After successful completion of this program, graduates of Food Nutrition and Dietetics will have the following attributes:

1. Scientific Knowledge: Apply the knowledge of food science, chemistry, nutrition, physiology and dietetics in a competent manner to innovate in the field of nutrition and dietetics.
2. Design and Development of Solutions: Design nutrition and dietetics strategies as per the specified requirements of regulatory bodies related to food, health, environment, hospitals, families and communities.
3. Problem Analysis: Identify, formulate, rationalise, and analyse nutrition-related problems in the community and hospitals so as to reach substantiated diet-based conclusions using the principles of food nutrition and dietetics.
4. Modern Tool usage: Create, select, and apply modern nutrition and dietetics tools, techniques, and resources of relevance in nutrition and dietetics.
5. Environment and Sustainability: Evolve nutrition and dietetics approaches in the context of food security and environmentally sustainable development goals.
6. Teamwork: Function objectively as an individual and as a member in diverse teams.
7. Communication: Effectively document and communicate nutrition and dietetics approaches and plans with individuals, patients and communities.
8. Lifelong learning: Independently engage in continuous learning to adapt to newer concepts in nutrition and dietetics.

Program Specific Outcomes (PSOs):

After successful completion of this program, graduates of Food Nutrition and Dietetics will have the following specific attributes:

- Utilize the knowledge from the physical and biological sciences as a basis for understanding the role of food and nutrients in health and disease processes
- Evaluate the food product and the application of necessary preservation techniques to increase the shelf life of the product and also be a part in the auditing industry
- Work in Research laboratories on the fortification and enrichment of existing product as well as the development of new product
- Apply the nutrition and dietetics-based knowledge and skills in the planning and assessment of suitable diets for individuals of every age, patients and the community in a sustainable manner.
- Provide nutrition counselling and education to individuals, groups, and communities throughout the lifespan using a variety of communication strategies
- Apply technical skills, knowledge of health behaviour, clinical judgment, and decision-making skills when assessing and evaluating the nutritional status of individuals and communities and their response to nutrition intervention.
- Implement strategies for food access, procurement, preparation, and security for individuals, families, and communities.
- Apply food science knowledge to describe functional properties of food ingredients.
- Apply the knowledge of principles and techniques of nutrition and dietetics for research-based approaches.
- Apply skills gained in nutrition and dietetics for research, development, and entrepreneurship.

Scheme and Syllabus for B.Sc. (Food, Nutrition and Dietetics) 2024-25 onwards

Course/Paper Titles	Instructions Hours/Week	Duration of exam (Hours)	Marks			Credits
			IA	Exam	Total	
SEMESTER I						
Human Nutrition – I	4	3	20	80	100	3
Human Physiology – I	4	3	20	80	100	3
Food Science – I	4	3	20	80	100	3
Human Nutrition – I Practical	4	3	10	40	50	2
Human Physiology – I Practical	4	3	10	40	50	2
Food Science – I Practical	4	3	10	40	50	2
	24				450	15
SEMESTER II						
Human Nutrition – II	4	3	20	80	100	3
Human Physiology – II	4	3	20	80	100	3
Food Science – II	4	3	20	80	100	3
Human Nutrition – II Practical	4	3	10	40	50	2
Human Physiology – II Practical	4	3	10	40	50	2
Food Science – II Practical	4	3	10	40	50	2
	24				450	15
SEMESTER III						
Life Span Nutrition – I	4	3	20	80	100	3
Dietetics – I	4	3	20	80	100	3
Food Microbiology	4	3	20	80	100	3
Life Span Nutrition – I Practical	4	3	10	40	50	2
Dietetics – I Practical	4	3	10	40	50	2
Food Microbiology Practical	4	3	10	40	50	2
Domain Elective/Optional						
Nutritional Assessment and Surveillance/Food Sanitation and Hygiene	2	3	10	40	50	2
	26				500	17
SEMESTER IV						
Life Span Nutrition – II	4	3	20	80	100	3
Dietetics – II	4	3	20	80	100	3
Quality Control	4	3	20	80	100	3
Life Span Nutrition – II Practical	4	3	10	40	50	2
Dietetics – II Practical	4	3	10	40	50	2
Quality Control Practical	4	3	10	40	50	2
Domain Elective/Optional						

Food Technology/ Diet in Lifestyle Disorder	2	3	10	40	50	2
Skill Based Paper Research and development of new product	2	3	10	40	50	2
	28				550	19

SYLLABUS for B.Sc.- Food Nutrition and Dietetics -2024-25
SEMESTER I
HUMAN NUTRITION - I

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Comprehend nutritional classification of food and methods of assessing nutritional status and energy requirements
CO 2. Understand the functions and sources of nutrients
CO 3. Apply the knowledge of human nutrition in maintenance of good health for the individual and the community
CO 4. Assess the factors affecting availability and requirements of nutrients

Unit–1 **15 Hrs.**

Nutritional Status: Definitions of the terms – Nutrition, Health, Nutrients, Nutritional status, Malnutrition: Definition, types, causes, symptoms, interventions. Methods of assessing nutritional status –Direct and Indirect methods.

Unit–2 **15 Hrs.**

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

Carbohydrates: Classification, functions, digestion, absorption, glycaemic index, sources and requirements.

Unit–3 **15 Hrs.**

Proteins: Composition, Classification, functions, digestion, absorption, sources and requirements Nutritional classification of amino acids, evaluation of protein quality, Factors affecting bio-availability supplementation and deficiency state.
Lipids / Fats: Classification, chemical composition, functions, digestion, absorption, sources and requirements. Nutritional significance and effects of deficiency of saturated and unsaturated fatty acids.

References

- WTO Technical Reports Series for Different Nutrients.
- Roday S. (2018), Food Science and Nutrition, Oxford University Press
- Srilakshmi B (2015) Nutrition science - 4th Ed., New age international Publ., New Delhi
- Agarwal A, Udipi SA (2014) Text book of human nutrition, Jaypee Bros. Medical Publ., New Delhi.
- Raheena Begum., (2009), A Text book of Food, Nutrition & Dietetics, Sterling Publications, New Delhi.

- Srilakshmi. B., (2009), Human Nutrition, New Age International Publishers.

