Marudhar Kesari Jain College for Women (Autonomous)

Vaniyambadi

Regulations 2026 - 2027

PG & Research Department of Foods and Nutrition For

Postgraduate Programme Master of Science in Foods and Nutrition

CONTENTS

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	**PO1: Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that forma part of postgraduate Programme of study. **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. **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. **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. **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. **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. **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. **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.

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 a long 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	

Course Code	Course Category	Title of the Course	Ins. Hrs/ Week	Credit	Marks		Total
					CIA	ESE	
Semester – I							
26PNDC11	Core – 1	Advanced Food Science	6	5	25	75	100
26PNDC12	Core – 2	Advanced Human Physiology	6	5	25	75	100
26PNDC13P	Core – 3	Advanced Food Science - Practical	5	3	25	75	100
26PNDE11/ 26PNDE12	DCE – 1	Macronutrients/ Food Preservation	5	3	25	75	100
26PNDE13/ 26PNDE14	DCE – 2	Food Processing and Technology/ Innovative Food Product Development	4	3	25	75	100
26PNDA11	AECC-1	Perspectives of Home science	2	2	25	75	100
26PCHR11	HR	Human Rights	2	2	25	75	100
			30	**23**	**175**	**525**	**700**
Semester – II							
26PNDC21	Core – 4	Micronutrients	6	5	25	75	100
26PNDC22	Core – 5	Clinical Biochemistry	6	5	25	75	100
26PNDC23P	Core – 6	Techniques in Food Analysis - Practical	5	3	25	75	100
26PNDE21/ 26PNDE22	DCE – 3	Nutrition in Emergencies/ Health Psychology	5	3	25	75	100
26PNDE23/ 26PNDE24	DCE – 4	Functional Foods and Nutraceuticals/ Bakery Techniques	5	3	25	75	100
26PNDS21	SEC-1	Digital Applications in Nutrition and Dietetics	3	2	25	75	100
			30	**21**	**150**	**450**	**600**
Semester – III							
26PNDC31	Core – 7	Applied Clinical Dietetics	6	5	25	75	100
26PNDC32	Core – 8	Food Microbiology	6	5	25	75	100
26PNDC33P	Core – 9	Applied Clinical Dietetics - Practical	6	4	25	75	100
26PNDE31/ 26PNDE32	DCE – 5	Research Methodology in Nutrition/ Sports Nutrition	6	3	25	75	100
26PNDS31	SEC – 2	Diet Counselling and Patient care	3	2	25	75	100
26PNDIK31	IKS*	Traditional Indian Diet Patterns	3		25	75	100
26PNDIN31	Internship			2	25	75	100
			30	**21**	**175**	**525**	**700**
Semester – IV							
26PNDC41	Core –10	Advanced Food Service Management	6	5	25	75	100
26PNDC42	Core – 11	Public Health Nutrition	6	5	25	75	100
26PNDC43P	Core – 12	Advanced Food Service Management – Practical	4	3	25	75	100
26PNDC44P	Core – 13	Project	6	6	25	75	100
26PNDE41/ 26PNDE42	DCE – 6	Food Standards and Quality Control/ Food Safety and Nutrition Security	4	3	25	75	100
26PNDP41	PEC	Entrepreneurial Development	2	2	25	75	100

26PNDL41	SLC	Adolescent Nutrition	2	2	25	75	100
	MOOC	**NPTEL (Online)**			25	75	100
			30	**26**	**200**	**600**	**800**
			120	**91**	**700**	**2100**	**2800**

Students must complete at least one online course (MOOC) from platforms like SWAYAM, NPTEL, 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

DCE: Discipline Centric Elective

SEC: Skill Enhancement Course

PEC: Professional Enhancement Course

SLC: Self Learning Course

IKS: Indian Knowledge System (Non- Credit Course)

AECC: Ability Enhancement Compulsory Course

Department of Foods and Nutrition		L	T	P	Credits	Hours	Marks		
Regulation 2026-27									
Course Code	Title of the Course						CIA	ESE	Total
26PNDC11	Advanced Food Science	4	1	1	5	6	25	75	100
Category	Core – 1	Theory &Problem							

Learning Objectives	
LO1	To know food composition, nutrients, and types of food dispersions.
LO2	To understand the relationship between food processing and changes in nutritional quality.
LO3	To recognize composition, properties, rancidity and role of fats and oils.
LO4	To identify composition and processing effects on milk, milk products and eggs.
LO5	To examine the impact of food processing on nutrient changes

