



Marudhar Kesari Jain College for Women (Autonomous)

Vaniyambadi – 635 751

PG & Research Department of Foods and Nutrition

For

Postgraduate Programme

Master of Science in Foods and Nutrition

Regulations 2024 - 2025

CONTENTS

1. Preamble

2. Programme Outcomes

3. Programme Specific Outcomes

4. Eligibility for Admission

5. Methods of Evaluation and Assessments

6. Skeleton & Syllabus

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK FOR POSTGRADUATE EDUCATION

1. Preamble

Nutrition plays a major role in fostering optimal health and well-being of an individual, and provides an absolute understanding of the intricate interplay between food, nourishment and human physiology. The PG Department of Foods & Nutrition of Marudhar Kesari Jain College for Women, Vaniyambadi strives to produce young budding nutritionists and dietitians who through rigorous research, education and outreach empower individuals to make informed choices about their diet and lifestyles, promoting longevity, vitality and resilience.

Nutrition is not only a cornerstone of preventive healthcare but also a catalyst for social change and sustainable development. We, the Department of Foods & Nutrition engage with communities, policy makers and industry partners to address predominant nutritional challenges, foster food security and promote environmental stewardship.

The programme is aimed at training postgraduate graduate students who would have adequate background knowledge and practical skills for application in postgraduate research, teaching, industrial production, medical, hospital and environmental management.

The Department aims to equip the undergraduate students with a sound knowledge of the fundamental principles involved in the study of Foods & Nutrition, to produce graduates who would create an impact in the diverse fields of human endeavors, considering the ubiquitous nature of food and the wide – ranging applications of the knowledge of Nutrition.

The main objective of the Department is to provide focus for a career in various fields of applied science including Food Industries, Medical Coding, Research Institution, Hospital Administration, Food Service Sectors, Free Lancing, Health Sectors, Quality Control, Biotechnology, Government and Non-Government agencies.

LEARNING OUTCOMES-BASED CURRICULUM FRAME WORK FOR POST GRADUATE EDUCATION

Programme	M.Sc., Foods and Nutrition
Programme Code	PS05
Duration	2Years [PG]
Programme Outcomes	<p>PO1: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that forma part of postgraduate Programme of study.</p> <p>PO2:Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one’s views and expresser self/herself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.</p> <p>PO3:Critical thinking: Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.</p> <p>PO4:Problem solving: Capacity to extrapolate from what one has learned and applies their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one’s learning to real life situations.</p> <p>PO5:Analytical reasoning: Ability to evaluate their liability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints.</p> <p>PO6:Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.</p> <p>PO7:Cooperation / Team work: Ability to work effectively and respect fully with diverse teams; facilitate cooperative or coordinated effort On the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.</p> <p>PO8:Scientific reasoning: Ability to analyze interpret and draw conclusions from quantitative/qualitative data; and critically valuate ideas, evidence, and experiences from an open-minded and reasoned perspective.</p>

PROGRAM OUT COMES

PO1	Acquire knowledge in Foods and Nutrition to apply the knowledge in their day-to-day life for betterment of self and society.
PO2	Develop critical, analytical thinking and problem-solving skills.
PO3	Develop research related skills in defining the problem, formulate and test the hypothesis, analyze, interpret, and draw conclusion from data.
PO4	Address and develop solutions for societal and environmental needs of local, regional and national development.
PO5	Work independently and engage in lifelong learning and enduring proficient progress.
PO6	Provoke employability and entrepreneurship among students along with ethics and communication skills.
PO7	Understand the importance of ethical behavior in business contexts and be able to recognize and address ethical dilemmas they may encounter in their professional careers.
PO8	Prepared for lifelong learning and professional development, including the ability to adapt to changes in technology, business practices, and economic conditions throughout their careers.

PROGRAM SPECIFIC OUTCOMES

PSO1	Students will be able to understand the principles of various methods involved in food science, macro nutrients, Human Physiology, Food Processing technology and Clinical biochemistry.
PSO2	Students would get in-depth understanding of the principles, theories and concepts related to food, nutrition, Biochemistry, Physiology & related fields, thereby enabling them to evaluate scientific literature, identify gaps in knowledge and to propose innovative solutions to complex issues in foods and nutrition.
PSO3	To make the students skilled professionals, in assessing the nutritional needs of individuals, populations by conducting dietary assessments, developing evidence-based nutrition interventions.

Eligibility for Admission:

Candidate for admission to the first year of M. Sc Foods & Nutrition. Department of Foods & Nutrition shall be required to have passed the UG with Nutrition & Dietetics / Nutrition, Food Service Management & Dietetics/ Foods & Nutrition / Clinical Nutrition / Food Process & Technology / Home Science are eligible.

Methods of Evaluation and Assessment

Methods of Evaluation		
Internal Evaluation		25 Marks
External Evaluation	End Semester Examination	75 Marks
Total		100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand / Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or overview	
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate Between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

Semester – I						
Code	Course Title	Hours Distribution				C
		L	T	P	S	
24PNDC11	CC – 1 Advanced Food Science	3	1	2	0	4
24PNDC12	CC – 2 Advanced Human Physiology	3	1	2	0	4
24PNDC13P	CC - 3 Practical – Advanced Food Science	0	0	4	0	3
24PNDE11	EC - 1 Macro Nutrients	3	1	1	0	3
24PNDE12	EC – 2 Food Processing and Technology	3	1	1	0	3
24PNDA11	AECC – 1 Home Scale Preservation of Fruits and Vegetables	1	1	0	0	2
24PCHR11	VE - 1 Human Rights	1	1	0	0	2
					30	21

Semester – II						
Code	Course Title	Hours Distribution				C
		L	T	P	S	
24PNDC21	CC – 4 Micro Nutrients	3	1	2	0	4
24PNDC22	CC – 5 Clinical Biochemistry	3	1	2	0	4
24PNDC23P	CC - 6 Techniques In Food Analysis Practical	0	0	4	0	3
24PNDC24	CC – 7 Research Methods in Nutrition	2	1	1	0	3
24PNDE21 24PNDE22	EC 3 – Food Preservation EC-4 – Bakery Science	2	1	1	0	3
24PNDE23 24PNDE24	EC – 5 Perspectives of Home Science EC-6 Life style practice	2	1	1	0	3
24PNDS21	SEC - 1 (NME) Basic in Food Science	1	1	0	0	2
					30	22

Semester – III						
24PNDC31	CC – 8 Advanced Dietetics	3	1	2	0	5
24PNDC32	CC – 9 Food Microbiology	3	1	2	0	5
24PNDC33P	CC – 10 Practical III - Advanced Dietetics	0	0	5	0	4
24PNDC34	CC – 11 Performance Nutrition	2	1	1	0	3
24PNDE31 24PNDE32	EC – 7 Food Product Development EC-8 Nutrition in Emergencies	2	1	1	0	3
24PNDS31	SEC – 2 Diet Counselling and patient care	1	1	0	0	2
24PNIN31	Internship	0	0	3	0	2
					30	24

Semester – IV							
24PNDC41	CC – 12 Advanced Food Service Management	3	1	2	0	5	
24PNDC42	CC – 13 Public Health Nutrition	3	1	2	0	5	
24PNDC43P	CC - 14 Project / Viva Voce	0	0	6	0	5	
24PNDE41 24PNDE42	EC – 9 Functional Foods EC-10 Food Safety and Nutrition Security	4	1	1	0	4	
24PNDE41	PEC – 1 Entrepreneurial Development	1	1	0	0	2	
24PNDL41	SLC – Nutrition and Child Psychiatry	0	0	1	3	2	
					30	23	
	Total Credits					90+2*	

Students must complete at least one online course (MOOC) from platforms like SWAYAM, NPTEL, or within the third semester. Additionally, engaging in a specified Self-learning Course is mandatory to qualify for the degree, and successful participation will be acknowledged with an extra credit of 2*.

CC	Core Course	14
EC	Elective Paper	6
SEC	Skill Enhancement Course	2
AEC	Ability Enhancement Compulsory Courses	1
VE	Value Educations	1
	Internship	1
PEC	Professional Enhancement Course	1
SLC	Self-Learning Course	1

1ST YEAR: FIRST SEMESTER

Subject Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC11	CC -1 Advanced Food Science	Core	3	1	2	0	5	6	25	75	100
Learning Objectives											
LO1	In depth understanding of Food and composition and structure: Gain knowledge about all the Nutrients										
LO2	Students learn about various Food Processing methods and how they affect Nutritional content										
LO3	Understand the Principles of Nutrition and Dietary guidelines										
LO4	Explore methods for Sensory analysis to assess the Organoleptic Properties of Food Products										
LO5	Understand the knowledge about food colors and Flavours										
Unit	Content									Hours	
1	Properties of food - Food nutrients, solids, solutions and colloids, Solutions - Physical properties of solutions, Food dispersion; Types of colloids and properties of colloid and rheology of food dispersion, structure formation and stability of gels, sols, and emulsion foams. Starch - Classification, structure and physio chemical properties. Modified food starches- Structure and composition. Gelatinization of starch, syneresis and hydrolysis. Dextrinization and factors affecting gelatinization.									14	
2	Proteins - Structure and composition, Classification and properties of proteins. Role of proteins in food products. Pulses and legumes, millets, vegetables, meat and fish, dairy products by product utilization. Functional properties - protein denaturation, hydration, solubility, interfacial properties, gelatin and dough formation. Amino acids - structure, classification and physio chemical properties of amino acids									14	
3	Fats and oil - Structure, composition and properties of fats and oil; storage of fat, smoking point, Rancidity Types, Mechanism and prevention. Role of fat/oil in food products and fat replaces. Sugar and sugar products -Types of sugar, Physical and chemical properties, various forms of sugar used in cookery and Crystallization of sugar. Sweeteners -Properties, Artificial and Natural sweeteners and role of sweeteners in food industry.									14	
4	Milk and Milk products: Physiochemical properties of milk, Effect of physical and chemical factors on milk components. (Effect of heat, protein factors affecting coagulation, casein coagulation. Non-enzymatic browning) (Effect of acid), Effect of enzyme- Rennin. Fermented and non- fermented milk product. Egg Structure, composition and nutritive value. Quality check- grading and deterioration. Functional properties- Foaming, Factors affecting foam formation. Utilization of wastages of egg shell.									14	
5	Food Additives - Definition, Classification and need for food additives. Flavors Compounds in vegetables, fruits and spices; Effect of processing on food colours and flavors; Role of colours and flavours in food products.									14	

CO	Course Outcomes
CO1	Over view the relationship between the chemical structure and the properties of the main components in food like starch, protein and lipids
CO2	Understand the Composition and characteristics of various food commodities
CO3	Explain the cooking quality of foods and apply food science knowledge in food industries
CO4	Identify and understand the nutrients and functions of foods in maintaining health
CO5	Analyze the proper use of food colors and food additives in safe food preparation

Text book	
1	Srilakshmi B. (2015). Food Science. New Age International (P) Ltd. Publishers.
2	Reddy. S.M (2015). Basic Food Science and Technology. New Age International publishers. Avantina Sharma (2017).T ex
3	Swaminathan A. (2018).Hand book of Food and Nutrition, Bangalore press.
4	Serpil Sahin and Servet Gulum Sumnu. (2006). Physical properties of Foods. Springer publications
5	Norman N. Potter (2007). Food Science
Reference Books:	
1	Gerard L. Hanchett, Richard W. Hartel (2019). Food Emulsifiers and Their Applications. Springer publications.3 rd edition
2	Vickie. A. Vaclavik.(2021).Essentials of Food science. Springer publications. 5 th edition
3	Dr. M. Swaminathan. (2015). Advanced text book of Food and Nutrition. Volume 2. Bapco Publications
4	Eskein (2012). Biochemistry of Food. Elsevier Publications
5	Lyn Obrien Nabors. (2001). Alternative Sweeteners. Taylor and Francis Publications

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	2	3	3	3	3
CO2	3	3	3	3	2	3	3	3	3	3	3
CO3	3	3	2	3	3	3	3	2	3	3	3
CO4	3	3	3	3	3	3	3	2	3	3	3
CO5	3	3	2	3	3	2	3	3	3	3	3
Total	15	15	13	15	14	13	14	13	15	15	15
Average	3	3	2.6	3	2.8	2.6	2.8	2.6	3	3	3

3 – Strong, 2- Medium, 1- Low

1ST YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC12	CC 2-Advanced Human Physiology	Core	3	1	1	0	4	6	25	75	100
Learning Objectives											
LO1	Understand the Structure of Cell and Tissue										
LO2	Understand the integrated function of the system.										
LO3	Understand alterations of structure and function in various organs and systems in disease conditions.										
LO4	To understand the Physiological Principles and Pathophysiology of common medical conditions and diseases.										
LO5	To Gain Knowledge about the Various physiological systems and to maintain homeostasis.										
Unit	Content									Hours	
1	Cell and Tissue: Cell – Structure and Function. Difference between Meiotic and Mitotic cell, Stem cells-types and functions. Tissue: Structure, Types and Function.									14	
2	Blood and Circulatory System Blood -Composition and Functions, Blood Group – ABO system and Rh factor. Blood plasma protein-types and Functions. Circulatory System –Structure and Function of Heart and Blood Vessels. Systemic and Pulmonary circulation. Cardiac cycle. , ECG, Blood pressure.									14	
3	Respiratory System and Endocrine System Respiratory System –Mechanism of respiration. Circulation and Exchange of respiratory gases. Internal and External respiratory system. Ventilation and Artificial Respiration. Endocrine System –Hormones and its type. Syndromes resulting from hypo and hyperactivity of Pituitary, Thyroid, Adrenals and Pancreas									14	
4	Gastro Intestinal System and Reproductive System Gastrointestinal System Structure and function of GI tract and its accessory organs. Reproductive System –Male and Female Reproductive Organs. Menstrual Cycle and Menopause.									14	
5	Nervous System and Excretory System Nervous System – Structure and Function of Neuron. Cerebrospinal fluid (CSF) – composition and function. Renal Nerve Function, Nerve Regeneration, Neuro transmitters and its role. Excretory Systems –Organs in the Urinary System. Mechanism of formation of urine. Skin –Structure and function.									14	