- Mudambi S R and Rajagopal M V., (2008), Fundamentals of Food, Nutrition and Diet Therapy by New Age International Publishers, New Delhi
- Shills ME, Shike M, Ross AC, Caballero B, Cousins RJ (2005) Modern Nutrition in health and disease – 10th Ed., Lippincott Williams and Wilkins
- Bamji M, Rao NP, Reddy V (1996) Text book of Human Nutrition, Oxford and IBH Publ. Co. Pvt Ltd, New Delhi
- Gopalan C (1991) Nutrition value of Indian foods, ICMR
- Guthrie AH (1986) Introductory Nutrition, 6th Ed., The CV Mosby Company
- Robinson CH, Lawler MR, Chenoweth WL, Garwick AE (1986) Normal and therapeutic nutrition, 17th Ed., Macmillan Publ. Co.
- Swaminathan M (1985) Essentials of food and nutrition, Vol I and II, Ganesh and Co, Madras.

HUMAN NUTRITION - I (PRACTICAL)

1. Qualitative analysis of glucose
2. Qualitative analysis of protein
3. Estimation of total lipid in egg yolk
4. Demonstration of lipid extraction using soxhlet method
5. Demonstration of protein using kjeldahl's method

HUMAN PHYSIOLOGY – I

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Understand the homoeostatic status of the human body
CO 2. Comprehend the physiological processes and functions of various vital organs as applicable to human nutrition
CO 3. Apply the knowledge of physiological states to therapeutic diets
CO 4. Assess malfunctioning of vital organs or systems

Unit-1 **15 Hrs.**

Introduction: Cell – structure and function of organelles, nucleus, chromosomes, genes, homoeostasis and body fluids. Blood: Red blood cells – Erythropoiesis, function, counts. Hemoglobin – structure, function, concentration. White blood cells– function, lifespan, counts, differential counts. Platelets normal count, functions. Plasma proteins – concentration, types, albumin, globulin, fibrinogen. Hemostasis– definition, normal hemostasis, clotting factors, mechanism of clotting, disorders of clotting factors. Blood groups– ABO system, Blood grouping and typing, cross matching. Rh system– Rh factor, Rh in compatibility. Anticoagulants – examples and uses. Blood indices – color index, MCH, MCV, MCHC. Erythrocyte sedimentation rate (ESR) and packed cell volume. Blood volume – normal value, determination of blood volume and regulation of blood volume.

Unit-2 **15 Hrs.**

Cardiovascular system: Heart – structure, functions, cardiac cycle – systole, diastole, conduction system. Blood pressure – Definition, normal value, clinical measurement of blood pressure. Physiological variations, regulation of heart rate, cardiac shock, hypotension, hypertension.
Respiratory System: Function of respiratory system - anatomy of respiratory system. Lung volume and capacities. Transportation of respiratory gases: Transportation of O_2 and CO_2: direction, pressure gradient, forms of transportation, oxygenation of hemoglobin, quantity of O_2 and CO_2 transported. Medical conditions and disorders: Hypoxia, cyanosis, asphyxia, dyspnoea, dysbarism, apnoea, artificial respiration.

Unit-3 **15 Hrs.**

Digestive System: Physiological anatomy of gastro-intestinal tract, functions of digestive system. Salivary glands –structure and functions, deglutition, mastication – stages and regulation of saliva, functions of saliva. Stomach–structure and functions. Gastric secretion–composition, function, regulation of gastric juice secretion. Pancreas – structure, function, composition and regulation of pancreatic juice. Gall bladder – functions. Intestine – small intestine and large intestine: functions, digestion, absorption. Defecation.

References

- Jain NA (2022) CC Chatterjee's Human Physiology, 24th Ed., CBS Publishers, New Delhi
- Stuart IF, Rompolski K. (2018) Human Physiology, 15th Ed., McGraw Hill
- Marieb E, Hoehn K. (2018) Human Anatomy and Physiology, Pearson
- Chatterjee CC (2016), Human Physiology Volume I, Medical Allied Agency, Kolkata
- Jain A K (2012) Text Book of Physiology volume 1 and Vol.2, APC publications New Delhi
- Sembulingam K, Sembulingam P (2012) Essentials of medical physiology, Jaypee Bros. Medical Publ., New Delhi
- Chatterjee CC (1988) Human Physiology, Calcutta, WB
- Guyton AC, Hall JE (1996): Textbook of Medical Physiology, 9th Ed., Prism Books Pvt Ltd., Bangalore
- Wilson (1989) Anatomy and Physiology in Health and Illness, Edinburgh Churchill Livingstone.

HUMAN PHYSIOLOGY - I (PRACTICAL)

1. Instruments used in hematology
2. Blood grouping by agglutination method
3. Record of blood pressure – Sphygmomanometer, palpatory method, auscultatory method, variation of BP

4. Determination of Bleeding Time (BT) by Duke's method

5. Determination of Coagulation Time (CT) by Wright's method
6. Enumeration of RBC and WBC count by hemocytometry/Neubauer's counting chamber.

FOOD SCIENCE – I

Course Outcomes: After the successful completion of the course, the student will be able to:

CO 1. Understand factors to be considered during selection of basic commodities, raw and processed and various aspects of their products and distribution

CO 2. Comprehend the principles underlying changes in overall quality of food characteristics during cooking.

CO 3. Evaluate food products based on their quality characteristics

CO 4. Assess methods and media of cooking, nutritive value and processing, storage, preservation of both plant and animal-based food

Unit -1 **10 Hrs.**

Introduction to food science. Definition of food science. Food as a source of nutrients. Food groups: ICMR Five Food Group System. Eleven Food Group System. Nutritional Classification of foods. Methods of cooking Moist heat methods – Water/steam as a medium of cooking Boiling, simmering, poaching, stewing, steaming and pressure cooking – definition, advantages and disadvantages of each method. Dry heat method. Air as medium of cooking - grilling, roasting and baking Fat as medium of cooking – stir frying, sautéing, shallow and deep fat frying. Definition, advantages and disadvantages of each method. Combination of cooking method – braising. Microwave cooking – mechanism of microwave cooking, construction of a microwave oven advantages and disadvantages.

Unit-2 **15 Hrs.**

Cereals and pulses: cereals: Composition and nutritive value, types of cereal grain. Wheat and rice: Structure, production and storage; processing of cereal grains (rice and wheat); milling, soaking, germination, fermentation, parching, extrusion. Parboiling – processes for parboiling, its advantages and disadvantages. Cereal protein gluten – process of gluten formation, factors affecting gluten formation.

Characteristics of cereal starch – Amylose and Amylopectin. Gelatinization of starch – process of gelatinization, gelatinization temperature, factors affecting gelatinization. Changes in cooked starches – gel formation, retro gradation, syneresis. Modified starch.