Unit	Content	Hours
1	**Properties of food** - Food nutrients, solids, solutions - Physical properties of solutions and colloids - Types of colloids and properties of colloids, Food dispersion, formation and stability of gels, sols and emulsion foams. **Starch–** Classification, structure and physio chemical properties. Gelatinization of starch, Gluten formation . Dextrinization and factors affecting gelatinization.	18
2	**Protein** - Structure and composition, Classification of protein. Role of protein in food products. Pulses and Legumes, Dairy products, Meat and Fish by product utilization. **Functional properties** - Protein denaturation, gelatin and dough formation. **Amino acids**- structure, classification and physio chemical properties of amino acids.	18
3	**Fats and oil**s - Structure, composition and properties of fats and oil, smoking point. **Rancidity** - Types, Mechanism and prevention. Role of fats/oils in food products. **Sugar and sugar products** -Stages of Sugar Cookery and crystallization , various forms of sugar used in cookery **Sweeteners** -Artificial and Natural sweeteners and role of sweeteners in food industry.	18

4	**Milk and Milk products** -Effect of physical and chemical factors on milk components. (Effect of heat, factors affecting coagulation, casein coagulation). Fermented and non- fermented milk products. **Egg -** Structure, composition and nutritive value. **Quality check-** grading and deterioration. **Functional properties-** Foaming, Factors affecting foam formation.	18
5	**Food Additives** - Definition, Classification for food additives. Flavors Compounds in vegetables, fruits and spices, Effect of processing on food colors and flavors. Role of colors and flavors in food products.	18

CO	Course Outcomes	Knowledge Level
CO1	Demonstrate knowledge of food composition, nutrients, and food dispersions.	K1, K2, K3
CO2	Identify physical properties of solutions, colloids, gels, emulsions, and foams.	K1, K2, K3, K4
CO3	Apply knowledge of starch, proteins, fats, sugars, and their functional properties in food preparation.	K1, K2, K3
CO4	Analyze the role of milk, eggs, and protein-rich foods in food systems and product quality.	K1, K2, K3, K4
CO5	Evaluate fats, oils, sweeteners, additives, colors, and flavours in relation to food quality and stability.	K1, K2, K3, K4

Textbooks:	
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. Ava ntina Sharma (2017).Tex
Reference Books:	
1	Food Emulsifiers and Their Applications – Gerard L. Hasenhuettl & Richard W. Hartel, Springer Publications.
2	Essentials of Food Science – Vickie A. Vaclavik, Springer Publications.

3	Advanced Textbook of Food and Nutrition Volume 2 – Dr. M. S. Swaminathan, Bapco Publications.
4	Biochemistry of Food – N. A. M. Eskin, Elsevier Publications.
5	Alternative Sweeteners – Lyn O'Brien Nabors, Taylor & Francis Publications.
Web Resources:	
1	Food and Agriculture Organization – https://www.fao.org
2	World Health Organization – https://www.who.int
3	National Institute of Nutrition – https://www.nin.res.in

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	3.0	3.0	2.6	3.0	2.8	2.6	2.8	2.6	3.0	3.0	3.0

3 – Strong, 2- Medium, 1- Low

Department of Foods and Nutrition		L	T	P	Credits	Hours	Marks		
Regulation 2026-27									
Course Code	Title of the Course						CIA	ESE	Total
26PNDC12	Advanced Human Physiology	4	1	1	5	6	25	75	100
Category	Core -2	Theory & Problem							

Learning Objectives	
LO1	To understand the structure and function of cells and their organelles.
LO2	To analyze blood composition and the mechanisms of cardiovascular function related to circulation and cardiac regulation.
LO3	To evaluate the functions of the respiratory and endocrine systems in gas exchange and hormonal control.
LO4	To examine gastrointestinal and reproductive physiology in relation to digestion, metabolism, and reproductive processes.
LO5	To interpret the roles of the nervous, excretory and integumentary systems in maintaining homeostasis and clinical balance.

Unit	Content	Hours
1	**Cell and Tissue Biology:** **Cell:** Cell structure and functions – Mitosis and Meiosis – Difference between mitotic and meiotic cell division – Membrane transport – Tissue structure and functions. **Stem cells:** Definition, Types, characteristics and functions – Basics of regenerative medicine and AI-assisted stem cell research – Ethical issues in stem cell applications.	18
2	**Blood and Circulatory System:** **Blood:** Composition and functions – Blood groups – Plasma proteins and their functions – Haematological disorders. **Circulatory System:** Structure and functions of heart and blood vessels – Systemic and pulmonary circulation – Cardiac cycle – ECG – Blood pressure.	18
3	**Respiratory and Endocrine System:** **Respiratory System:** Structure and functions of respiratory organs – Mechanism of respiration – Lung volumes and capacities – Exchange and transport of	18