CO	Course Outcomes
CO1	Develop in sight of normal function in go fall the organ system so the body and their interaction. Understand the current state of knowledge about the functional organization of Human cell and histology
CO2	Understand the structural and functional organization of Blood and Cardiac System
CO3	Understand the structural and functional organization of respiration Immunity and Endocrine system.
CO4	Comprehend the structural and functional organization of GIT, Digestive System and Reproductive System
CO5	Understand the structural and functional organization of Skin, Nervous and Excretory System

Textbooks:	
1	CC Chatterjee (2020). Human Physiology CBSpublishers.13thedition
2	K.Sem bulingam & Prema Sembulingam (2019),Essentials of Medical Physiology. Jaypee publications.8 th edition
3	Pal GK (2019).Text book of human physiology, Elsevier publications. 3 rd edition
4	Jain, A.K. Text book of Physiology. A vichal Publishing Co., New Delhi. Vol. I and II.
5	Chatterjee Chandi Charan: Text Book of Medical Physiology, London W.B.
Reference Books:	
1	Waugh A, Ross and Wilson (2018). Anatomy and Physiology in Health and Illness. Elsevier publications.13 th edition
2	Indu Khurana (2020). Medical Physiology for Under graduate Students. Elsevier Publication .2 nd edition
3	Wilson, K.J. Wand Waugh, A. (2003): Ross and Wilson Anatomy and Physiology in Heath and Illness. Churchill Living stone.8 th edition.
4	Ganong, W.F. (1985):Review of Medical Physiology. Lange Medical Publication.,12 th edition
5	Win word. Sear's Antomy and Physiology for nurses. London, Edward Arnell

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	3	2	3	3	3	3	3
CO2	3	3	3	3	3	3	2	3	3	3	3
CO3	3	3	3	2	3	3	3	2	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	14	15	14	15	14	14	14	15	15	15
Average	3	2.8	3	2.8	3	2.8	2.8	2.8	3	3	3

3 – Strong, 2- Medium, 1- Low

1ST YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC13P	CC-3 ADVANCED FOOD SCIENCE PRACTICAL	Core	0	0	4	0	4	4	25	75	100
Learning Objectives											
LO1	To understand the concept of TGV and its role in determining the bulk density and packing properties of grains.										
LO2	Apply the properties of food in various food processing and preparations.										
LO3	Analyze the factors affecting cooking quality of foods.										
LO4	Create appropriate food preparation and processing methods to ensure quality standards										
LO5	Comprehend the knowledge gained on characteristics and properties of foods during cooking.										
Unit	Content									Hours	
1	Physical properties –Thousand grain weight, Thousand grain volume, Hydration capacity, Hydration index, Swelling capacity. Starch –Microscopic Structure and Gelatinization. Factors affecting gelatinization –sag test. Gluten Formation. Viscosity -Viscometer.									12	
2	Pluses: Factors affecting cooking quality. Fruit: Enzymatic browning, Pectin test.									12	
3	Sugar: Stages of sugar cookery –Prepare Different stages of Recipe. Fats and oils: Smoking point– Groundnut oil, coconut oil, gingerly oil, Olive oil, Vanaspati, Ghee, Refined Sunflower oil.									12	
4	Vegetable: Various method of cooking fat soluble and water-soluble pigment. Milk: Detecting the presence of starch, urea in milk sample. pH of Milk. Effect of acid on milk Maillard reaction									12	
5	Adulteration Sensory method –Analysis of taste sensitivity-Threshold test. Duo– Trio test, Multiple sample difference tests									12	

CO	Course Outcomes
CO1	Gain knowledge on sensory analysis and cereal cookery Concept
CO2	Understand the properties of various food
CO3	Analyze the cooking quality of foods and apply knowledge in food industries.
CO4	Identify and understand the Physical characteristics.
CO5	Revise appropriate food preparation and processing methods to ensure standards in food industry

Text books:	
1	Srilakshmi B. (2015). Food Science, New Age International (P) Ltd. Publishers.
2	Potter N. and Hotchkiss J.H. (1996). Food Science, Fifth ed., CBS Publishers and Distributors, New Delhi
3	Avantina sharma (2017). Text book of food science and Technology.
4	CBS Publisheres and distributes ltd. 3rd Edition.
5	Reddy S M. (2015). Basic Food science and technology. New Age International publishers. 2 nd edition.
Reference Books:	
1	Swaminathan A (1979). Food Science and Experimental Foods, Ganesh And Company Madras. 3 rd edition
2	Bennion, Marion and O. Hughes (2001). Introductory Foods. Edi: mac millian N. Y. 1 st edition.
3	Eskein. (2012). Biochemistry of Food. Elsevier publications
4	Desrosier, N.W. and James N. (2007). Technology of food preservation.AVI Publishers.
5	Manay, S. and Shada Sharama samy, (2004). Food: Facts and Principles, New Age International Publishers, New Delhi. 1 st edition

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	3	2	3	3	3
CO2	3	3	3	3	3	3	3	2	3	3	3
CO3	2	3	3	3	3	3	3	3	3	3	3
CO4	3	2	3	3	2	2	2	3	3	3	3
CO5	2	3	2	2	3	3	3	3	3	3	3
Total	13	14	14	14	14	13	14	13	15	15	15
Average	2.6	2.8	2.8	2.8	2.8	2.6	2.8	2.6	3	3	3

3 – Strong, 2- Medium, 1- Low

1ST YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDE11	Elective course-1 Macro Nutrients	Core	3	1	1	0	3	5	25	75	100
Learning Objectives											
LO1	To understand the relationship between lipid, carbohydrate, protein and mineral metabolism.										
LO2	To learn about the therapeutic uses of carbohydrates, protein and fat in prevention of non-communicable disease										
LO3	To get insights in the inborn errors of metabolism.										
LO4	To identify primary functions of Macronutrients and Biological Functions										
LO5	To learn about the regulatory mechanisms that maintains water balance in the body.										
Unit	Content									Hours	
1	Energy Energy content of foods, physiological fuel value, Estimation of total energy requirements (BMR, REE and physical cost of activities) TEE, Basal metabolic rate, total energy requirements, BMR& RMR, Factors affecting BMR.									12	
2	Carbohydrates Classification, Therapeutic uses of carbohydrates. Role of dietary fiber in health and disease. Role of carbohydrates in health and disease. Glycemic index of foods and its uses.									12	
3	Protein Amino acid patterns in protein of animals and vegetable origin, Essential Amino Acids, amino acid balance and imbalance, Role of protein in health and disease.									12	
4	Lipids Concepts of visible and invisible fats, EFA, SFA, MUFA, PUFA, omega-6 to omega-3 ratios. – Sources and physiological functions and their role in health and disease.									12	
5	Water Sources, Function, Requirement, Distribution of water in the body, Factors influencing distribution of body fluid. Exchange of water in the body.									12	

CO	Course Outcomes
CO1	Understand the essentials of nutrients in growth and development of humans
CO2	Appreciate the importance of major nutrients in maintaining human health and leading active life style
CO3	Plan for enhancement of nutritional quality of the diet.
CO4	Identify the various types & sources of food borne illness and methods of prevention
CO5	Evaluate the role of nutrients in health and diseases.

Text books:

1	Satyanarayana, & Chakrapani, U. (2013). Biochemistry, Book and Allied Pvt. Ltd., Kolkata
2	Williams, S.R. (2004). Nutrition and diet therapy. Nutrition and diet therapy
3	Mahan, L.K., & Stump, S.E.(2002).Krause's Food Nutrition and Diet Therapy. W.B. Saunder's company, Philadelphia.10 th edition
4	Brown, J.E., (2002). Nutrition Now. Wads worth Thomson Learning New York. 3rd edition.
5	Jain, J.L., Jain, S., & Jain, N., (2005). Fundamentals of Biochemistry. S.Chand & Company Ltd. Ramnagar, New Delhi-110055.6 th revised edition.

Reference Books:

1	Tadeja, G.S. (2004). Micro nutrient profile of Indian population. Indian Council of Medical Research Publication, New Delhi
2	Bogert, J.G. V., Briggs D.H., & Calloway, (2000). Nutrition and physical fitness. W.B. Saunders Co., Philadelphia, London, Toronto.11 th edition.
3	Sizer, F., Whitney, E., & Webb, F.(2003).Nutrition Concepts and Controversy, Thomas Wadsworth, Australia .9 th edition
4	Wardlaw, G.M., Byrd-Bred Benner, C., Moe, G., Berning, J.R., & Kelley, D. S. (2013). Ward law's perspectives in nutrition. McGraw-Hill
5	Swaminathan, M., (2002). Principles of Nutrition and Dietetics. BAPPCO, 88, Mysore

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	2	3	3	2	3
CO2	3	3	3	3	2	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	2	3	3	3
CO4	2	2	3	2	3	2	3	2	2	2	3
CO5	3	3	2	3	3	2	3	3	3	3	3
Total	14	14	14	14	14	12	14	13	14	13	15
Average	2.8	2.8	2.8	2.8	2.8	2.4	2.8	2.6	2.8	2.6	3

3 – Strong, 2- Medium, 1- Low

1ST YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDE12	EC-2 Food Processing and Technology	EC-2	3	1	1	0	3	5	25	75	100
Learning Objectives											
LO1	Understand the science behind processing of foods and its impact on nutritive value of food stuffs.										
LO2	Acquire in depth knowledge on production of processed food products and the waste utilization techniques										
LO3	Learning the food preservation and its effect on microbiological growth, enzyme activity and food quality										
LO4	Understand the changes in physicochemical properties of foods due to processing condition.										
LO5	To identify the need for effective post-harvest technology in modern agriculture.										
Unit	Content									Hours	
1	Processing of Foods Primary, secondary and tertiary processing, historical perspective, traditional technologies used in food processing. Enzymes in Food Processing Enzyme - Review of classification, enzyme inhibitors, enzymatic browning									12	
2	Cereal Processing and Technology: Rice: Parboiling, milling and pearling; Processing and milling of wheat, maize & Barley. Cereal Products: Flours and its quality; processed products of rice, wheat and Maize. Pulse Processing and Technology: Dals, flours, protein concentrates, isolates and hydrolysates; Byproducts utilization									12	
3	Vegetables processing and Technology Pigments: Classification, effects on processing of vegetables; preliminary processing of vegetables. Fruits Processing and Technology: Concept of maturity, ripening and senescence; Methods of fruit processing technologies. Milk Processing and Technology: Milk types, composition, Milk processing - Separation, centrifugal process, pasteurization, sterilization, homogenization.									12	
4	Egg Processing and Technology: Egg processing and storage; Effect of processing on nutritive value and Physiochemical properties of eggs. Meat Processing and Technology: Meat: Processing and storage; Factors influencing meat quality; Ageing and Tenderization of meat. Poultry and Fish; Processing, storage and preservation methods.									12	

5	Introduction of post- harvest technology: Introduction to post-Harvest technology of agricultural produce; Status of Production, Losses, Need, Scope and Importance.	12
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CO	Course Outcomes
CO1	Understand the concepts and principles of food processing
CO2	Identify the various processed food products from plant and animal sources.
CO3	Plan the by-products utilization from food processing.
CO4	Make use of the systematic knowledge of basic and applied aspects in food processing and technology.
CO5	Apply the various post-harvest technologies for different food products

Text books:	
1	Shakuntala Manay N Shadak Chera swamy M. (2004) Food Facts and Principles. New age publisher. 2 nd edition.
2	Roady S. (2011).Food Science. Oxford publication.1st edition
3	B Srilakshmi (2015) Food science. New Age Publishers. 6 th edition. Fellows P. (2000). Food Processing Technology, 2 nd Edition.
4	Wood head Publishing Limited and CRC Press LLC.1 st edition
5	Avantina Sharma. (2017). Text book of food science and Technology. CBS Publisher and distribute ltd.3 rd edition.
Reference Books:	
1	Raocg. (2006). Essentials of food process engineering. PHI learning private ltd.
2	Janet D Ward and Larry Ward. (2006). Principles of Food Science. Stem Publishers. 4 th edition.
3	Srivastava R, Pand Kumar S. (2006) Fruits and Vegetables Preservation Principles and Practices. International Book Distributing Co.3 rd edition
4	WB Cruses. (2004). Commercial Unit and Vegetable Products. W.V. Special Indian Edit ion, Pub Agro bios India.2 nd edition.
5	Eskein . (2012). Biochemistry of Food. Elsevier publications.1 st edition

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	2	3	3	3	3	3
CO2	3	3	3	3	3	2	3	2	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3
CO4	2	2	2	3	3	2	3	2	3	3	3
CO5	3	3	2	2	3	3	2	3	3	3	3
Total	14	14	13	14	14	12	14	13	15	15	15
Average	2.8	2.8	2.6	2.8	2.8	2.4	2.8	2.6	3	3	3

3 – Strong, 2- Medium, 1- Low

1ST YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDA11	AECC1-HOME-SCALE PRESERVATION OF FRUITS AND VEGETABLES	AECC-1	1	1	0	0	2	2	25	75	100
Learning Objectives											
LO1	Gain understanding of the principles and importance of Food Preservation.										
LO2	Learn about various home scale preservatives method of fruits and vegetables										
LO3	Understand the importance of food safety in home food preservation.										
LO4	To understand the historical and modern role of Chemical and salt in food preservation.										
LO5	Learning about the stages of fermentation, the influence of yeast strains on flavor profiles, and the chemical processes.										
Unit	Content									Hours	
1	Introduction to Food Preservation- Basic Principles of Food Preservation, Types of Spoilage, Importance of Food Preservation Different Methods of Food Preservation.									6	
2	Preservation by using Sugar- Sugar concentrates, Preparation of Jam, Jelly, Marmalades, Candied, Glazed, Crystallized Fruits, FPO Specification, Problems Encountered, Spoilages									6	
3	Preservation by Removal of Moisture - Sun drying, Drying, Dehydration, Method of Drying, Preparation of Vegetable , Vathals – Ladies Finger, Brinjal, Beans, Cluster Beans, Preparation of Vadams– Rice Vadam, Sago Vadam, Rice Flakes Vadam, Tomato Vadam									6	
4	Preservation by using Chemicals and Salts: Chemical Preservatives– Definition, Types of Preservatives, Preparation and Preservation of Fruit Juices Salt preservatives: Pickles, sauerkraut.									6	
5	Fermentation: Definition, Types of Fermentation, Common Fermented Foods–Cheese Making, Dokhla, Wine and fermented sausages.									6	

CO	Course Outcomes
CO1	Knowledge on the principles of food preservation, importance and methods of food preservation and food spoilage.
CO2	Gain expertise to preserve fruits using sugars
CO3	Gain expertise to prepare and preserve dehydrated foods at home scale level
CO4	Expertise to preserve fruits and vegetables using chemicals and salts.
CO5	Students will gain knowledge about various fermented foods, their production processes, and their cultural significance.