Pulses: Nutritive value composition and types, Processing of pulses – milling, soaking, germination, fermentation, parching and puffing, extrusion. Toxic constituents of pulses. Pulse cookery – effect of cooking, factors that affect cooking quality.

Unit-3 **10 Hrs.**

Nuts, oil seeds, spices and condiments:

Composition, nutritive value of specific nuts and oilseeds – groundnuts, coconut, sunflower and soyabean. Animal fats – lard, margarine and butter Processing of fats and oils – rendering,

pressing, solvent extraction hydrogenation and refining. Changes during cooking – effect of

heating, changes in fat on heating. Storage spoilage, rancidity, toxicity, fat substitutes. Role of fats and oils in cookery

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

Unit-4 **10 Hrs.**

Fruits and vegetables:

Fruits: Classification, composition and and nutritive value. Pigments. Ripening of fruits, pectic substances. Enzymatic and non-enzymatic browning and its prevention, post-harvest changes and storage.

Vegetables: Classification, nutritive value and composition. Pigments. Vegetable cookery. Changes during cooking. Loss of nutrients during cooking. Enzymes and non-enzymatic browning its prevention. Post- harvest losses and storage of vegetables.

References

- Penten R, Vieira E. (2022) Elementary food science, Springer.
- Srilakshmi B. (2020) Food Science, New Age International Publishers.
- Sharma A. (2017) Food Science and Technology, CBS Publishers and Distributors
- Ward DJ. (2013) Principles of food science, Goodheart-Wilcox.
- Manay NS, Shadaksharaswamy M (2010) Foods - Facts and principles, New Age International Publ., NewDelhi
- Roseville LJ, Viera ER (1992) Elementary food science, 3rd Ed., Chapman and Hall, New York
- Potter NN, Hotchkiss JH (1988) Food Science, 5th Ed, CBS Publisher and Distributors, Delhi
- Levies (1988) Food commodities, Heinemann Ltd., London
- Charley H (1982) Food Science, 2nd Ed., John Wiley and Sons.
- Dowell P, Bailey A (1980) The Book of ingredients, Dorling Kindersley Ltd., London
- Hughes and Benniion M (1970) Introductory Foods, Macmillan and Co, New York.

FOOD SCIENCE – I (PRACTICAL)

1. Food groups – ICMR five and eleven food group system, food pyramid
2. Methods of cooking – moist and dry heat methods
3. Physical characteristics of cereal grains
4. a) Water absorption capacity of wheat flour
   b) determination of gluten content of wheat flour
5. Gelatinization of starches in cereals
6. Effect of germination in pulses and legumes
7. Browning of fruits and vegetables
8. Smoking point of fats and oils
9. Adulteration of spices and condiments

Second Semester

FOOD SCIENCE - II

Course Outcomes: After the successful completion of the course, the student will be able to:
CO 1. Understand methods used in processing of milk and milk products
CO 2. Assess the nutritional qualities of egg and changes in characteristics during cooking. CO 3. Evaluate composition of meat, processing and storage
CO 4. Enumerate the nutritive value of eggs, fish and the use of major spices in processing

Unit-1 **15 Hrs.**

Milk and milk products: Composition and nutritive value. Physical properties of milk. Effect of heat on mil constituents – nutrients, color, flavor, digestibility, microorganisms, scum formation, scorching of mil Processing of milk – clarification, pasteurization and homogenization. Processing of cheese, butter, curd and Ice cream. Problems encountered in cooking milk. Milk products – Vitamin D milk, skim milk concentrated milk and cream.

Unit-2 **15 Hrs.**

Egg: Structure, composition, nutritive value, Pigments. Vegetarian egg. Egg quality – evaluation of egg quality, egg grading, candling and deterioration of egg quality. Functional properties of egg emulsification, foaming, coagulation, binding, thickening. Egg cookery – Effects of heat and coagulation of egg proteins, microorganisms, effect of ingredients on egg protein. Egg prepared in the shell – boiled eggs hard and soft. Egg prepared out of the shell – poached egg, fried egg, scrambled egg and omelet Product based on egg – custard, meringues, mayonnaise. Preservation and storage– freezing, cold storage, drying.

Unit-3 **15 Hrs.**

Meat: Classes of meat, Cuts and grades of meat and their selection. Structure, composition and nutritive value of meat. Post mortem changes. Functional properties of meat –water holding capacity, texture and binding, flavor development, color stability. Storage and changes during cooking. Ageing of meat and curing of meat. Factors affecting tenderness of meat. Meat cookery and changes during cooking, methods of cooking – dry heat and moist heat.
Poultry and fish: Classification, composition, nutritive value. Selection, Processing, preservation and storage. Methods of cooking poultry and fish. Spoilage of fish.

References

- Manay NS, Shadaksharaswamy M (2010) Foods - Facts and principles, New Age International Publ., New Delhi
- Roseville LJ, viera ER (1992) Elementary food science, 3rd Ed., Chapman and Hall, New York
- Potter NN, Hotchkiss JH (1988) Food Science, 5th Ed., CBS Publisher and Distributors, Delhi

- Charley H. (1982) Food Science, 2nd Ed., John Wiley and Sons.

- Levies (1988) Food commodities, Heinemann Ltd., London
- Hughes and Benniion M (1970) Introductory Foods, Macmillan and Co, New York
- Dowell P, Bailey A (1980) The Book of ingredients, Dorling Kindersley Ltd., London.

FOOD SCIENCE - II (PRACTICAL)

1. Platform test for milk – COB, alcohol, resazurin
2. Determination of titrable acidity of milk
3. Adulteration of milk and milk products
4. Milk cookery
5. Quality evaluation of egg
6. Experimental cookery of egg – boiled egg, poached egg, omelet and custard.
7. Physical evaluation of fish

HUMAN NUTRITION – II

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Understand the functions and sources of nutrients
CO 2. Apply the knowledge in maintenance of good health for individual and the community.
CO 3. Evaluate factors affecting availability and requirements of minerals and vitamins
CO 4. Assess the role of water and fiber in nutrition.

Unit-1 **15 Hrs.**

Macro minerals: Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chlorine and Sulphur-functions sources, requirements and effects of deficiency, Bioavailability.

Unit-2 **15 Hrs.**

Micro minerals: Copper, Cobalt, Zinc, Iodine, Manganese, Fluorine, Molybdenum, Selenium, Chromium Iron-functions, sources, requirements and effects of deficiency, Bioavailability.

