. Gas/Vacuum packaging of foods and shelf life studies.
5. Edible packaging of Food Samples.
6. Packaged food cut-out analysis.

##### **Demonstration:**

1. Study of Sorption Isotherm for Food Package Design (**Demonstration**).
2. Determination of Water Vapor Transmission rate of Packaging Material (**Demonstration**).
3. Study the operation of FFS machine (**Demonstration**).

Or

#### **DSE4T: Nutrition communication for Health promotion Credits 06**

#### **DSE4T: Nutrition communication for Health promotion Credits 04**

##### **Course Contents:**

1. **Dietary guidelines for nutrition and health related concerns**-National and international guidelines and their role in nutrition promotion. Critical appraisal of the current guidelines.

2. **Nutrition and behaviour inter-relationship** -Food and health behaviour, models/theories of health behaviour, food choices, strategies for intervention at the ecological and individual level.
3. **Social and Behaviour Change Communication for nutrition and health promotion-**
  - a. Concept and objectives of communication for behaviour change
  - b. Planning of communication strategies for social and behaviour change programme,
  - c. Communication needs analysis, stakeholders in nutrition promotion, developing nutrition education plan, identifying communication strategies/ approaches for nutrition and health promotion (e.g. social marketing), designing nutrition and health messages, selecting communication channels, developing and field testing of communication materials, designing training strategies for trainers and their capacity building.
  - d. Implementing social and behaviour change communication intervention: an overview
  - e. Evaluation of social and behaviour change communication programmes.
4. **Ethics in nutrition and health communication-**
  - a. Significance of ethics in nutrition and health communication.
  - b. Ethical Principles and concerns

**DSE4P: Nutrition communication for Health promotion (Practical) Credits 02**

1. Planning of communication strategies for public health nutrition problems among vulnerable groups in the community -field testing of messages, materials and methods.
2. Review of communication strategies being used in any one public health nutrition programme in the community.