Text books:	
1	Adams, M. R. and Moss, M.O. (2005) Food Microbiology, New Age International (P) Ltd., New Delhi.
2	Usha Chandrasekhar, (2002) Food Science and Applications in Indian Cookery, Phoenix Publishing House Pvt. Ltd., New Delhi.
3	Srilakshmi, B. (2013) Food Science, New Age International (P) Ltd., New Delhi.
4	Serpil Sahin and Servet Gulum Sumnu. (2006). Physical properties of Foods. Springer publications
5	Norman N. Potter (2007). Food Science
Reference Books:	
1	Fellows, P. (2000) Food Processing Technology, Principles and Practice, 2 nd Edition, CRC Press, Woodland Publishing Ltd., Cambridge, England,
2	Sommers, C.H. and X Veteng Fan, (2006) Food Irradiation Research and Technology, Blackwell Publishing, 2006.
3	Swaminathan, M. Food Science, Chemistry and Experimental Foods, Beppo Publishers 2013.
4	Eskein. (2012). Biochemistry of Food. Elsevier Publications
5	Lyn Obrien Nabors. (2001). Alternative Sweeteners. Taylor and Francis Publications.

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	3	3	3	3
CO2	3	2	3	3	3	2	3	2	3	3	3
CO3	2	3	3	3	3	2	2	3	3	3	3
CO4	3	2	3	3	3	3	2	3	2	3	3
CO5	3	3	2	3	3	3	2	3	3	3	3
Total	14	13	14	15	15	13	11	14	14	15	15
Average	2.8	2.6	2.8	3	3	2.6	2.2	2.8	2.8	3	3

3 – Strong, 2- Medium, 1- Low

1ST YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC21	CC-4 MICRO NUTRIENTS	Core	3	1	2	0	4	6	25	75	100
Learning Objectives											
LO1	To enables the students to learn the functions, deficiency symptoms, food sources and requirements of the different micronutrients										
LO2	To Gain knowledge of nutrients requirement and management of micronutrients during various stages of life and disease										
LO3	To gain in sight about recent concept and findings in field of nutrition and application of the same to prevent disease										
LO4	To Identify between water-soluble vitamins and their functions.										
LO5	To gain the knowledge different types of immune nutrients and antioxidants and Nutraceuticals promoting health and preventing disease.										
Unit	Content									Hours	
1	UNIT-I Macro Minerals Distribution in the body, functions, effects of deficiency, food sources, requirement and Recent research of macro minerals Calcium, Phosphorous, Magnesium, Potassium, Sodium and Chloride.									14	
2	UNIT –II Micro Minerals Distribution in the body, functions, food sources, requirement deficiency, toxicity and recent research of micro minerals and trace minerals. Micro minerals-Iron, Zinc, Fluoride, Copper, Iodine and Manganese. Trace Minerals Selenium, Cobalt, Chromium, Silicon, Boron and Nickel Selenium and Vitamin E relationship, Chromium and glucose tolerance factor.									14	
3	UNIT-III Fat Soluble vitamins Distribution in the body, functions, food sources, requirement deficiency, toxicity and recent research of Fat Soluble Vitamins A, D, E and K.									14	
4	UNIT-IV Water soluble vitamins Distribution in the body, functions, food sources, requirement deficiency, toxicity and recent research of Water soluble vitamins– Water soluble vitamins: VitaminC, Thiamine, Riboflavin, Niacin, Pantothenic Acid, Biotin, Folic Acid, Vitamin B 12, Vitamin B6.									14	
5	UNIT-V Recent Concepts in Nutrition: Immuno-nutrients and Antioxidants. Definition, classification and function of functional food and Nutraceuticals. Anti nutrients present in various food groups – Cereals, legumes and nuts and oilseeds Food and drug interaction. Prebiotics and probiotics									14	

CO	Course Outcomes
CO1	Evaluate the specific role of functional foods and Nutraceuticals in prevention of degenerative disease
CO2	Understand the importance of micronutrients in growth and development of humans
CO3	Analyze the importance of diet in maintaining human health to combat nutrient deficiency in the community
CO4	Gain in-depth knowledge of the physiological and metabolic functions of vitamins and minerals and their implications
CO5	Analyse the recent advances in the field of micronutrient and research for the welfare of the community

Text books:	
1	Guthrie, H.A. (2001) "Introductory Nutrition" Tenth edition, C.V Mos by Company, St. Louis.
2	Bogert, J.G.V., Briggs, D.H, Calloway, (2000). "Nutrition and physical fitness", 11th edition W.B. Saunders Co., Philadelphia, London, Toronto.
3	Ward law, G.M and Kessel, M, (2002) "Perspective in Nutrition", 5 th edition, McGraw Hill, New York, New Delhi.
4	William, S.R. (2000). "Nutrition and Diet Therapy", Mos by Co., St. Louis.
5	Sizer, F.S and Whitney E.R. (2003). "Nutrition, Concepts and Controversies" 9th edition, Thomas Wadsworth, Australia.
6	Robinson Ch., M.B. Lawlea, W.L., Chenoweth, and A.E., Carwick. (1990). Basic Nutrition and Diet therapy, MacMillan Publishing Company
Reference Books:	
1	Brown, J.E. (2002). "Nutrition Now", 3rd edition, Wadsworth Thomson Learning New York.
2	Maurice, E. Shils, James A. Olson, Moshe Shike, (2000). "Modern Nutrition in Health and Disease", 8th Edition, Vol I and II, Lea & Febiger Philadelphia, A Waverly Company
3	Mahan L.K. and Stamp, S.E (2000). "Krause's Food Nutrition and Diet Therapy", 11 th edition, W.B. Saunder's Company, Philadelphia
4	Tadeja, G.S and Singh P (2004). "Micronutrient Profile of Indian Population", ICMR Publication, New Delhi.
5	D. M. Swaminathan (2002). "Principles of Nutrition and Dietetics", BAPPCO, 88, Mysore Road Bangalore- 560 018.

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	2	3	3	3	3
CO2	3	3	3	3	2	3	3	3	3	3	3
CO3	3	3	2	3	3	3	3	2	3	3	3
CO4	3	3	3	3	3	3	3	2	3	3	3
CO5	3	3	2	3	3	2	3	3	3	3	3
Total	15	15	13	15	14	13	14	13	15	15	15
Average	3	3	2.6	3	2.8	2.6	2.8	2.6	3	3	3

3-Strong, 2-Medium, 1-Low

1ST YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC22	CC-5 CLINICAL BIOCHEMISTRY	Core	3	1	2	0	4	6	25	75	100
Learning Objectives											
LO1	To acquire fundamental knowledge blood glucose regulation and diabetes mellitus										
LO2	To know about the genetic diseases and fatty liver										
LO3	To obtain a knowledge of liver function tests and its interpretation with pathological diseases										
LO4	To gain insights renal function tests and importance of non-protein nitrogenous Compounds										
LO5	To understand the importance marker enzymes in diseases and gastric function.										
Unit	Content									Hours	
1	Blood glucose homeostasis: Renal threshold value, regulation of blood glucose - hormonal action. Diabetes Mellitus and its metabolic complications. Oral GTT in normal and diabetic condition, renal glycosuria, Fructosuria & Galactosemia.									14	
2	Disease related to amino acid metabolism: Clinical manifestation of Phenylketonuria, Cystinuria, Albinism, Fanconi syndrome, Tyrosinemia and alkaptonuria. Types of Lipoproteins - Dyslipoproteinemias, atherosclerosis, obesity & Fatty liver.									14	
3	Liver function tests: Metabolism of bilirubin - Jaundice, types, causes and differential diagnosis. Liver function test -Icteric index, Vandenberg test, plasma protein changes, Prothrombin Test. Liver disorders - Acute and Chronic Hepatitis, Cirrhosis									14	
4	Renal function tests: Clearance test - urea, creatinine, insulin, PAH test, concentration and dilution test. Diabetes Insipidus, Nephrotic syndrome, renal failure and UTI.									14	
5	Gastric function test: collection of gastric contents, examination of gastric residue, FTM stimulation test, tubeless gastric analysis. Gastric disorders. Enzyme patterns in acute pancreatitis, Myocardial infarction and bone disorder.									14	

CO	Course Outcomes
CO1	To understand the relationship between the enzymes and their activity
CO2	Understand the metabolism of carbohydrates
CO3	Explain the classification of Proteins and their metabolism in human body
CO4	Identify and understand the biomolecules and functions of lipids in maintaining health and various diseases
CO5	Analyze the structure and function of Nucleic acid

Text books:	
1	Jain, J.L, Jain ,S.,& Jain ,N.(2005).Fundamentals of Biochemistry. S. Chand &Company Ltd. Ramnagar, New Delhi-110055.6 th revised edition
2	Bettelheim, F.A., Brown, W.H., Campbell, M.K., & Farrell, S.O.(2009). <i>General, Organic & Biochemistry</i> . Brooks/Cole Cengage Learning
3	Champe,P.C.,Harvey,R.A.,&Ferrier,D.R.(2005). <i>Biochemistry</i> .LippincottWilliams&Wilkins,6 th edition, Wolters Kluwer, London
4	Talwar, G.P. ,& Srivastava. N,L.M. (2002). <i>Text book of biochemistry and human biology</i> .PHI Learning Pvt. Ltd
5	Murray, R.K., Granner, D. K., Mayes, P.A. and Rod well, V.W.(2000):25 th edition. Harpers Biochemistry Macmill and Worth Publishers
Reference Books:	
1	Beck, W.S. (1971) Human Design. Har court Brace Jovanovich Inc., New York.
2	Best, C.H. and Taylor, N.B. (1980) Living Body.4 th ed. BIP, Bombay
3	Creager, J.G. (1992) Human Anatomy and Physiology .2 nd ed. WMC Brown Publishers, England
4	Guyton, A. C. (1979) Physiology of the Human Body. 5 th ed. Saunders College of Publishing Philadelphia.
5	Subraniam, S. and Madhavan Kutty, K. (1971). The Text Book of Physiology. Orient Longman Ltd., Madras.

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	3	3	2	2	3	3	3	3
CO2	3	3	3	3	2	3	3	3	3	3	3
CO3	3	3	2	3	3	3	3	2	3	3	3
CO4	3	3	3	3	3	3	3	2	3	3	3
CO5	3	3	2	3	3	2	3	3	3	3	3
Total	15	14	13	15	14	13	14	13	15	15	15
Average	3	2.8	2.6	3	2.8	2.6	2.8	2.6	3	3	3

3 – Strong, 2- Medium, 1- Low

1ST YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC23P	CC-6 TECHNIQUES IN FOOD ANALYSIS PRACTICAL	Core	0	0	4	0	3	4	25	75	100
Learning Objectives											
LO1	Learn the techniques of estimating the quantity of different nutrients present in food										
LO2	To enable the students to get practical experience in the laboratory and develop the skills to undertake research work										
LO3	To understand the significance of Ash content which represents the total mineral content in food samples.										
LO4	To understand the principles and techniques for determining moisture content in food.										
LO5	To understand the purpose and applications of different experimental methods for food analysis.										
Unit	Content									Hours	
1	UNIT-I Introduction to Laboratory Practices 1. Instrumental Techniques Autoclave, Hot Air Oven, pH Meter, Electronic Weighing Balance, Centrifuges, Hot Plate, Spectrophotometer, Water Bath, Muffle Furnace, Viscometer, IR Moisture, Analyzer Colorimeter.									12	
2	UNIT –II Preparation and Standardizations of Solution									12	
3	UNIT –III Ashing of Food (Thermo gravimetric Method) and Preparation of Ash Solution									12	
4	UNIT-IV Food Analysis Experiments– Estimation of Moisture Content–Air Oven Method, Iodine Number of oils–Wij’s Method, Acid Number of oils- Titrimetric Method, Peroxide Value of oils-Titrimetric Method, Ascorbic Acid–2,6-Dichloroindophenols, Titrimetric Method, Calcium-Precipitation Titrimetric Method, Iron–Wong’s Method, Phosphorus–Colorimetric Method.									12	
5	UNIT- V Demonstration Experiments Estimation of protein content in food by Kjeldahl method, Estimation of fat content in food by Soxhlet method. Pigment Analysis by Paper Chromatography Techniques									12	

CO	Course Outcomes
CO1	Understand safety rules for the laboratory and demonstrate various instruments used for food analysis.
CO2	Acquire skills to prepare and standardize various solutions to conduct experiments for food analysis.
CO3	Acquire skills in ashing of foods and prepare ash solution to analyse mineral contents in food.
CO4	Demonstrate quantitative analysis of various nutrients in foods i.e. crude fibre, moisture, Vitamin C, calcium, phosphorus, iron, etc.
CO5	Demonstrate experiments to check estimation of protein, fat content and pigment analysis

Textbooks:	
1	S. Suzanne Nielsen (2017). Food Analysis Laboratory Manual. Springer International Publishing. Third Edition.
2	S. Suzanne Nielsen (2017). Food Analysis. Springer International Publishing. Fifth Edition.
3	Otles, S. (2005). "Methods of Analysis of Food Components and Additives" CRC Press, USA
4	Ranganna, S. (2001). "Hand book of Analysis and Quality Control for Fruit and Vegetable Products". Tata- McGraw-Hill, India. 2 nd edition
5	Sadasivam, S and Manickam, A (1997). "Biochemical Methods". New Age International Publishers, New Delhi. 2 nd Edition.
6	Jayaram, I, (1996), "Laboratory Manual in Biochemistry", New Age International Publishers, New Delhi. Fifth ed
7	Raghuramulu, N, Nair K.M & Kalayana Sundaram, S.A, (1983), "Manual of Laboratory Techniques", National Institute of Nutrition, ICMR.