Unit-3 **15 Hrs.**

Vitamins: Classification on the basis of solubility, Vitamin A, D, E, K, Ascorbic acid, Thiamine, Riboflavin Niaci Folic acid, Vitamin B12, Pantothenic acid, Pyridoxine-functions, sources, absorption, requirements an deficiency.
Water: Importance, distribution in the body, functions, edema, dehydration, sources, water balance and Requirements. Fiber: Definition, classification, sources and role of fiber in human nutrition.

References

- WTO Technical Reports Series for Different Nutrients.
- Srilakshmi B (2015) Nutrition science - 4th Ed., New Age International Publ., New Delhi
- Agarwal A, Udipi SA (2014) Text book of human nutrition, Jaypee Bros Medical Publ., New Delhi
- Bamji M, Rao NP, Reddy V. (2007) Text book of Human Nutrition, Oxford and IBH Publ. Co. Pvt Ltd, New Delhi
- Shills ME, Shike M, Ross AC, Caballero B, Cousins RJ (2005) Modern Nutrition in health and disease – 10th Ed., Lippincott Williams and Wilkins
- Gopalan C (1991) Nutrition value of Indian foods, ICMR
- Guthrie AH (1986): Introductory Nutrition, 6th Ed., the CV Mosby Co.
- Robinson CH, Lawler MR, Chenoweth WL, Garwick AE (1986) Normal and therapeutic nutrition,17th Ed., Macmillan Publ. Co.
- Swaminathan M (1985) Essentials of food and nutrition, Vol I and II, Ganesh and Co, Madras.

HUMAN NUTRITION - II (PRACTICAL)

1. Qualitative test for minerals
2. Determination of ash contents in fruits and vegetable sample
3. Determination of moisture content in food sample
4. Estimation of calcium
5. Estimation of phosphorous
6. Estimation of iron

HUMAN PHYSIOLOGY – II

Course Outcomes: After the successful completion of the course, the student will be able to:

CO 1. Understand the role played by hormones in metabolism and associated disorders.
CO 2. Comprehend the structure and function of neuromuscular systems and disorders
CO 3. Understand excretory physiology and its importance in nutrient retention
CO 4. Differentiate between male and female reproductive physiology and changes due to pregnancy and lactation

Unit-1 **15 Hrs.**

Endocrine System: Definition, classification of endocrine glands and their hormones, properties of hormones. Thyroid gland hormones, Parathyroid gland, Adrenal gland, Pituitary gland hormones – types, functions, structures, secretions, actions and regulations. Insulin – secretion, regulation, function and action. Diabetes mellitus – regulation of blood glucose level. Calcitonin – function, action, Ca metabolism and hormone regulating Ca metabolism.

Reproductive system and puberty. Male reproductive system – structure, functions, spermatogenesis. Androgens - Testosterone- structure and functions. Female reproductive

system-ovulation, menstrual cycle, Physiological changes during pregnancy, pregnancy test. Lactation: Composition of milk factors controlling lactation. Contraception.

Unit-2 **15 Hrs.**

Nervous system: Structure, Functions of nervous system, classification and properties, neuroglia. Synapse - structure, types, properties, synaptic transmission and reflexes. Autonomic nervous system: concept of sympathetic and parasympathetic nervous system. Cerebrum, Cerebellum, hypothalamus, neuron- anatomy and functions. Basal ganglia-functions, EEG, Parkinson's disease. Cerebra Spinal Fluid (CSF) - formation, circulation, properties and functions. Special senses.

Musculoskeletal physiology: Classification of muscle, structure of skeletal muscle. Neuromuscular junction, transmission across neuromuscular junction, excitation contraction coupling. Mechanism of muscle contraction muscle tone, fatigue. Rigor mortis, isometric and isotonic concentration.

Unit-3 **15 Hrs.**

Excretory system: Excretory organs - Kidney: function, structural and functional unit - nephrons, vasorecta, cortical and juxta medullary nephrons- comparison, juxta glomerular apparatus-structure and function. Renal circulation peculiarities. Mechanism of urine formation – ultrafiltration, criteria for filtration, GFR, plasma fraction, determination of GFR, urine output. Selective re-absorption - sites of re- absorption, substance reabsorbed, mechanisms of re-absorption. Diuretics: water, diuretics, osmotic diuretics, artificial kidney, renal function tests.
Skin – function and structure, regulation of body temperature.

References

- Jain NA (2022) CC Chatterjee's Human Physiology, 24th Ed., CBS Publishers, New Delhi
- Chatterjee CC (2016), Human Physiology Volume I, Medical Allied Agency, Kolkata
- Sembulingam K, Sembulingam P (2012) Essentials of medical physiology, Jaypee Publication
- Guyton AC, Hall JE (1996) Textbook of Medical Physiology, 9th Ed., Prism Books Pvt Ltd.,Bangalore
- Wilson (1989) Anatomy and Physiology in Health and Illness, Edinburgh Churchill Livingstone
- Chatterjee CC (1988) Human Physiology, Calcutta, WB.

HUMAN PHYSIOLOGY – II (PRACTICAL)

1. Histology of cartilage, bone, skin, tissues
2. Histology of epithelial, connective, muscular, nervous
3. Urine analysis – albumin
4. Urine analysis – glucose test

5. Hemoglobin estimation using Sahli's method

Third Semester

LIFE SPAN NUTRITION – I

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Comprehend the concept of a balanced diet
CO 2. Understand the role of nutrition in growth and development processes from birth till adolescence
CO 3. Formulate nutritional needs of people at different stages of growth
CO 4. Formulate diets for various nutrition-related health conditions

Unit–1 **15 Hrs.**

Basic principles of meal planning: Explanation of terms: Health, RDA, Adequate intake, Balanced diet. Food exchange list, food guide pyramid. Vegetarian diets - classification of vegetarianism. Quality of variou nutrients - proteins, fats, minerals, vitamins, fibers and antioxidants. Principles of planning meals. Factors affecting meal planning

Unit–2 **15 Hrs.**

Nutrition during pregnancy: Normal growth and weight gain. Physiological changes. Dietary modifications. General dietary problems. Complications during various stages of pregnancy. Nutritional requirements.
Diet planning Nutritional needs during lactation: Physiology of lactation. Milk output and factors affecting it. Dietary guidelines. Nutritional requirements. Diet planning

Unit–3 **15 Hrs.**

Nutrition during infancy: Growth and development, use of growth chart to monitor development. Advantages of breast feeding. Nutrition factors of human milk. Difference between human and animal milk, artificial feeding. Factors to be considered in bottle feeding. Feeding problems.
Nutritional requirements. Weaning: Need and use. Points to be considered in introducing weaning foods. Problems in Weaning. Types of supplementary foods.

References

- Elizabeth, K. E. (2022). Nutrition and child development,6th Ed., Paras Medical Publisher, Hyderabad.
- Joshi AS. (2021). Nutrition and Dietetics, 5th Ed. McGraw Hill, Noida
- Srilashmi B. (2019). Dietetics, 8th Ed., New Age International Publishers., New Delhi
- Mudambi SR, Rajgopal MV. (2020). Fundamentals Of Foods, Nutrition And Diet Therapy, 6th Ed., New Age International Publishers., New Delhi.
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- Mahan K L, Escott-Stump S (2012) Krause's Food and the Nutrition Care Process, 13th Ed., Elsevier, Missouri
- Mclaren DS, Meguid MM (1998) Nutrition and its disorders, Churchill Livingstone
- Gopalan C (1993) Recent trends in nutrition, 9th Ed., Oxford Univ. Press
- Ghosh (1992) The feeding and care of infants and young children, VHAI, 6th Ed., New Delhi
- Swaminathan M (1985) Essentials of food and nutrition, Vol I and II, Ganesh and Co, Madras
- WHO (1978) A growth chart for international use in maternal and child health care, Geneva.

LIFE SPAN NUTRITION - I (PRACTICAL)

Planning, preparing and calculating the major nutrients of the following (Two planned diets with different age groups)

1. Pregnancy
2. Lactation
3. Nutritive Recipes for weaning
4. Diet planning for Infancy- 6-8 months and 9-12 months
5. Use and interpretation of Growth Charts- WHO Growth Charts

DIETETICS – I

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Know the principles of diet therapy
CO 2. Understand the modifications of normal diet for therapeutic purposes
CO 3. Learn the role of a registered dietician
CO 4. Identify the roles of others who collaborate in delivery of food and nutrition Services.

Unit–1 **15 Hrs.**

Definition of dietetics, clinical dietetics, objectives of dietetics, Growth and scope of dietetics, Characteristics and role of dietician in health care, classification of dietitian, characteristics of a dietitian, objectives of diet therapy. Hospital Dietary services- role and functions. Routine hospital diets: Liquid diet, Semi-solid, regular and bland diet. Modification of normal diets. Types of feeding - oral feeding and tube feeding - enteral and parental.

Unit–2 **15 Hrs.**

Diets in obesity and underweight: Obesity - Etiology, assessment, types. Regional distribution of fat in the body. Metabolic changes in obesity. Modification, dietary treatment. Nutritional requirements. Die management – objectives, macronutrients, micronutrients, general considerations, foods allowed/not allowed. Under weight - Aetiology, Symptoms and complications, Dietary management - objectives macronutrients, micronutrients,

general considerations, foods allowed/not allowed.

Unit–3 **15 Hrs.**

Diet in infections and febrile conditions: Fever: Development, types and metabolic changes. Acute and chronic fevers. Causes and dietary management of typhoid, influenza, malaria, tuberculosis. Dietar management of all fevers - objectives, macronutrients, micronutrients, general considerations, food allowed/ not allowed. Chronic infection- HIV (Human Immunodeficiency Virus) infection and AIDS (Acquired Immune Deficiency Syndrome). Stages of HIV infection. Aetiology, diagnosis. Malnutrition and AIDS: Dietary management -objectives, macronutrients, micronutrients, general considerations.

References

- Srilakshmi B (2011) Dietetics, 6th Ed., New Age International Publ., New Delhi
- Joshi SA, (1992) Nutrition and dietetics, Tata McGraw Hill Publications, New Delhi
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- Anderson L, Dibble MV, Turkki PR, Mitchall HS, Rynbergin HJ (1982) Nutrition in health and disease, 17th Ed., JB Lippincott and Co., Philadelphia
- Antia FP (1973) Clinical dietetics and nutrition, 2nd Ed, Oxford Univ. Press, Delhi
- Williams SR (1989) Nutrition and diet therapy, 6th Ed, Time, Mirror, Mosby College Publ.

DIETETICS - I (PRACTICAL)

Planning, preparing and calculating the following diets (Two case studies)

1. Fluid diets
   a. Clear
   b. fluid
   c. Full fluid
   d. Tube feeding

2. Obesity
   a. Childhood obesity/overweight
   b. Adulthood obesity/overweight

3. Underweight.
   a. Childhood
   b. Adulthood

4. Febrile conditions
   a. General fevers
   b. Typhoid
   c. Tuberculosis

FOOD MICROBIOLOGY

Course Outcomes: After the successful completion of the course, the student will be able to:

CO 1. Understand the nature of microorganisms involved in food - spoilage, food infections and intoxication

CO 2. Comprehend the significance of microorganisms and methods used in food industry to sterilize

CO 3. Discuss the relevance of bacteria in food and understand life cycle of viruses

CO 4. Appreciate the importance of yeast and the problem of molds in food.

CO 5. Understand the important pathogens and spoilage microorganisms in foods, and the most likely sources of these organisms.

CO 6. Evaluate water quality based on microbiological content and apply treatment procedures.

CO 7. Apply preventive measures based on an understanding of the factors affecting growth of microorganisms in food

CO 8. Describe food contaminants, food poisoning and food borne infections caused by Microorganisms.

Unit-1 **15 Hrs.**

Definition and history of microbiology - Introduction, historical developments in food microbiology, Contributions of various scientists to the development of microbiology. Instrumentation in microbiology - Construction and working principles of autoclave, hot air oven, pH meter, laminar air flow, incubator, bacterial colony counter, spectrophotometer and membrane filter unit. Sterilization - Physical methods - heat, irradiation, filtration, solarisation, ultrasonic vibration. Chemical methods - alcohol, aldehydes, dyes, halogens, phenols, metallic salts, surface active agents, gases.

Unit-2 **15 Hrs.**

Culture media used in culturing of microorganisms, The common nutrient requirement for bacteria - macro and micronutrients, Isolation of microorganisms- serial dilution, streak plate, pour plate and spread plate methods. Growth curve, Measurement of growth. Factors affecting kinds and numbers of microorganisms in food. Factors affecting the growth of microorganisms in food. Bacteria - classification according to Bergey's manual up to levels of section,
Ultrastructure, reproduction - asexual and sexual methods, importance of bacteria in food.