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	3	3	2	2	3	3	3	3
CO2	3	3	3	3	2	3	3	3	3	3	3
CO3	3	3	2	3	3	3	3	2	3	3	3
CO4	3	3	3	3	3	3	3	2	3	3	3
CO5	3	3	2	3	3	2	3	3	3	3	3
Total	15	14	13	15	14	13	14	13	15	15	15
Average	3	2.8	2.6	3	2.8	2.6	2.8	2.6	3	3	3

3 – Strong, 2- Medium, 1- Low

1ST YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC24	CC-7 Research Methods in Nutrition	Core	2	1	1	0	3	4	25	75	100
Learning Objectives											
LO1	To provide students understanding about the basic concepts, approaches and methods in conducting research										
LO2	Enabling the appreciate and critique the designing are search study as well the ethical dimensions of conducting researches.										
LO3	To explain the importance of research in food science and nutrition.										
LO4	To make students understand the research problem and develop skills										
LO5	Outline of research work and construct common data collection tools.										
Unit	Content									Hours	
1	Nutrition Research Research - Meaning, Objectives and Classification of Research Designs. Exploratory, Des criptive– Longitudinal and Cross sectional, Observation. Need of Research in Food Science and Nutrition. Research Process- Selection and Formulation of Research Problem. Hypothesis – Definition, importance, types and errors I and II.									12	
2	Sampling Design- Sampling Process and Characteristics of good Sampling. Classification of Sampling Techniques- Probability and Non- Probability Sampling. Preparation of Laboratory Food Samples. Measurement and Scaling Fundamental and Comparative Scales– Meaning and types Nominal Scale Ordinal Scale Interval Scale Ratio Scale.									12	
3	Data Collection and Preparation Data Collection–Tools–Primary Data- Interviews-structured and unstructured, Case studies, Questionnaire, Surveys–Pilot, Laboratory Experiments. Secondary Data- Published Sources, Unpublished Sources. Data Preparation Process, Editing, Coding, Classification, Tabulation.									12	
4	Statistical Methods Parametric and Non- Parametric tests–Difference and Applications Data Analysis Process- Descriptive Analysis-Graphical and Diagrammatic Presentations Central Tendency–Mean, Median & Mode. Dispersion- Standard Deviation Statistical Inference–Tests of Hypothesis.									12	
5	Reporting the finding & computer applications Report Writing–Importance, Types, Mechanics, Guidelines and Precautions. End Notes-Bibliography, Appendices, Footnotes and Glossary of terms Computer applications in nutrition research- Importance and Uses Applicable Statistical Analysis Software- Literature Searching- PubMed Data Analysis-Micro Soft Excel, SPSS. Plagiarism Checker– Turnitin, Scribbr.									12	

CO	Course Outcomes
CO1	Demonstrate knowledge of the scientific method, purpose and approaches to research and become a qualified researcher.
CO2	Identify and select research sampling and scales of measurement.
CO3	Understand the types of tools applicable to research problem to develop skills of preparing outline of research work and construct common data collection tools
CO4	Assess the numerical data for providing statistical evidences to Support the research results and interpretation of data with the use of tables and pictorial representations
CO5	Present research data in a scientific manner and understand the key elements of a research report and various applications of computer in nutrition research.

Text books	
1	Kothari CR (2004). Research Methodology–Methods & Methodology. Delhi, New Age International PvtLtd.2 nd edition
2	Ranjit Kumar (2011). Research Methodology a step-by-step guide for beginners SAGE Publications.3 rd edition
3	Chawla, Deepak and Neena Sondhi. (2018): Research Methodology-Concepts and Cases. Noida, Vikas Publishing V House Pvt Ltd.2 nd edition
4	Da Daniai, Wayne Wand Chad Cross (2017): Biostatistics–Basic Concepts and Methodology For the Health Sciences–International Student Version. New Delhi, Aram International,10 th edition.
Reference Books:	
1	Kerlinger, Foundation of Educational Research Ingle P.O. Scientific Report Writing. Nagpur Sarla P. Ingle
2	Anderson, David Randet.al. (2013). Statistics for Business and Economics. Delhi
3	Bandarkar, P. L. and Wilkinson T.S. (2000). Methodology and Techniques of Social Research
4	Bell, Judith (2005): Doing our Research Project–A guide for first time researchers in education

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	3	3	3	3
CO2	3	3	3	3	2	3	3	3	3	3	3
CO3	3	3	2	3	3	3	3	2	3	3	3
CO4	3	3	3	3	3	3	3	2	3	3	3
CO5	3	3	2	3	3	2	3	3	3	3	3
Total	15	14	13	15	14	13	14	13	15	15	15
Average	3	3	2.8	3	2.8	3	2.8	2.6	3	3	3

3 – Strong, 2- Medium, 1- Low

1ST YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDE21	EC 3 –Food Preservation	Core	2	1	1	0	3	4	25	75	100
Learning Objectives											
LO1	Learn the basic concepts and importance of Food Preservation										
LO2	Understand the different methods of Food Preservation										
LO3	Choose appropriate food handling and storage techniques										
LO4	Understand about the different methods of Preservation										
LO5	Learn about how each preservation method works to inhibit spoilage and extend shelf life.										
Unit	Content	Hours									
1	Introduction to Food Preservation Concept, importance of food preservation. Common terms used in food preservation. Different methods and Principles of preservation. Food Additives.	12									
2	Preservation by Low Temperature Use of Cold and Refrigerated Storage. Use of Freezing temperatures: Slow and fast freezing of foods and Cryogenic freezing of foods, dehydro freezing, Frozen storage of foods.	12									
3	Preservation by High Temperature Preservation of foods by high temperatures. Blanching, Pasteurization and Sterilization of foods. General process of caning of foods.	12									
4	Preservation by Drying Principles and application of drying and dehydration of foods. Different types of drying and dryers	12									
5	Preservation using Chemicals and Irradiation Preservation using Chemical Preservatives-Squashes, Ketchup and Marmalade Preservation by Irradiation: Gamma rays, X-rays and Electron Beam Preservation by high osmotic pressure: High Concentration of Sugar-jams and Jellies, High Concentration of Salt. Pickling and curing of meat.	12									

CO	Course Outcomes
CO1	Describe the basic concepts and principles of Food Preservation
CO2	Identify the best methods of storage of different foods based on their shelf life. Recommend appropriate post-harvest technology procedures that increase shelf life of food
CO3	Analyze the use of low and high temperature to preserve food and identify the appropriate method to preserve different foods
CO4	Discuss the use and effects of different preservatives on the quality of foods
CO5	Appreciate the use of modern technology in food preservation and managing Food wastage

Textbooks:	
1	"Food Preservation and Processing" by Shirley J. VanGarde and Margy Woodburn
2	"Handbook of Food Preservation" edited by M. Shafiur Rahman
3	"Food Processing Technology: Principles and Practice" by P.J. Fellows
4	"Fermentation for Beginners: The Step-by-Step Guide to Fermentation and Probiotic Foods" by Drakes Press
5	"Modern Food Microbiology" by James M. Jay
Reference Books:	
1	Prakash Triveni (2010). Food Preservation ,Aadi ,Delhi.
2	M. Shafiur Rahman (2007): Hand Book of Food Preservation, Marcel Dekker Inc, New York.
3	Mc Willims and Paine (2009): Modern Food Preservation, Surjeet Publications
4	Karnal, Marcus and D.B. Lund (2003). "Physical Principles of Food Preservation"
5	Rutledge. V and Garde, S.J. and Wood burn. M (2001) "Food Preservation and Safety Principles and Practice". Surbhi Publications.

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	3	3	3	3
CO2	3	3	2	2	3	3	2	3	3	3	3
CO3	3	3	3	2	3	3	2	3	3	3	3
CO4	3	3	2	2	3	3	2	3	3	3	3
CO5	3	3	2	2	3	3	33	2	2	2	2
Total	15	15	11	11	15	15	12	15	14	14	14
Average	3	3	2.2	2.2	3	3	2.4	3	2.8	2.8	2.8

3 – Strong, 2- Medium, 1- Low

1ST YEAR: SECOND SEMESTER

Subject Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDE23	EC -5 Perspectives of Home Science	Core	2	1	1	0	3	4	25	75	100
Learning Objectives											
LO1	Understand and define the concept of Extension Education,										
LO2	Explore the interrelationship between maturation and learning, and how they influence each other in human development.										
LO3	Aim to build foundational knowledge in textile science and fabric production.										
LO4	Provide essential skills for managing family resources and improving household decision-making and interior designs										
LO5	To grasp the fundamentals of guidance and counselling, and its role in education and personal growth.										
Unit	Content									Hours	
1	Extension Education a. Meaning, definition, objectives, characteristics, principles b. Extension teaching methods-types and methods c. Qualities of a good extension worker d. Role of Extension Education in Promoting Lifelong Learning									12	
2	Human Development a. Growth, Development, Maturation and Learning. b. Principles and Developmental stages and task c. Parental Disciplinary Techniques–merits and demerits. d. Nutrition and Its Role in Human Development across the Lifespan									12	
3	Textiles and Clothing a. Classification and general properties of textile fibers. b. Processing and manufacture of Cotton, Silk, Wool, progenies. Classification of Yarn c. Textile Dyeing and Printing Techniques, Textile Testing and Quality control d. Fabric construction-woven, non-woven and knitted fabric.									12	
4	Family Resource Management a. Home Management–Meaning, objectives and process. b. Time, Money and Energy management C. Decision making-Steps and Methods of resolving conflicts. d. Principles and Elements of Interior design, Various colors and color schemes.									12	
5	Guidance and counselling a. Meaning, nature, types and scope of Guidance and counselling. b. Various steps and techniques of Guidance and counselling. c. Need and importance of educational guidance.									12	

CO	Course Outcomes
CO1	Understand the concept of Extension Education and its importance.
CO2	Comprehend the key aspects of human growth and development.
CO3	Understand the basic concepts of Textiles and Clothing.
CO4	Understand the meaning of Guidance and Counselling and Career.
CO5	Understand the meaning of Guidance and Career in Home science
Textbooks:	
1	Jha,J.K. (2002). Encyclopaedia of Teaching of Home Science, Vol. I, II and III. New Delhi: Anmol Publications.
2	Suriakanthi. A. (2002). Child Development- An Introduction Gandhi gram: Kavitha Publications.
3	Srilakshmi. B. (2015). Food Science. New Delhi. New Age Age International Pvt. Ltd.
4	Premlata Mullick (2016),4 th edition, Kalyani Publishers.
Reference Books:	
1	Serene and Ahlawat Santos Shekhar (2013). Textbook of Home Science Extension Education.
2	Tami James Moore and Sylvia M. Asay (2008). Family Resource Management, Sage Publications.
3	Diane E. Papalia (2004). 9th edition, Human Development, McGraw Hill India.
4	Rani K. Sudha and Srivastava Sushila, Textbook of Human Development: A Lifespan Development Approach, S. Chand & Co Ltd.

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	3	3	3	3
CO2	3	3	2	2	3	3	2	3	3	3	3
CO3	3	3	3	2	3	3	2	3	3	3	3
CO4	3	3	2	2	3	3	2	3	3	3	3
CO5	3	3	2	2	3	3	33	2	2	2	2
Total	15	15	11	11	15	15	12	15	14	14	14
Average	3	3	2.2	2.2	3	3	2.4	3	2.8	2.8	2.8

3 – Strong, 2- Medium, 1- Low

1ST YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDS21	Sec-1 BASIC IN FOOD SCIENCE	Core	1	1	0	0	2	2	25	75	100
Learning Objectives											
LO1	Obtain knowledge of different food groups and their nutritive value, Understand the scientific principles underlying food preparation										
LO2	To help them study the different methods of cooking and their advantages and Disadvantages.										
LO3	To gain experience in the preparation of foods with attention to the preservation of their nutritive value oriented to Indian cooking.										
LO4	To help them understand the scientific principles governing the acceptability of food preparations.										
LO5	To Provide a comprehensive understanding of fats, sugars, spices, and beverages.										
Unit	Content								Hours		
1	Introduction to Food and Cooking Methods Definition - Food, food science, nutrients, balanced diet, food pyramid. Cooking - cooking methods- Moist and Dry heat methods of cooking.								12		
2	Cereals, Millets, Pulses, Legumes and Nuts: Cereal and Millets – Nutritive value of cereals. Pulses and legumes - methods of cooking Nuts - Role of nuts in cookery Oilseeds - Uses and shelf life								12		
3	Vegetables, Fruits and Milk: Vegetables - Classification and selection of vegetables. Fruits - Enzymatic browning and its prevention. Milk - Composition and Nutritive value, Types of milk.								12		
4	Flesh foods and Egg Meats – Selection of meat. Fish - classification, Nutritive value and selection of fish Eggs - Structure, Selection, use in cookery.								12		
5	Fats and Oils - Types, Rancidity, Smoking point. Sugar - stages of sugar cookery, crystallization. Spices and Condiments – Classification, uses in Indian cookery Beverages – Classification of Beverages and nutritive value								12		

CO	Course Outcomes
CO1	To gain knowledge on food groups and its function, their nutritive value and role in the day's diet.
CO2	To understand different methods of cooking
CO3	To relate skill and techniques in Food preparation with conservation of nutrients, understand the cookery concepts involved in cereals, pulses and vegetables
CO4	To comprehend the composition, nutritive value and develop skills in the preparation of milk and fleshy products.
CO5	To recognize the smoking point of any cooking oil, apply knowledge on preparation of beverages.