Unit-3 **15 Hrs.**

Yeast - morphology, reproduction - haplobiontic, diplobiontic and haplodiplobiontic cycle, physiology and nutrition in yeast. Importance of yeast in food. Mold - outlines of classification and reproduction - asexual and sexual modes. Type study of Aspergillus, Penicillium Rhizopus and Mucor. Importance of molds in food. Viruses - structure and classification - plant, animal, bacterial and cyanophycean viruses, life cycle in virus - lytic and lysogenic cycle.General principles underlying spoilage of food; Causes for spoilage. Contamination and kinds of organisms causing spoilage of fruits and vegetables, meat,

poultry, fish, eggs, milk and milk products, fats and oils, bottled beverages, spices and condiments.

References

- Frazier WC, Westoff DC (1998), Food Microbiology 4th Ed., Tata Mc Graw Hill Publ. Co. Ltd.
- Jay J M (1986) Modern Food microbiology, 3rd Ed., Van No Strand Reinhold Co. Inc.
- Pelezer ML, Reid RD (1978) Microbiology, McGraw Hill Book Co., New York
- Brown A, Smith H (2015) Benson's Microbiological applications, McGraw Hill Publ.

FOOD MICROBIOLOGY (PRACTICAL)

1. Study of instruments in microbiology lab
2. Preparation of medias
3. Culturing techniques (serial dilution, spread plate, pour plate, streak plate)
4. Staining techniques – simple staining, gram staining
5. Negative staining
6. Fungal staining
7. Isolation of food spoilage microorganisms

NUTRITIONAL ASSESSMENT AND SURVEILLANCE

Course Outcomes: After the successful completion of the course, the student will be able to:

CO 1. Assess nutritional status using rapid assessment procedures
CO 2. Use anthropometrics and interpret the same
CO 3. Develop nutritional assessment and surveillance protocols in the community, carry out data survey and analysis and develop dietary counselling strategies
CO 4. Perform role of professional dietician

Unit-1 **15 Hrs.**

Nutritional status assessment and surveillance - Meaning, need, objectives and importance. Community, regional, National and International surveillance systems. Rapid assessment procedures - Need, importance, techniques, interpretation and steps in RAP. Sources of secondary health data - sources of relevant vital statistics, importance of infant, child, maternal, Mortality rates, and epidemiology of nutrition related disease.

Unit-2 **15 Hrs.**

Growth chart - Meaning, WHO Chart, and charts used in India, uses, use of growth charts for various age groups. Meaning of reference curve and growth curve. Anthropometry: Need, importance, standards for reference, techniques of measuring height, weight, head circumference, chest circumference, mid-arm circumference, skin fold thickness, waist hip ratio, calculation of BMI, interpretation of the measurements.

Unit-3 **15 Hrs.**

Nutritional assessment - Diet Surveys: need, importance, methods, interpretation, concept of conception unit, intra inter individual distribution in the family, verifying the adequacy of the diet with respect to RDA, concept of family food security. Clinical signs, biochemical and biophysical methods: need, importance, identifying signs of deficiency diseases, interpretation of the clinical signs, biochemical and biophysical values in major diseases. Nutritional care process - Medical History assessment. Assessment of patient needs. Role of Dietitian – Professional code and ethics of a dietitian. Problems in feeding children at the hospitals. Psychology of feeding the patient.

References

- Antia FP (2008) Clinical dietetics and nutrition. Oxford University Press, New Delhi.
- Mahan LK, Escott-Stump S (2000). Krause's Food Nutrition and Diet Therapy 10th Ed., W.B. Saunders Ltd.
- Zeeman, FJ. (1998) Applications of clinical nutrition. Englewood cliffs: Prentice Hall, International Inc.,
- Thomas B (1995) Blackwell Manual of Dietetic practice, 2nd Ed., Oxford: New York
- Robinson (2006) Normal and therapeutic nutrition, Macmillan Pub. Company New York
- Mudambi SR, Rajagopal MV (2015) Fundamental of food, nutrition and diet therapy. New age International Publ., New Delhi,
- Srilakshmi B (2014) Dietetics, New age international Publ., New Delhi.

FOOD SANITATION AND HYGIENE

Course Outcomes: After the successful completion of the course, the student will be able to:
CO 1. To apply knowledge to assess consumers' food preferences and choices
CO 2. To design processes to improve existing products or new products
CO3. To understand the knowledge base for product development
CO 4. To evaluate produced foods based on sensory evaluation of foods

Unit-1 **15 Hrs.**

Personal Hygiene & Importance of Water: General principles of food hygiene. Necessity for personal health and Hygiene (Hands and skin, hair, nose, mouth and ears, cuts, boils etc.), medical checkup. Habits, Importance of Rest, Exercise and Recreation. Protective Clothing. GMP & GLP And Sanitary aspects of building and equipment. Equipment for personal hygiene.

Unit-2 **15 Hrs.**

Sources of water, contamination of water. Importance of water and Purification of Water, potable water. Water quality standards, Criteria for judging water quality. Sanitary aspects of water supply, water sewage treatment.

Unit-3 **15 Hrs.**

Food Contamination, Poisonings: Different Types of contamination - Bacterial, Physical, Chemical Food Poisoning - common types and its symptoms (Salmonella, *Clostridium perfringens*, Botulism, Staphylococcus). Prevention of food poisoning. Cross contamination in food plants. Food Borne Diseases/ Illness - Amoebiasis, Acute diarrhea/dysentery, Typhoid.

References

- Johns N (1991) Managing Food Hygiene, Palgrave Macmillan.
- Sprenger RA (2000) The Food Hygiene Handbook, High Field Publication
- Park K (2015) Park Textbook of preventive & social medicine 24th Ed., Banarsidas Bhanot Publ.
- Bedi YP (1977) A handbook of social and preventive medicine, Anand Publ.
- Roday S (2011) Food Hygiene and Sanitation with case studies, 2nd Ed., TATA
- McGraw Hill Education Pvt. Ltd. New Delhi.

Fourth Semester

LIFE SPAN NUTRITION – II

Course Outcomes (COs): After successful completion of this course, students will be able to:

CO 1. Understand the process of growth and development and the concept of growth promotion

CO 2. Comprehend nutritional needs at different stages of growth.

CO 3. Evaluate nutritional needs during pregnancy and lactation

CO 4. Apply nutritional requirements for the aged taking their physiology into account.

Unit-1 **15 Hrs.**

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

School children - Meal planning for school children. Feeding problems. School lunch programs. Factors affecting feeding programs. Nutritional requirements.

Unit-2 **10 Hrs.**

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

Unit-3 **10 Hrs.**

Nutritional needs of adults: Reference man and reference woman in relation to occupation.

Dietary guidelines to reduce the cost of a meal. Nutritional requirements.