Text books:

1	Srilakshmi. B; Food Science, 6th edition, New Age International (P) Limited Publishers, 2015.
2	Shakunthala Manay. N; Shadakshara Swamy.M; Foods Facts and Principles, 3 rd edition, New Age International (P) Limited Publishers, 2014.
3	Lillian Hoagland Meyer, Food chemistry, CBS Publishers and Distributors, 2004.
4	Arindam Ramaswamy, Elements of Food Science, Oxford Book Company, 2010.
5	Siva Sankar. B; Food Processing and Preservation, PHI Learning Private Limited, 2011.

Reference Books:

1	Hughes, O and Bennion, M. 1970 Introductory Foods, 5th ed., The Macmillan Co., New York.
2	Griswold, R.M. 1962. Experimental Study of Foods, Houghton Mifflin company, Boston.
3	Ghose, R.L.M., Ghate, M.B. and Subramaniam, V. 1960. Rice in India. ICMR, New Delhi.
4	Eckles, G.H., Combs, W.S. and Macy, H. 1951. Milk and Milk Products, RMB Publishing Co., Ltd., New Delhi.
5	Fisher, P. and Bender, A. 1971. The Value of Foods. Oxford University Press, London.

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	3	3	3	3
CO2	3	3	2	2	3	3	2	3	3	3	3
CO3	3	3	3	2	3	3	2	3	3	3	3
CO4	3	3	2	2	3	3	2	3	3	3	3
CO5	3	3	2	2	3	3	3	2	2	2	2
Total	15	15	11	11	15	15	12	15	14	14	14
Average	3	3	2.2	2.2	3	3	2.4	3	2.8	2.8	2.8

3 – Strong, 2- Medium, 1- Low

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC31	CC-8 ADVANCED DIETETICS	Core	3	1	2	0	5	6	25	75	100
Learning Objectives											
LO1	Understand the aetiology, physiologic & metabolic of Gastrointestinal Disorders										
LO2	Identify the crucial points of disease management of Liver and Pancreas.										
LO3	To learn recent concepts in dietary management of different diseases in Cardiovascular & Lung Disorders.										
LO4	To understand the Nutritional modifications and dietary requirements for the therapeutic condition.										
LO5	To know the appropriate nutrition therapy for cancer and RA										
Unit	Content										Hours
1	Medical Nutrition Therapy for Gastrointestinal Diseases a) Dietary management of physiologic & metabolic of Upper gastro intestinal diseases - Etiology, signs & symptoms, complications and dietary management for: Gastro-esophageal reflux disease (GERD). Stomach: Gastritis, Peptic & Duodenal Ulcer. b) Dietary management of Lower gastro intestinal diseases - Etiology, signs & symptoms, complications and dietary management of Flatulence – condition, Constipation, Diarrhea, Celiac Disease.										18
2	Medical Nutrition Therapy for Liver, Biliary & Pancreatic Diseases - Assessment, Diagnosis and PES statement of GI diseases. a) Physiology, functions of Liver. Dietary management of Hepatitis, Stages & Progression of Liver Disease, Hepatic Encephalopathy, Fatty Liver. b) Etiology, symptoms and dietary management of Cholelithiasis, Cholecystitis and cholecystectomy. c) Dietary management and diagnostic tests of Pancreatic disorders; Acute & Chronic Pancreatitis, Type 1 Diabetes, Type 2 Diabetes, Gestational Diabetes.										18
3	Medical Nutrition Therapy for Cardiovascular, Renal & Lung Diseases a) Prevalence, Pathophysiology, risk factors, diagnostic tests and dietary management of cardiovascular diseases; Atherosclerosis and Hypertension. b) Pathophysiology, classification, diagnostic tests, risk factors and dietary management of acute and chronic renal failure Glomerulonephritis, Nephrotic Syndrome.										18

	C)Pathophysiology, risk factors and dietary management of lung diseases: Asthma, Tuberculosis and Lung Cancer.	
4	Medical Nutrition Therapy for Weight Management and Other Conditions a) Etiology, classification, management of Obesity: Types & causes of Obesity, Nutritional Management. b) Etiology, clinical manifestation and Dietary management of Underweight. c) Classification, dietary management in Burns, AIDS, Stroke, Fever. Preventive medicine: A whole plant-based food without medications	18
5	Nutritional management in cancer Pathogenesis and progression of cancer, types, Symptoms and Dietary management. Medical Nutrition therapy for Rheumatic disease Etiology, Pathophysiology of Inflammation of Rheumatic diseases, Rheumatoid Arthritis, Osteoarthritis.	18

CO	COURSE OUTCOMES
CO1	Explain patho physiology, signs and symptoms and nutrition management of the various disease conditions of upper and lower Gastro Intestinal tract
CO2	Enumerate the types, Etiology, symptoms and complications and explain the dietary management of diseases of liver, Biliary and pancreatic diseases.
CO3	Comprehend the nutrient requirement for each disease condition including Cardiovascular, Renal and Lung diseases
CO4	Identifying the diet therapy for weight management and related interventions.
CO5	Apply the dietary principles to manage the life style disorders in the society

Text books:	
1	B.Srilakshmi.(2020).Dietetics.K.K.GuptaForNewageInternationalPvtLtd.NewDelhiPublisher.
2	Advanced Nutrition and Dietetics in Diabetes (Advanced Nutrition and Dietetics) Ph.D. Goff, Louise (Editor), Ph.D. Dyson, Pamela (Editor) 2015
3	Sue Rodwell Williams (2013) Nutrition, Diet Therapy (9th ed.). WB Saunders Company, London
4	RobinsonCh.,M.B.Lawlea,W.L.,Chenoweth,andA.E.,Carwick.BasicNutritionandDiettherapy,MacmillanPublishingCompany.
Reference Books:	
1	GarrowJS,JamesWPT,RalphA.(2000).HumanNutritionandDietetics.ChurchillLivingstone,NY.10 th edition.
2	Nix S. (2013) Williams' Basic Nutrition & Diet Therapy. 14 th Edition. Pub. Elsevier

3	Whitney,E.N.andC.B.Cataldo.(1983).UnderstandingNormalandClinicalNutrition.WestPubS1.Paul.
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Web resources:
https://www.espen.org
https://www.nutritioncare.org/home
https://www.idf.org
https://ispad.org
https://www.diabetes.org

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	3	3	3	3	3	3
CO2	3	3	1	3	2	3	3	3	3	3	3
CO3	3	2	1	3	2	3	3	3	3	3	3
CO4	3	2	1	3	3	3	3	2	3	3	3
CO5	3	3	1	3	3	3	3	3	3	3	3
Total	15	12	5	15	13	14	14	14	15	14	13
Average	3	2.4	1	3	2.6	2.8	2.8	2.8	3	2.8	2.6

3–Strong, 2-Medium,1-Low

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC33P	CC-10 Practical III - Advanced Dietetics	Core	0	0	5	0	4	5	25	75	100
Learning Objectives											
LO1	To understand the therapeutic modifications of diet.										
LO2	To acquire knowledge in planning diets for Cardiovascular Disorders										
LO3	To acquire knowledge in planning diets for various disorders.										
LO4	Apply principles of diet therapy in planning and preparation of foods for various disease conditions.										
LO5	Know the various nutritional supplements available and identify its appropriate usage.										
Unit	Content								Hours		
Unit I	1. Routine hospital diet: Regular diet, Clear liquid, soft diet, Full liquid diet 2. Assessing requirements and planning diet for obesity and underweight individual								15		
Unit II	Planning and preparation of diet for A. Atherosclerosis B. Hypertension								15		
Unit III	Assessing and planning diets for the following conditions A. Peptic ulcer B. Hepatitis C. Cirrhosis								15		
Unit IV	1. Planning and preparation of diet for cancer according to the condition. 2. Planning and preparing diet for Rheumatic arthritis								15		
Unit V	1. Planning and preparation of diet for Glomerulonephritis 2. Planning diet for postburn condition Nutritional supplements for above disease condition								15		

CO	COURSE OUTCOMES
CO1	Evaluate various therapeutic diets
CO2	Acquire the skill to accurately assess and interpret the nutritional status
CO3	Apply dietetic principles in planning, preparing and evaluating meals intended for various disease conditions.
CO4	Create knowledge in nutrient calculations and dietary principles.
CO5	Identify the requirements for disease conditions and critically ill patients

Text books:	
1	EliaM,LjungqvistO,StrattonRJ,LanhamSA.(2013).ClinicalNutrition.TheNutritionSociety Textbook. WileyBlackwellPublishers.2ndedition.
2	Mitch,W.andIkizler,Alp.(2010).HandbookofNutritionandtheKidney.LippincottWilliamsandWilkins,NewDelhi.6thedition.
Reference Books:	
1	ClinicalDieteticsManual.(2018).IndianDieteticAssociation.2 nd edition.
2	William's.(2012).BasicNutritionandDiettherapy.14thedition.

Web resources:	
https://www.espen.org	
https://www.nutritioncare.org/home	
https://www.idf.org	
https://ispad.org	
https://www.diabetes.org	

MappingwithProgrammeOutcomesandProgrammeSpecificOutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	2	2	3	3	2	2
CO2	3	3	1	3	2	3	3	3	3	3	2
CO3	3	2	1	3	2	3	3	3	3	3	3
CO4	3	2	1	3	3	3	3	2	3	3	3
CO5	3	3	1	3	3	3	3	3	3	3	3
Total	15	12	5	15	13	14	14	14	15	14	13
Average	3	2.4	1	3	2.6	2.8	2.8	2.8	3	2.8	2.6

3–Strong, 2-Medium,1-Low

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC32	CC-9 FOOD MICROBIOLOGY	Core	3	1	2	0	5	6	25	75	100
Learning Objectives											
LO1	Define and classify microorganisms based on their characteristics.										
LO2	Explain the techniques for culturing, sampling, and isolating microorganisms.										
LO3	Understand the role of microorganisms in food fermentation and identify common fermented foods in India.										
LO4	Identify foodborne pathogens and describe their effects on human health.										
LO5	To learn the food preservation methods and their applications in food safety.										
Unit	Content									Hours	
1	Definition and classification of microorganism. General morphology of microorganism – bacteria, fungi, algae, yeast and virus. Microbial growth –growth curve, factors affecting growth: intrinsic factors and extrinsic factors									18	
2	Culturing of an organism Sampling, sample collection, transport and storage, sample preparation for analysis. Microscopic and culture dependent method- Direct microscopic observation, culture, enumeration and isolation methods									18	
3	Beneficial Use of Microorganism in Food Definition Of Fermentation, Principles of culture maintenance and preparation, Types of Starter Cultures Used for Food Fermentation. Cereal, Pulse, Milk, Fruit and Vegetable Based Fermented Products of India/Asian Countries. Concept Of Probiotics, Prebiotics, Symbiotic, Single Cell Protein and Psychobiotics									18	
4	Harmful effects of Microorganisms Food borne diseases: Definition, Bacterial food borne diseases (Staphylococcal intoxication, Botulism, Salmonellosis, Shigellosis, Escherichia Coli, Clostridium Perfringens gastroenteritis, Bacillus cereus Gastroenteritis).									18	
5	Principles of food preservation. Physical methods and chemical methods – high temperature, Principles and techniques of canning, low temperature, chemical and natural preservatives, dehydration, food irradiation, hurdle technology. Food Safety and its importance.									18	

CO	Course Outcomes
CO1	Acquire the knowledge about different Microorganisms
CO2	Relate the theoretical knowledge with sampling and culturing of organisms
CO3	To understand the concept of beneficial use of Microorganisms
CO4	Comprehend the knowledge gained on the concepts of food borne diseases and to assess the microbiological quality of food
CO5	Apply knowledge in field of food preservation and its recent advances.

Text books:	
1	Food Microbiology by Martin R. Adams, Peter J. McClure, and Maurice O. Moss
2	Modern Food Microbiology by James M. Jay, Martin J. Loessner, and David A. Golden
3	Fundamental Food Microbiology by Bibek Ray and ArunBhunia
4	Foodborne Microorganisms of Public Health Significance edited by Ailsa D. Hocking
5	Principles of Food Sanitation by Norman G. Marriott and Robert B. Gravani
Reference Books:	
1	Microbiology of Fermented Foods by B. J. Wood
2	Food Microbiology by Frazier and Westhoff
3	Industrial Microbiology by Prescott and Dunn
4	Microorganisms in Foods by International Commission on Microbiological Specifications for Foods (ICMSF)
5	Fundamentals of Microbiology by L. M. Prescott and J. P. Harley

Web resources:	
	https://www.microbiologysociety.org/
	https://www.cdc.gov/foodborneburden/index.html
	https://www.who.int/health-topics/food-safety
	https://pubmed.ncbi.nlm.nih.gov/
	https://www.asm.org/

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	2	2	3	3	2	2
CO2	3	3	1	3	2	3	3	3	3	3	2
CO3	3	2	1	3	2	3	3	3	3	3	3
CO4	3	2	1	3	3	3	3	2	3	3	3
CO5	3	3	1	3	3	3	3	3	3	3	3
Total	15	12	5	15	13	14	14	14	15	14	13
Average	3	2.4	1	3	2.6	2.8	2.8	2.8	3	2.8	2.6

3-Strong, 2-Medium, 1-Low

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC34	CC-11 PERFORMANCE NUTRITION	Core	2	1	1	0	3	4	25	75	100
Learning Objectives											
LO1	Understand about the Nutritional assessment and Energy Requirements for athletes										
LO2	Understand the role of Carbohydrate, Protein and Fat Requirement for Sports Performance.										
LO3	Learn about the role of Micronutrients and Hydration in enhancing Sports Performance.										
LO4	Understand the fundamentals of planning diet for different sports.										
LO5	Know about the different types of sports supplements and nutrition for special athletes.										
Unit	Content									Hours	
1	Nutritional assessment for athletes -assessment of body composition, techniques of measuring body composition, surface anthropometry, Biochemical, clinical and dietary assessment, Body composition and sports performance. Energy requirements for optimal athletic performance - Energy production, Energy metabolism in Athletes, Fatigue and exercise, energy requirements of athletes, factors affecting energy requirements of athletes									12	
2	Carbohydrates in sports performance - Carbohydrate types, Glycemic index and Glycemic load, carbohydrate utilization during exercise, carbohydrate loading, fueling before during and after exercise, carbohydrate requirements for athletes. Protein and fat requirement for sports performance -protein and exercise, requirements of protein and fat for athletes, factors affecting protein requirements, protein needs and vegetarian athletes.									12	
3	Micronutrients in sports - vitamins and mineral requirements in athletes, sports anemia, antioxidants and exercise induced free radicals. Hydration for athletes - Fluid balance and thermoregulation, fluid and electrolyte requirements for athletes, Effects of dehydration, factors affecting fluid intake, gastric emptying and fluid delivery to working muscles, Fluid intake before, during and after exercise.									12	
4	Nutrition for competition performance -Nutrient timing, pre-competition nutritional guidelines, nutrition during exercise and nutrition after exercise, nutrition plan for specific sports events. Ergogenic aids - Categories of Ergogenic aids and Ergolytics. Sports foods -sports drinks, sports gels dietary supplements,MCT diets, Antioxidant rich dietsupplements.									12	
5	Nutrition for athletes with special dietary needs - Nutrition for special population like children, young and older athlete, Female athlete triad, weight loss and weight gain in athletes, vegetarian athlete, diabetic athlete, athletes with disabilities, factors affecting nutritional needs for travel athlete, GI stress and athletes.									12	

CO	Course Outcomes
CO1	Analyze and assess the body composition of athlete
CO2	Comprehend the role of Macronutrients towards athletic performance
CO3	Emphasize the Role of Micronutrients, principles of fluid balance and thermoregulation in athletes.
CO4	Retrieving the various sports supplements and Ergogenic aids for the athletes
CO5	Apply personalized nutrition guidance in the area of sports nutrition.