Unit-4 **10 Hrs.**

Nutritional needs during old age: Physiological changes, RDA, Nutritional guidelines, nutritional, health concerns & complications and their management. Dietary modifications. Factors contributing to longevity.

References

- Elizabeth, K. E. (2022). Nutrition and child development,6th Ed., Paras Medical Publisher, Hyderabad.

- Joshi AS. (2021). Nutrition and Dietetics, 5th Ed. McGraw Hill, Noida
- Srilashmi B. (2019). Dietetics, 8th Ed., New Age International Publishers., New Delhi
- Mudambi SR, Rajgopal MV. (2020). Fundamentals Of Foods, Nutrition And Diet Therapy, 6th Ed.,New Age International Publishers., New Delhi
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- Srilakshmi B (2011) Dietetics, 6th Ed., New Age International Publ., New Delhi
- Mclaren DS, Meguid MM (1998) Nutrition and its disorders, Churchill Livingstone
- Gopalan C (1993) Recent trends in nutrition, 9th Ed., Oxford Univ. Press
- Ghosh (1992) The feeding and care of infants and young children, VHAI, 6th Ed., New Delhi
- Swaminathan M (1985) Essentials of food and nutrition, Vol I and II, Ganesh and Co, Madras
- WHO (1978) A growth chart for international use in maternal and child health care, Geneva.

LIFE SPAN NUTRITION - II (PRACTICAL)

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

1. Diet planning for Toddlers- (1-3 years)
2. Diet planning for Preschool Child- (4-6 years)
3. Diet planning for School going Child-(7-9 years and 10-12 years)
4. Nutritive Recipes for snacks and packed lunches
5 Diet planning for Adolescents (13-15 years and 16-18 years)
6 Diet planning for Adult (men and women)
7 Old age

DIETETICS – II

Course Outcomes (COs): After successful completion of this course, students will be able to:
CO 1. Understand the principles of diet therapy for various ailments and diseases
CO 2. Work out the modifications of normal diet for therapeutic purposes
CO 3. Assess food allergies, intolerance and nutrient-drug interactions for appropriate

dietetics approaches

CO 4. Evaluate nutritional requirements for deficiencies and develop suitable dietary Treatments.

Unit-1 **10 Hrs.**

Diet in burns injury and surgery conditions: Burns- definition, classification, complications: Dietary management - objectives, macronutrients, micronutrients, general considerations. Injury/ Trauma- definition. Metabolic, physiological and hormonal response to Injury: Dietary management - objectives, macronutrients, micronutrients, general considerations. Surgery- definition. Metabolic, physiological and hormonal response to surgery: Dietary management - objectives, preoperative and postoperative nutritional care, macronutrients, micronutrients, general considerations

Unit-2 **15 Hrs.**

Gastro-intestinal tract ailments: Diarrhea- definition, classification, consequences. Treatment diarrhea- Fluid management- Oral Rehydration Therapy (ORT). Dietary management - objectives macronutrients, micronutrients, general considerations, low residue and low fiber foods. Definition symptoms, classification, complications and dietary management - objectives, macronutrients micronutrients, general considerations, and foods allowed and not allowed for the following: Constipation Gastro Esophageal Reflux Disease (GERD), Gastritis- acute and chronic, Peptic ulcer, Irritable bowel syndrome, Steatorrhoea, Ulcerative colitis, Diverticulosis.

Unit-3 **10 Hrs.**

Food intolerance: Definition, causative factors, diagnosis, treatment – elimination diet. Lactose intolerance symptoms, causative foods and stages according to severity, foods included and excluded, nutrition treatment. Gluten intolerance – symptoms, dietary treatment, and foods included and excluded, nutritional treatment. Nutrient- drug interaction
Food Allergy: Definition, types of allergy, common food as allergens. Signs and Symptoms, tests for allergy. Dietetic treatment.

Unit-3 **10 Hrs.**

Nutritional deficiency: Protein – energy malnutrition- aetiology, types, symptoms, dietary treatment and prevention, hospital treatment, domiciliary rehabilitation. Aetiology, clinical features, dietary treatment and prevention, prophylaxis programs of the following: Iodine Deficiency disease and Vitamin A deficiency. Nutritional Anemia - Aetiology, clinical features, types, dietary treatment and prevention ofthe following: Iron deficiency Anemia / Disorder (IDD), Megaloblastic Anemia, Folate Deficiency, Pernicious anemia.

References

- Srilakshmi B (2011) Dietetics, 6th Ed, New Age International Publ., New Delhi
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- Robinson CH, Lawler MR, Chenoweth WL, Garwick AE (1986) Normal and therapeutic nutrition, 17th Ed, MacmillanPubl and Co.
- Anderson L, Dibble MV, Turkki PR, Mitchall HS, Rynbergin HJ (1982): Nutrition in health and disease, 17th Ed., JBLippincott and Co., Philadelphia
- Antia FP (1973) Clinical dietetics and nutrition, 2nd Ed., Oxford Univ. Press, Delhi

DIETETICS - II (PRACTICAL)

Planning, preparing and serving the following diets (two case studies)

- Burns
- Constipation
- Peptic ulcer
- Protein deficiency
- Iron deficiency
- Vitamin A deficiency
- Food allergy/intolerance

QUALITY CONTROL

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Understand international and national food laws, regulations and standards governing the safety of the food from field to fork

CO 2. Able to locate and interpret government regulations regarding the manufacture and sale of food products.

CO 3. Describe the use of adulterants added to foods

CO 4. Discuss the application of biotechnological techniques and evaluate packaging requirements of diverse foods.

Unit-1 **15 Hrs.**

Food quality and quality control: Definitions. Principles of quality control. Food inspection and role of food inspector, Sample and sampling methods. Industrial quality control: Raw material control, Process control, Finished Product control and inspection.
Adulteration of food: Definition, types, contamination of food by incidental adulteration by Microorganisms, packaging materials and other sources. Tests to detect common adulterants.

Unit-2 **15 Hrs.**

Food Laws: PFA - Mode of work and duties of food inspectors. Essential commodities act, FSSA 2006, ISO 9000, 22,000 Food standards: ISI, AGMARK, Export inspection council,

consumer protection act,

CODEX Alimentarius, FSSAI. HACCP - Importance. Principles. Determination of CCP. Problems in implementing HACCP. Importance of TQM, GMP and GLP.

Unit-3 **15 Hrs.**

Food additives: Definitions. Principles and objectives. Classification and uses. Coloring agents: Natural, Synthetic and non-certified colors. Leavening agents: Classification and uses.