Text books:	
1	B.Srilakshmi, Suganthi.v, C.Kalaivani Ashok.(2017). Exercise physiology fitness and sports Nutrition, New age publishers. 1st edition.
2	Bourns, Fred.(2002).Essentials of Sports Nutrition. John and Wiley. 2nd edition.
3	Bean, Anit. (2010).The complete guide to Sports Nutrition.A&C.Black. London.6th edition.
Reference Books:	
1	D. Enette Larson-Meyer.(1963).Vegetarian sports nutrition.Human kinetics.
2	Natalie DigateMuth.(2015).Sports Nutrition for healthprofessionals.QuincyMcDonald.
3	Burke, Louise. (2007).Practical Sports Nutrition.Human Kinetics.

Web resources:	
http://ijnpa.biomedcentral.com	
www.acsm.org	
www.ausport.govt.au	
www.sportsci.org	
www.gssiweb.com	

MappingwithProgrammeOutcomesandProgrammeSpecificOutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	2	2	3	3	2	2
CO2	3	3	1	3	2	3	3	3	3	3	2
CO3	3	2	1	3	2	3	3	3	3	3	3
CO4	3	2	1	3	3	3	3	2	3	3	3
CO5	3	3	1	3	3	3	3	3	3	3	3
Total	15	12	5	15	13	14	14	14	15	14	13
Average	3	2.4	1	3	2.6	2.8	2.8	2.8	3	2.8	2.6

3–Strong, 2-Medium,1-Low

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDE31	EC-7 FOOD PRODUCT DEVELOPMENT	Core	2	1	1	0	3	4	25	75	100
Learning Objectives											
LO1	To Learn the Steps Involved in Food Product Development, Consumer preference and Formulation of Nutritious Food Product.										
LO2	To Learn about the Sensory characteristics and Rating Test of Food product.										
LO3	To Understand the Different types of Packaging Materials.										
LO4	To Learn the Product Labelling and Nutritional Information in Governing Laws.										
LO5	To Develop Advertising and Marketing Strategies										
Unit	Content										Hours
1	INTRODUCTION TO NEW FOOD PRODUCT DEVELOPMENT Definition, significance of product development, food needs and consumer preferences, market survey and designing a questionnaire to find consumer needs for a product. Steps involved in product development, formulation of nutritious food products and standardization, Factors that influence new product development success,										12
2	SENSORY EVALUATION OF THE PRODUCT Assessing the sensory characteristics of food - colour, texture, odor and taste. Sensory evaluation of foods – Laboratory set up, equipment, panel selection and training, judging quality. Subjective evaluation techniques – Difference tests: paired comparison test, duo-trio test, triangle test. Rating tests – Ranking single sample, two samples and multiple samples. Objective tests to assess the sensory properties of foods.										12
3	ESSENTIALS OF FOOD PACKAGING Importance, definition, principles design requirement and basic FSSAI laws packaging functions, Package testing, Safety of food packaging Selection criteria and types of packaging material – metal, glass, paper, plastic, edible, wooden. Packages with special features – Boil-in-bag package, plastic-shrink package, cryovac film, microwave oven packaging, aseptic packaging and Distribution packaging.										12
4	PRODUCT LABELLING AND REGULATIONS Definition, purpose, importance, Function, Nutritional information and laws Governing product labeling. Types of labeling – smart labels, barcode labels, radioactive labels, antimicrobial labels, security labels and other specialized food labels. General Labeling , Food Labeling and Nutritional Labeling Standards and regulations for nutrition harming and Nutrition claims in food labels.										12

5	<p>QUALITY CONTROL, PRICING AND MARKETING</p> <p>Analyzing the product stability, evaluation of shelf life, determining the changes in sensory attributes due to environmental conditions. Pricing a product, Methods of pricing-cost plus pricing, Demand pricing, Competitive pricing, markup pricing, Principles of pricing, determining the selling price and profit margin, price bundling, promotional pricing and quantity discounts.</p> <p>Advertising and marketing strategies- Basic techniques, Food advertising regulations.</p>	12
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CO	Course Outcomes
	Students will be able to
CO1	Understand the Concept of Food Product Development and Market Strategies.
CO2	Analyze Subjective Evaluation Techniques
CO3	Evaluate Selection Criteria and Types of Packaging Materials in Food Product
CO4	Understand standards and regulations concerning nutritional labeling, including guidelines for nutrient content claims and health claims
CO5	Analyze about Types of Pricing and Marketing Strategies.

Text books:	
1	Food Product Development: From Concept to the Marketplace" by I. Sam Saguy and Ernest Graf
2	Sensory and Consumer Research in Food Product Design and Development" by Howard R. Moskowitz, Jacqueline H. Beckley, and Anna V. A. Resurreccion
3	Food Labeling Compliance Review" by James L. Summers
Reference Books:	
1	Quality Control for the Food Industry" by Amihud Kramer and Bernard A. Twigg
2	Sensory Evaluation of Food: Principles and Practices" by Harry T. Lawless and Hildegard Heymann

Web resources:	
	www.slideshare.net/slideshow/food-product-development-process-design-strategies/262044800
	https://www.fssai.gov.in/PDF

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	2	2	3	3	2	2
CO2	3	3	1	3	2	3	3	3	3	3	2
CO3	3	2	1	3	2	3	3	3	3	3	3
CO4	3	2	1	3	3	3	3	2	3	3	3
CO5	3	3	1	3	3	3	3	3	3	3	3
Total	15	12	5	15	13	14	14	14	15	14	13
Average	3	2.4	1	3	2.6	2.8	2.8	2.8	3	2.8	2.6

3-Strong, 2-Medium, 1-Low

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDE32	EC-8 NUTRITION IN EMERGENCIES	Core	2	1	1	0	3	4	25	75	100
Learning Objectives											
LO1	Understand the types of natural and manmade disasters that lead to emergency situation.										
LO2	Identify the specific nutritional challenges faced by vulnerable groups (e.g., children, pregnant women, elderly, displaced populations) during emergencies.										
LO3	Understand the nature of communicable diseases: Identify the types of communicable diseases.										
LO4	Understand the different aspects of malnutrition assessment and how it varies depending on the context (e.g., refugee camps, disaster zones, conflict areas).										
LO5	Understand the methods and tools used to evaluate the nutritional requirements of populations affected by disasters, conflicts, or other emergencies.										
Unit	Content									Hours	
1	Natural / manmade disasters resulting in emergency situations. Famine, drought, flood, earthquake, cyclone, war, civil and political emergencies. Factors giving rise to emergency situation in these disasters. Illustration using case studies from Indian Subcontinent.									12	
2	Nutritional problems in emergencies in vulnerable groups. Causes of malnutrition in emergency situations. Major deficiency diseases in emergencies. Protein – energy malnutrition. Specific deficiencies.									12	
3	Communicable diseases: Surveillance and treatment. Control of communicable diseases in emergencies Role of immunization and sanitation. Public nutrition approach to tackle nutritional problems in emergencies.									12	
4	Assessment and surveillance of nutritional status in emergency affected populations. Scope of assessment of malnutrition in emergencies. Indicators of malnutrition clinical signs for screening acute malnutrition, Subjective Global Assessment Index Anthropometric assessment of nutritional status – Indicators and cut – offs indicating seriously abnormal nutrition situation weight – for – height-based indicators, MUAC, social indicators. Organization of nutritional surveillances and individual screening.									12	
5	Nutrition Relief and Rehabilitation. Assessment of food needs in emergency situations. Food distribution strategy – identifying and reaching the vulnerable group – Targeting Food Aid. Mass and supplementary feeding. Special foods / rations for nutritional relief. Local production of special foods. Local food rehabilitation. Organization of mass feeding / general food distribution. Feeding centers. Transportation and food storage. Sanitation and hygiene. Evaluation of feeding programmes.									12	

CO	Course Outcomes
CO1	Gained insight on Natural / manmade disasters resulting in emergency situations.
CO2	To understand the common nutritional problems prevalent among the vulnerable groups in emergencies
CO3	Learned about communicable diseases in emergencies and public nutrition approach to tackle them.
CO4	The student will gain knowledge to assess the nutritional status of emergency affected population and organize nutritional surveillance and individual screening.
CO5	Learned knowledge to apply the principles of massive supplementary feeding and food safety for the welfare of the community

Text books:	
1	The Management of Nutrition in Major Emergencies. WHO, UNHCR, IFRC, WFP. Geneva,. World Health Organisation. 2000.
2	Kielmann AA, Taylor CE, Parker RL. The Narangwal Nutrition Study: a summary review. American Journal of Clinical Nutrition. 1978;31:2040–2052. [PubMed]
3	Nutrition in Public Health: A Handbook for Developing Programs and Services” by Arlene Spark.
4	Essential Nutrition Actions: Improving Maternal, Newborn, Infant and Young Child Health and Nutrition” by UNICEF.
5	The Science and Fine Art of Food and Nutrition” by Arnold Ehret
Reference Books:	
1	Shills, M.E., Olson, J.A, Shike, M and Ross, A.C. (2003): Modern Nutrition in Health and Disease, 9th Edition, A. Williams and Willdns.
2	Goyet, fish.. V.; Seaman, J. and Geiger, u-(2008): The Management of Nutritional Emergencies in Large Populations, World HealthEmergency Nutrition: From Response to Recovery” by Lesley J. Mills Organization, Geneva
3	Mahan, L.K. and Escort-Stump, S. (2000): Krause’s Food Nutrition and Diet-Therapy, 10th Edition, W-13 Saunders Ltd.
4	Emergency Nutrition: From Response to Recovery"by Lesley J. Mills.
5	Nutrition and Health in a Disaster” by Pierre M. L. Chaves.

Web resources:
Handbook of Nutrition and Food, Third Edition by Carolyn D. Berdanier (Editor); Johanna T. Dwyer (Editor); David Heber (Editor).
The Atlas of Food by Erik Millstone; Tim Lang; Marion Nestle (Foreword by)
Dietary Reference Intakes by Jennifer J. Otten (Editor); Jennifer PitzHellwig (Editor); Linda Meyers (Editor)
Encyclopaedia of Food Sciences and Nutrition.
Scrimshaw NS, Taylor CE, Gordon JE. Interactions of nutrition and infection. Geneva: WHO; 1968.

MappingwithProgrammeOutcomesandProgrammeSpecificOutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	2	2	3	3	2	2
CO2	3	3	1	3	2	3	3	3	3	3	2
CO3	3	2	1	3	2	3	3	3	3	3	3
CO4	3	2	1	3	3	3	3	2	3	3	3
CO5	3	3	1	3	3	3	3	3	3	3	3
Total	15	12	5	15	13	14	14	14	15	14	13
Average	3	2.4	1	3	2.6	2.8	2.8	2.8	3	2.8	2.6

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDS31	Sec-2 DIET COUNSELING AND PATIENT CARE	Core	1	1	0	0	2	2	25	75	100
Learning Objectives											
LO1	To familiarize students with diet counselling skills and acquaint them with basic principles of psychology										
LO2	Understand the interrelationship between Nutrition and Psycho social disorders.										
LO3	To understand the special needs and health challenges of the human life cycle.										
LO4	familiarize with the health promoting treatment.										
LO5	To understand the Concept of Diet Counselling in Therapeutic Diet										
Unit	Content									Hours	
1	UNIT-1: Introduction to counselling Definition of counselling, Theories of counselling – Reality theory, Gestalt theory, cognitive behavioral, counselling theory. Types of counselling - client centered counselling, Behavioural counselling, Directive and non-directive and eclectic counselling. Areas of counselling- individual (personalized), family, group.									6	
2	UNIT-2: Basic counselling skills Observation Skills, questioning skills, Communication Skills (Listening, Feedback, Non-Verbal), Making Notes and Reflections. The Counselling Interview, History Taking, Interviewing (Characteristics, Types and Techniques). Counselling to special group – children, adolescent and elderly.									6	
3	UNIT-3: Component of counselling Relationship of the Counsellor, Role Model, Need of the Counsellor. Objectivity/Subjectivity, Emotional Involvement, Counsellor Limits in Practice.									6	
4	UNIT-4: Counselling ethics Need for Ethical Standards, Ethical Codes and Guidelines, Rights of Clients Dimensions of Confidentiality, Dual Relationships in Counselling Practices. The Counsellor's Ethical and Legal Responsibilities, Ethical Issues in the Assessment Process.									6	
5	UNIT-5: Diet counselling at hospital and community level Role of counselling in hospital, Role of counselling in community, organizing health camps and patient feedback – at hospital level, Organizing health camps and patient feedback – at community level, Diet counselling for obese people. Diet counselling for Diabetics. Diet counselling for CVD. Diet counselling for mother and child care. Diet counselling for adolescent. Patient follow up / home visits.									6	

CO	Course Outcomes
CO1	Enriches in knowing the guidelines for counseling.
CO2	Understanding the techniques embedded in skills of counseling
CO3	Comprehending the different components involved in counseling
CO4	Evaluating and analyzing the ethical standard in counseling
CO5	Apply and relate the knowledge obtained in counseling and patient care

Text books:	
1	Linda, G. Snetselaar, (2009). Nutrition Counseling Skills for the Nutrition Care Process. (4th ed.) Jones and Bartlett Publishers.
2	Mahan, L.K., Raymond, J.L. (2017). Krause's Food and Nutrition Therapy. (12th ed.), United Kingdom: Elsevier.
3	Richard, O. Straub. (2017). "Health Psychology". (6th ed.) New York: Worth Publishers
4	Robinson, C. H. (1990). Normal and Therapeutic Nutrition. United States: Macmillan Publishing Company.
5	Taylor, S. E. (2006). Health Psychology. India: McGraw-Hill Education (India) Pvt Limited.
6	Nix McIntosh, S. (2016). Williams' Basic Nutrition & Diet Therapy - E-Book. India: Elsevier Health Sciences.
Reference Books:	
1	Beena, C and Parweshwaran, E.G. Invitation to Psychology. Neel Kamal Publications.
2	Gable, J. and Herrmann, T. (2016). Counselling skills for dietitians (3rd ed.). United Kingdom: Blackwell Publishing Ltd.
3	Gibson, R.L. and Mitchell, M.H. (2005). Introduction to counselling and guidance. (6th ed.). 4. Gelso, C.J. and Fretz, B.R. (1995). Counselling Psychology. Bangalore: Prism Books Pvt Ltd. 5. Sharma, T.C. (2002). Modern Methods of Guidance and Counseling. New Delhi: Sarup & Sons.
Web sources	
1. https://www.ncbi.nlm.nih.gov/pmc/articles 2. https://www.betterhealth.vic.gov.au/health/servicesandsupport/dietitians 3. https://www.art-of-patient-care.com/medical-references.html 4. http://www.webmd.com/ 5. https://onlinelibrary.wiley.com/journal	

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	2	2	3	3	2	2
CO2	3	3	1	3	2	3	3	3	3	3	2
CO3	3	2	1	3	2	3	3	3	3	3	3
CO4	3	2	1	2	3	2	3	2	2	2	3
CO5	3	3	1	3	3	3	3	3	3	3	3
Total	15	12	5	14	13	14	14	14	14	13	13
Average	3	2.4	1	2.8	2.6	2.8	2.8	2.8	2.8	2.6	2.6

3-Strong, 2-Medium, 1-Low

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC41	CC -12 ADVANCED FOOD SERVICE MANAGEMENT	Core	3	1	2	0	5	6	25	75	100
Learning Objectives											
LO1	Understand the modern trends and approaches in food service management										
LO2	Understand various modes of purchasing and the importance of systematic procurement in food service establishments.										
LO3	Learn the different food delivery service systems and types of service styles used in food service establishments.										
LO4	Gain knowledge of employee welfare facilities and benefits , and their role in improving job satisfaction and retention.										
LO5	Learn the phases of layout planning , including determining workflow, identifying work centers, and selecting equipment.										
Unit	Content									Hours	
1	HISTORY, DEVELOPMENT OF FOOD SERVICE SYSTEM, MENUPLANNING - History and development, Types of food service establishments- Commercial establishments & Non- commercial establishments, Approaches to food service management. Menu planning – definition, importance, needs and skills required for planning menu. Types of Menu and its applications - Steps in menu planning, construction of menu, characteristics of a good menu.									18	
2	PURCHASE AND STORAGE, QUALITY AND FOOD PRODUCTION - Mode of purchasing, centralized purchasing, group purchasing, minimum stock level, maximum stock level. Storage space -dry storage, low temperature storage, store room management. Production control, use of standardized recipes, safeguard in food production, quality control in food preparation and cooking.									18	
3	FOOD MANAGEMENT: DELIVERY AND SERVICE STYLES Methods of delivery service system -centralized delivery system, decentralized delivery system, conventional food service system. Different types of service in food service establishments - table and counter service, self-service. Types of service in a restaurant -silver service, plate service cafeteria service, and buffet service. Specialized forms of service -hospital tray service, home delivery, room service.									18	
4	PERSONNEL MANAGEMENT, WORK PLACE SAFETY Definition of leadership, leadership styles recruitment, selection and induction, Employee facilities and benefits, Training and development. Hygiene and sanitary practices, types of accidents, precautions to prevent accidents. Garbage and refuse sanitation - inside and outside storage, Pest control- pests, signs of infestation.									18	

5	<p>SETTING UP AND PLANNING FOOD SERVICE UNIT</p> <p>Layout and design – Phases of planning layout, determining work centers equipment, Factors influencing layout design, evaluation of plan and time management.</p> <p>Planning- steps and types of planning, Preparing a planning guide ,Credit facilities for startup .</p>	18
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CO	COURSE OUTCOMES
CO1	Explain the historical development and classify food service establishments.
CO2	Implement food safety practices and quality control checks during food preparation and Cooking in institutional settings.
CO3	Identify the main types of food delivery systems and explain different service styles used in Restaurants, cafeterias, and institutional food outlets.
CO4	Discuss the importance of employee facilities, benefits, and training for workplace Productivity and development and human resource management in food service organizations.
CO5	Identify the critical design factors that affect efficiency, hygiene, and customer satisfaction in a food service unit.

Text books:	
1	"Foodservice Management: By Design"
2	"On Cooking: A Textbook of Culinary Fundamentals" by Sarah R. Labensky, Steven G. Labensky, and Alan M. Hause:
3	"Foundations of Lodging Management" by Michael J. O'Fallon and Roger G. Clouser:
4	"Business Plan for a Restaurant: How to Write a Winning Plan to Open a Restaurant" by Brian A. Cohen:
Reference Books:	
1	"Foundations of Menu Planning" by Daniel Traster
2	"HACCP: A Practical Guide" by the Food and Drug Administration (FDA):
3	"Food and Beverage Management" by Bernard Davis, Sally Stone, and Andrew Lockwood:
Web resources:	
https://www.haccpalliance.org – Safety standards in food service systems	

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	4	4	3	3	4	3	3	3	4	4	4
CO2	4	3	3	4	3	3	4	3	4	3	3
CO3	3	3	4	3	4	4	3	3	4	4	3
CO4	4	4	4	4	3	3	4	3	3	3	4
CO5	3	3	3	4	3	3	4	4	4	4	4
Total	18	17	17	18	17	16	18	16	19	18	18
Average	3.6	3.4	3.4	3.6	3.4	3.2	3.6	3.2	3.8	3.6	3.6

3–Strong, 2-Medium, 1-Low

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC42	CC-13 PUBLIC HEALTH NUTRITION	Core	3	1	2	0	5	6	25	75	100
Learning Objectives											
LO1	To understand the concept of Public Nutrition.										
LO2	Impart the knowledge about Assessment of Nutritional status.										
LO3	To enable students to develop a holistic knowledge based on the importance of understanding the Nutrition problems and their prevention										
LO4	To understand the nutritional problems during the emergencies/disasters as well as the strategies to tackle them.										
LO5	develop skills in preparation of communication Aids and planning nutrition education Programme for the community										
Unit	Content									Hours	
1	CONCEPT OF PUBLIC NUTRITION a) Role of Nutrition and Health in National Development b) Relationship between health and nutrition, National Health Care Delivery System c) Determinants of Health Status, Indicators of Health. Nutritional deficiency disorders in India d) Prevalence .Etiology, Symptoms, Current status and Recent updates-Protein Energy Malnutrition, Vitamin A deficiency disorder, Iodine Deficiency Disorder, Anemia. Role of public nutritionists in the health care delivery system									18	
2	ASSESSMENT OF NUTRITIONAL STATUS Direct methods: Direct methods of Nutritional assessment, Nutritional anthropometry, biochemical, clinical and dietary assessment and Growth charts-plotting of growth charts. Indirect methods: Demography, population dynamics and vital health Statistics and their health implications. Food balance sheets, recent Nutritional assessment methods- MUST, SGA, SOAP. Indicators of health and nutrition. Basic concepts of Nutritional Surveillance- Millennium Development Goals (MDG).									18	
3	STRATEGIES FOR IMPROVING NUTRITIONAL STATUS AND HEALTH STATUS OF THE COMMUNITY a) Immunization: Awareness, types of vaccines, Importance and schedule of Immunization. b) Nutrition intervention programmes- Balwadi Feeding Programme, Antyodaya Anna Yojana (AAY), Annapurna Scheme, Mid day Meal Program, CM Breakfast Scheme Food For Work Programme, Special Nutrition Programme.									18	

4	<p>ORGANIZATIONS TO COMBAT MALNUTRITION AND NUTRITION DURING EMERGENCIES AND SPECIAL CONDITIONS</p> <p>International organizations concerned with food and nutrition-AFPRO, CWS, CRS and World Bank.</p> <p>National organization – CHEB, NIPCCD, DFRL, NGOs.</p> <p>Nutritional deficiency diseases in emergencies-Major and micronutrient.</p> <p>Control of communicable diseases in emergencies-Factors responsible for spread of communicable disease, mode of transmission and prevention of chicken pox, malaria, swineflu, COVID-19 and AIDS.</p>	18
5	<p>NUTRITION EDUCATION AND EXTENSION OF BETTER NUTRITION</p> <p>Nutrition education for the community –Objectives, Definition and Importance of nutrition education to the community, Principles Of planning, executing and evaluating nutrition education programmes.</p> <p>Development and Use of AV aids in Public Nutrition Education.- Charts flipchart, posters, flannel board, models, OHP.</p>	18

CO	Course Outcomes
CO1	Understand the role of nutrition in national development
CO2	Acquire skill in assessment of nutritional status of Community.
CO3	Gain depth knowledge on strategies for improving nutritional Status and health status of the community.
CO4	Evaluate the role organization in combating malnutrition.
CO5	Understand and apply nutrition education for the community Welfare.

Text books:	
1	Park, K. (2013). Text Book of Preventive and Social medicine. M/s. Banarsidas Bhanot Publishers ,Jabalpur. 22 nd Edition
2	Suryatapa Das (2020).Textbook of Community Nutrition. Academic Publishers,Kolkata.4th Edition
3	Srilakshmi, B (2017).Nutrition Science. New Age International Publishers. Multi Color 6 th Edition.
4	WHO (2002).The management of Nutrition in Major Emergencies. Published by AITBS Publishers, New Delhi.
Reference Books:	
1	. Muthu V K (2014).A Short Book of Public Health, Jaypee Brothers Medical Publishers.2 nd edition
2	Owen,A.Y. and Frackle,R.T.,(2002).Nutrition in the Community. The Art of Deliv erring Services. Times Mirror /Mosby.2 nd Edition
3	Carolyn Deadener Johanna T. Dwyer David Heber (2014).Hand book of Nutrition and Food, CRC Press, New York. Third Edition.
Web Resource	
https://bradley.libguides.com/publichealthedu/websites	
https://unl.libguides.com/c.php?g=332530&p=2234794	

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	4	4	4	3	4	3	4	4	3
CO2	4	3	4	3	4	3	4	3	3	3	4
CO3	3	4	3	3	4	4	3	3	4	4	3
CO4	4	3	4	3	3	4	3	4	4	3	4
CO5	3	4	3	4	4	3	3	4	3	3	4
Total	17	17	17	17	19	17	17	17	18	17	18
Average	3.4	3.4	3.4	3.4	3.8	3.4	3.4	3.4	3.6	3.4	3.6

3 – Strong, 2- Medium, 1- Low

Subject Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDE41	EC-9 Functional Foods & Nutraceuticals	Core	4	1	1	0	4	6	25	75	100
Learning Objectives											
LO 1	To gain knowledge about functional foods and Nutraceuticals										
LO 2	To have thorough understanding about the health effects										
LO 3	To be familiar with applications in industry.										
LO 4	Identify other Nutraceuticals and its Benefits.										
LO 5	To gain knowledge about how Nutraceuticals in Medical Foods and their Functions										
Unit	Content									Hours	
1	Introduction- Functional foods and nutraceuticals Introduction, definition, importance, Health attributes of functional foods– Introduction, Health living Index provides information on healthy diet.									18	
2	Prebiotic and Probiotic immune system, sources of microalgal health supplement, Colonic Functional Foods: Introduction, Metabolism, Probiotics, Symbiotic Health aspects of functional colonic foods Host–microbe interaction treatment of GI tract disorders									18	
3	Phytochemicals – Introduction, Sources and Functions –Terpenoids, Polyphenolics, Anthocyanins, Isoflavones, Silymarin, and Tange Retin, Saponins. Difference between nutrients and phytochemicals, Interaction with other nutrients.									18	
4	Other Nutraceuticals – Source and Functions, Functional foods in the control of aging, mood and performance.									18	
5	Nutraceuticals in medical foods – Anti-Tumour properties: Nature of tumor growth, mode Of carcinogenesis, Diet and gene interactions, Mechanisms of action, Nutrients & their role of functional foods.									18	

CO	Course Outcomes
CO1	Describe about source, chemistry and uses of several natural Nutraceuticals
CO2	Describe occurrence, chemical nature and medicinal benefits of natural Nutraceuticals belong to different phytochemical categories.
CO3	Explain about Different dietary fibers and complex carbohydrate as functional food Ingredients
CO4	Explain the role of free radicals in development of different diseases and aging
CO5	Explain the role of natural and synthetic antioxidants, functional foods