Flavoring agents: Natural and Synthetic flavors.

Food fortification and enhances: Definition and importance. Principles. Commonly fortified and enriched foods. Non-nutritional constituents and food safety: naturally occurring toxicants, microbial toxins, bacterial food poisoning and contamination arising from processing.

References

- Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, Government of India
- Manay SN, Shadaksharaswamy M. (2001), Eds. Foods, Facts and Principles. 3rd edition, New Age International. New Delhi.
- Martin EH (1986) Standard methods for the examination of dairy products
- Ranjanna S (1985) Handbook of analysis and quality control for fruit and vegetable products
- Lees R (1978) Food analysis, analytical and quality control methods for food manufacturers and buyers
- Keister DC (1977) Food and beverage control, Prentice Hall Inc, New Jersey
- Coltman MM (1977) Food and beverage cost control, Prentice Hall Inc, New Jersey
- Kotas R (1973) An approach to food costing, Nelson Thornes, London

QUALITY CONTROL (PRACTICAL)

1. Detection of common adulterants present in the food sample – spices and condiments, food grains, sugars, fats and oils
2. Quality evaluation of water - hardness of water by titration method
3. Quality evaluation of milk – lactometer reading and tests to detect, adulteration of milk
4. Determination of starch content in food samples
5. Sensory evaluation of foods - Sweet, sour, bitter, salt, umami.
6. Sensory evaluation of various food samples
7. Quality of fats and oil - Iodine value, Acid number, peroxide value and saponification
8. Visit to a quality control laboratory of food industry.

FOOD TECHNOLOGY

Course Outcomes: After the successful completion of the course, the student will be able to:
CO 1. Understand concepts in food technology
CO 2. Evaluate the various types of food preservation and packaging
CO 3. Differentiate techniques used in milk processing
CO 4. Use sensory evaluation to study the quality of foods

Unit-1 **15 Hrs.**

Introduction to food technology, Physico-chemical properties of food, classification of food groups, Food ingredients, different techniques and equipments used in preservation of food: Drying, refrigeration, thermal treatments. Innovative techniques used in food processing: RTE, RTS, edible coatings, edible film, instant premixes. Different packaging requirements and its importance.

Unit-2 **15 Hrs.**

Milk: Definition, different techniques used in processing of milk products: UHT, Pasteurization,
Clarifications. Different types of milk products and processing. Sensory evaluation of the food products its importance, E-Noise & E-tongue.

Unit-3 **15 Hrs.**

Application of enzymes for production in biochemical and food processing industries, industrial application of microbial enzymes; production of amylase, lipase and pectinase; immobilized enzymes and their applications. Food regulations and licensing requirements.

References

- Flickinger M C, Drew SW (1999) Encyclopedia of Bioprocess Technology, A Wiley Inter Science Publ.
- Webb BH, Johnson AH (1988) Fundamentals of Dairy Chemistry, 3rd Ed., CBS Publ., New Delhi
- Robinson R K (2012) Modern Dairy Technology, Springer-Science.

DIET IN LIFE STYLE DISORDER

Course Outcomes (COs): After the successful completion of the course, the student will be able to:
CO 1. Able to gain in depth knowledge of various lifestyle disorders
CO 2. Understanding the primary treatment for these diseases.
CO 3 Describe the basic dietary guidelines to be followed for improving the disease conditions

Unit-1 **15 Hrs.**

Obesity – WHO classification of BMI, causes, risk factors, consequences, treatment, dietary guidelines, foods allowed/not allowed. Weight maintenance.

Unit-2 **15 Hrs.**

Atherosclerosis: Causes, Role of fat in the development of atherosclerosis, risk factors, consequences, treatment, dietary guidelines, role of dietary fiber in maintaining heart health, heart healthy foods.
Hypertension - Causes, types, stages, Symptoms, consequences, Dietary guidelines, treatment, DASH Diet, foods allowed/not allowed.

Unit-3 **15 Hrs.**

Diabetes Mellitus: causes, types, risk factors, consequences, dietary guidelines, treatment, glycemic index: definition, importance, high/low glycemic index foods, role of physical activity in diabetes mellitus.

References

- Joshi AS. (2021). Nutrition and Dietetics, 5th Ed. McGraw Hill, Noida
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- Mclaren DS, Meguid MM (1998) Nutrition and its disorders, Churchill Livingstone
- Mahan LM, Sylvia ES (2004) Krause's Food Nutrition and Diet Therapy, 11th Ed., Saunders, Elsevier Shils ME, Shike MS, Ross AC, Cabarellero B, Cousins RJ. (Eds.) (2005) Modern Nutrition in health and disease – 10th Ed., Lippincott Williams and Wilkins
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- M. Raheena Begum (2008). Textbook of Foods Nutrition and Dietetics, 3rd Revised Edition, Stering Publishers, Pvt, Ltd, New Delhi.

RESEARCH AND DEVELOPMENT OF NEW PRODUCT

Course Outcomes: After the successful completion of the course, the student will be able to:

CO 1. Understand concepts in research and development
CO 2. Identify the required R&D skills and apply them to various level of product development
CO 3. Evaluate the challenges in today's food environment and apply strategies for successful product development
CO 4. To know the principles and understand the concepts of brands and their role in product development in food industry.

Unit-1 **15 Hrs.**

Product Development in Food Industry

Introduction, Criteria for the product development, Principles of product development.

R&D Skills

Technical Basics, Required Skills

Level-1, Level 2—Team Player, Level 3—Business Partner, Skill and Capability Assessment, Basic Product Development Process Flow, The Product Creation Process, Challenges in Today's Environment, Product Development and Refinement Stage, Commercialization and Launch.

Company's Perspective on Innovation

Introduction, Innovation Defined, Key Principles and Applications, Innovation Comfort Level, Innovation Investment, Maintaining Relevance with Your Consumer, Target the Possibilities.

Unit-2 **15 Hrs.**

Brands

Introduction, From Great Brands to Meaningful Brands, Good and great brands, Functions of brands. The Relation between the Brand and the Product, consumer relevance.

Market Forces

Introduction, Marketing and Product Development, Brands as Added Value, Brands Act as Multipliers, Implications for New Products.

Process application

Introduction, Demand Economy, Speed, Accuracy, Money, targeting consumers and maintaining brand value.

References

- Wiley Blackwell 2007, Accelerating New Food Product Design and Development, Jacqueline H. Beckley, Editor, ISBN: 978-0-813-80809-3, Blackwell Publishing.