Textbooks:	
1	Functional Foods and Nutraceuticals by Rotimi E. Aluko
2	Functional Foods and Nutraceuticals: Bioactive Components, Formulations and Innovations (2020)
3	Functional Foods and Nutraceuticals: Chemistry, Health Benefits and the Way Forward (2024)
4	Functional Foods: Designer Foods, Pharmafoods, Nutraceuticals (1995) Edited by Israel Goldberg

Reference Books:	
1	Evidence-Based Nutraceuticals and Functional Foods (2025) Edited by Debian Huang and Liangli (Lucy) Yu.
2	Functional Foods and Nutraceuticals: Chemistry, Health Benefits and the Way Forward (2024) Edited by Khalid Bashir, Kulsum Jan, and Farhan Jalees Ahmad (Jamia Hamdard, New Delhi).
3	Handbook of Nutraceuticals and Natural Products: From Concepts to Application (2022) Edited by Sreerag Gopi and Preetha Balakrishnan.
4	Functional Food Ingredients and Nutraceuticals: Processing Technologies, 2nd Edition. Edited by John Shi
Web Resources:	
https://www.routledge.com/Advances-in-Nutraceuticals-and-Functional-Foods-Concepts-and-Applications/Gopi-Balakrishnan/p/book/9781774637524?utm_source=chatgpt.com	
https://www.sciencedirect.com/journal/journal-of-functional-foods/about/editorial-board	

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	4	4	3	3	3	3	4	4	3	4	3
CO2	3	3	3	3	3	4	4	3	4	3	4
CO3	4	4	3	4	3	4	3	4	3	4	3
CO4	3	4	3	3	3	4	3	4	4	3	4
CO5	4	3	4	4	3	4	3	4	3	4	3
Total	18	18	16	17	15	19	17	19	17	18	17
Average	3.6	3.6	3.2	3.4	3	3.8	3.4	3.8	3.4	3.6	3.4

3 – Strong, 2- Medium, 1- Low

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDE42	EC-10 FOOD SAFETY AND NUTRITION SECURITY	Core	4	1	1	0	4	6	25	75	100
Learning Objectives											
LO1	To understand the concept of food safety, food safety issues and their regulatory authorities										
LO2	Describe the key components of a food safety management system.										
LO3	Identify and categorize common food additives, adulterants, and pesticide residues										
LO4	Explain the structure and purpose of national and international food safety legislation.										
LO5	Understand the interconnectedness of hunger and malnutrition and their impact on individuals and communities.										
Unit	Content									Hours	
1	Introduction to Food Safety - Definition, Food safety issues in India, food hazards (physical, chemical and biological) natural toxins, Need and importance of food safety in household, Factors affecting food safety in household, Regulatory authorities at local, national and global level for Ensuring food safety in food industries and establishments.									18	
2	Food Hygiene and Microbiology -Inspection of premises, Quality Control and Quality Assurance, Personal Hygiene of Food Handlers, Routes of Contamination, Danger Zone –In food storage, Food Spoilage-Microbes responsible for Food spoilage-Effect on Health, Incubation Period, Symptoms and Treatment .Steps to overcome microbial spoilage.									18	
3	Safety Assessment -Food additives, adulterants, pesticide residues, safety aspects of water and beverages, Good Manufacturing Practices (GMP), Good Agricultural Practices (GAP), Good Hygienic Practices and Good Laboratory Practices, Management and disposal food wastes in food industries and establishments.									18	
4	Food Laws and Regulations -National Food Safety Legislation, International food safety legislation ,Codex Alimentarius, APEDA and ISO 22000 series, Food Safety Act 2006, Food Safety Rules and Regulations 2018, FSSAI, Essential Commodities Act, BIS, AGMARK, HACCP-Principles and Applications.									18	
5	Food and Nutrition Security -Definition, Importance, Hunger and malnutrition. Factors contributing to food insecurity, Food security model, Food availability, Household and individual food security survey, Public Distribution System, Strategies to combat food and nutrition insecurity, Food Security Bill and Act.									18	

CO	COURSE OUTCOMES
CO1	Identify and explain the major food safety issues prevalent in India.
CO2	Apply the principles of food hygiene to effectively inspect food handling premises.
CO3	Identify and categorize potential hazards arising from food additives, adulterants, and pesticide residues.
CO4	Explain the structure and purpose of national and international food safety legislation.
CO5	Explain the relationship between hunger and malnutrition and their impact on human health and development.

Text books:	
1	Food Safety: The Science of Foodborne Illness by Gary J. O.
2	Essentials of Food Safety and Sanitation" by David McSwane et al.– Includes QA/QC, HACCP, and hygiene standards.
3	Food Adulteration and Laws , Rekha Rani , Publisher: Centrum Press Focus on detection of food adulteration, consumer protection acts, and food law
4	Food Safety and Standards Act, Rules & Regulations (with FSSAI Guidelines) Publisher: Commercial Law Publishers (India) Pvt. Ltd.
Reference Books:	
1	Food Safety and Standards: Laws, Tools and Management Systems by D. Vijayalakshmi and Mrunal D. Barbhai
2	Food Safety and Quality Control M.K. Tripathi , Publisher: Pointer Publishers
3	Compendium of Food Safety and Relevant Laws in India by R.G. Gupta
Web Resources	
https://www.haccpalliance.org – Safety standards in food service systems	
https://www.who.int/foodsafety	
https://www.fao.org/fao-who-codexalimentarius	
https://www.iso.org/iso-22000-food-safety-management.html	

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	4	3	4	4	3	4	3	4	4	3	4
CO2	3	4	3	3	4	3	4	3	3	4	3
CO3	4	3	3	4	3	4	3	4	4	3	3
CO4	3	4	4	3	3	3	4	3	3	4	4
CO5	4	3	4	3	3	4	3	3	4	4	3
Total	18	17	18	17	16	18	17	17	18	18	17
Average	3.6	3.4	3.6	3.4	3.2	3.6	3.4	3.4	3.6	3.6	3.4

3–Strong, 2-Medium,1-Low

Subject Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDP41	PEC-1 Entrepreneurial development	Core	1	1	0	0	2	2	25	75	100
Learning Objectives											
LO1	Understand the concepts of Entrepreneurial Development										
LO2	Explore the Development of successful Business ideas										
LO3	Aim to build opportunities and helps to generate project ideas										
LO4	Identify and include Major steps involved in setting up a Small-Scale Unit										
LO5	To grasp the funding and legislation Formalities for the betterment of entrepreneurship skills .										
Unit	Content									Hours	
1	Entrepreneurship Entrepreneur-Meaning, Types of entrepreneurships, Factors promoting entrepreneurship, Barriers to entrepreneurship .The entrepreneurial culture, Stages in entrepreneurial process. Women entrepreneurship and economic development- Self Help Groups.									6	
2	Developing Successful Business Ideas Recognizing opportunities, trend analysis, Brainstorming, Focus Groups, Surveys, Customer advisory boards. Day in the life research – Encouraging focal point for ideas and creativity at a firm level-Patents and IPR.									6	
3	Opportunity Identification and Evaluation Opportunity identification and product selection – Generation and screening the project ideas. Cost benefit analysis and network analysis- Project formulation, Assessment of project feasibility, Dealing with basic problems of setting up of Enterprises.									6	
4	Setting up a Small-Scale Unit Meaning and Business planning process. Major steps involved in setting up a Small Scale Unit, Financial support from Financial Institutes. National level -NBMSME, KVIC, NSIC. State level - DIC, SFC.									6	
5	Funding and Legislation Formalities Sources of Finance- Venture capital and its process. Business angles- Commercial banks- Government Grants and Schemes. Legislation - Licensing, Registration, Municipal Laws, Business Ethics, Consumer Complaints and Tax–GST.									6	

CO	Course Outcomes
CO1	Understand basic concepts in entrepreneurship.
CO2	Acquire knowledge about the various Entrepreneurial development agencies
CO3	Adopt key steps in the elaboration of business ideas.
CO4	Understand major steps involved in setting up a Small-Scale Unit.
CO5	Highlight the Legislation process and Labor Laws Application.

Textbooks:

1	Saravanel,(2005),Entrepreneurial Development, Ess Pee Key Publishing House, Chennai
2	Vasant Desai,(2004),Project Management, Himalaya Publishing House.
3	Holt(2009),Entrepreneurship, New venture creation.
4	S.SainiandS.K.,Dhameja,(2011),EntrepreneurshipandSmallBusinessRawartNewDelhi.

Reference Books:

1	C.Jain,(2012),Handbook for New Entrepreneurs, Oxford University Press
2	Entrepreneurial Development by C.B. Gupta and N.P. Srinivasan: Another highly-regarded textbook, this one from Sultan Chand & Sons, publishers of educational books
3	Entrepreneurial Development by S.S. Khanka: This is a widely-used textbook, often referenced in various academic syllabi.
4	Vasant Desai,(2004),Project Management, Himalaya Publishing House.

Web Resources

<https://unl.libguides.com/c.php?g=332530&p=2234794>

<https://www.winstepforward.org/entrepreneurs-resources/>

<https://online.hbs.edu/blog/post/4>

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	4	3	3	4	3	4	3
CO2	4	4	3	3	3	4	3	3	3	3	4
CO3	3	3	3	4	3	4	4	4	3	3	3
CO4	4	4	3	4	3	4	3	3	4	3	3
CO5	3	3	4	3	3	3	4	3	3	4	3
Total	17	17	16	17	16	18	17	17	16	17	16
Average	3.4	3.4	3.2	3.4	3.2	3.6	3.4	3.4	3.2	3.4	3.2

3–Strong, 2-Medium,1-Low

Subject Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDL41	SLC-1 Nutrition and Child Psychiatry	SLC	0	0	1	3	2	4	25	75	100
Learning Objectives											
LO 1	Understand growth, development and body composition changes from infancy through adolescence.										
LO 2	Recognize how development, behaviour, family, school and nutrition interact.										
LO 3	Identify how psychiatric disorders can impact nutrition										
LO 4	Apply nutritional assessment specifically in children/adolescents with psychiatric/developmental disorders.										
LO 5	Understand population-based approaches and policies for child nutrition and mental health.										
Unit	Content									Hours	
1	Fundamentals of Child & Adolescent Nutrition Growth charts, standard references, body composition. Nutrient needs (energy, protein, key vitamins/minerals) for children & adolescents. Nutritional assessment tools and interpretation.									12	
2	Fundamentals of Child & Adolescent Psychiatry Overview of child/adolescent psychiatric disorders. Biological underpinnings (neurodevelopment, neuro anatomy, neurotransmitters) and their relation to nutrition. Social, family, and school contexts.									12	
3	Nutrition–Psychiatry Interactions in Children Gut- microbiome, neuroinflammation, oxidative stress, nutrient deficiencies & mental health. Feeding behaviour, eating disorders in children/adolescents. Impact of psychotropic medication on nutrition, appetite, and metabolism.									12	
4	Nutritional Assessment and Management in Child Psychiatry Settings Anthropometry, biochemical, clinical and dietary assessment adapted to psychiatric populations. Case-management: feeding difficulties in autism, ADHD, mood disorders; nutritional management of risk of obesity/metabolic syndrome in psychotropic-treated youth.									12	
5	Public Health, Programmes & Research in Nutrition & Child Mental Health National/international programmes for child nutrition, mental health. Evidence base for nutritional psychiatry in children: systematic reviews, guidelines. Research methods, evaluation of interventions, community settings.									12	

CO	Course Outcomes
CO1	Describe macro- and micro-nutrient requirements during childhood and adolescence.
CO2	Outline the bio psychosocial model in child psychiatry
CO3	Recognize nutritional risk factors in children with behavioural /psychiatric conditions.
CO4	Develop nutrition intervention strategies in collaboration with psychiatry, psychology, dietetics.
CO5	Design small-scale research/quality-improvement projects integrating nutrition and child psychiatry.

Textbooks:

1	Srilakshmi B. *Dietetics*, 6th ed., New Age International, New Delhi (for nutrition in children/adolescents).
2	Whitney E, Rolfes SR. *Understanding Nutrition*, 14th ed., Cengage (nutritional fundamentals).
3	Sadock BJ, Sadock VA, Ruiz P. *Kaplan & Sadock's Synopsis of Psychiatry*, 12th ed., Wolters Kluwer (for child/adolescent psychiatry fundamentals).
4	Williams SR. *Basic Nutrition & Diet Therapy* South Asia Edition, Elsevier India (for clinical nutrition).

Reference Books:

1	Nutrition and Mental Health: A Handbook: A more accessible handbook bridging nutrition & mental health; may serve as a supplementary resource.
2	Essentials of Child and Adolescent Psychiatry (2nd Ed): Another strong psychiatry reference; good for understanding child/adolescent disorders, diagnosis, and treatment.
3	Nutrition and Child Development (7th Ed): A classic nutrition text focused on child development, growth, nutrient needs
4	The Nutritional Psychology of Childhood: Focuses on psychological aspects of childhood nutrition—feeding behaviour, development, environment.

Web Resources

https://www.unicef.org/media/60806/file/SOWC-2019.pdf?utm_source=chatgpt.com "Children, food and nutrition"
https://www.child-encyclopedia.com/pdf/complet/child-nutrition?utm_source=chatgpt.com "Child nutrition"
https://www.apa.org/monitor/2022/11/nutrition-mental-health?utm_source=chatgpt.com "How nutrition affects mental health, helping kids overcome ..."

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	4	3	3	4	3	4	3
CO2	4	4	3	3	3	4	3	3	3	3	4
CO3	3	3	3	4	3	4	4	4	3	3	3
CO4	4	4	3	4	3	4	3	3	4	3	3
CO5	3	3	4	3	3	3	4	3	3	4	3
Total	17	17	16	17	16	18	17	17	16	17	16
Average	3.4	3.4	3.2	3.4	3.2	3.6	3.4	3.4	3.2	3.4	3.2

3-Strong, 2-Medium, 1-Low