	respiratory gases – Internal and external respiration – Ventilation and artificial respiration – Regulation of respiration – Pulmonary function tests – Recent advances in respiratory care. **Endocrine System:** Hormones and their types, mechanisms of hormone action, disorders due to hypo- and hypersecretion of pituitary, thyroid, adrenal and pancreas, hormonal regulation and feedback mechanisms.	
4	**Gastrointestinal System and Reproductive System:** **Gastrointestinal System:** Structure and functions of digestive system – Regulatory mechanisms of digestion – Role of gut microbiota in different systems – Digestion and absorption of nutrients – Modern diagnostic approaches in gastrointestinal health and disorders. **Reproductive System:** Structure and functions of male and female reproductive systems – Reproductive hormones and their functions – Reproductive cycles – Fertility regulation – Assisted reproductive techniques: IVF, IUI, ICSI and surrogacy.	18
`5	**Nervous, Excretory and Integumentary System** **Nervous System:** Structure and functions of neuron – Organization of central and peripheral nervous systems – Cerebrospinal fluid (CSF) Composition and functions – Neurotransmitters and their roles – Nerve regeneration and neuroplasticity. **Excretory System:** Structure and functions of urinary system – Mechanism of urine formation – Renal function – Fluid and electrolyte balance – Acid–base balance – Renal diagnostic tests. **Integumentary System:** Structure and functions of skin – Thermoregulation – Wound healing.	18

CO	Course Outcomes	Knowledge Level
CO1	Understand the concepts of cell and tissue physiology and stem cell applications	K1, K2, K3
CO2	Analyse blood composition and cardiovascular functions	K1, K2, K3, K4
CO3	Evaluate respiratory and endocrine mechanisms	K1, K2, K3
CO4	Interpret gastrointestinal and reproductive physiology	K1, K2, K3, K4

CO5	Assess the functions of nervous, excretory, and integumentary systems in maintaining homeostasis and clinical conditions	K1, K2, K3, K4

Textbooks:	
1	C. C. Chatterjee (2020). *Human Physiology*. CBS Publishers, 13th Edition.
2	K. Sembulingam & Prema Sembulingam (2019). *Essentials of Medical Physiology*. Jaypee Publications, 8th Edition.
Reference Books:	
1	Lauralee Sherwood (2016). Human Physiology: From Cells to Systems. Cengage Learning.
2	Vander, Sherman & Luciano (2018). Human Physiology: The Mechanisms of Body Function. McGraw Hill.
3	Berne & Levy (2017). Physiology. Elsevier.
4	Guyton & Hall (2021). Textbook of Medical Physiology. Elsevier.
5	Tortora & Derrickson (2021). Principles of Anatomy and Physiology. Wiley
Web Resources:	
1	NPTEL – Human Physiology Online Courses
2	National Institutes of Health (NIH) – https://www.nih.gov
3	PubMed / Google Scholar – https://pubmed.ncbi.nlm.nih.gov

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	3	3	3	3	3
CO2	3	3	3	3	3	3	3	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

Department of Foods and Nutrition		L	T	P	Credits	Hours	Marks		
Regulation 2026-27									
Course Code	Title of the Course						CIA	ESE	Total
26PNDC13P	Advanced Food Science – Practical	-	-	5	3	5	25	75	100
Category	Core -3	Theory & Problem							

Learning Objectives	
LO1	To understand the concept of TGV and its role in determining the bulk density and packing properties of grains.
LO2	To Apply the properties of food in various food processing and preparations.
LO3	To Analyze the factors affecting cooking quality of foods.
LO4	To Create appropriate food preparation and processing methods to ensure quality standards
LO5	To 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.	15
2	**Pluses**: Factors affecting cooking quality. **Fruit:** Enzymatic browning, Pectin test.	15
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.	15
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	15
5	**Adulteration** **Sensory method**–Analysis of taste sensitivity-Threshold test. Duo–Trio test, Multiple sample difference tests	15

CO	Course Outcomes	Knowledge Level
CO1	Gain knowledge on sensory analysis and cereal cookery Concept	K1, K2, K3
CO2	Understand the properties of various food	K1, K2, K3, K4
CO3	Analyze the cooking quality of foods and apply knowledge in food industries.	K1, K2, K3
CO4	Identify and understand the Physical characteristics.	K1, K2, K3, K4
CO5	Revise appropriate food preparation and processing methods to ensure standards in food industry	K1, K2, K3, K4

Textbooks:	
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
Reference Books:	
1	Swaminathan A (1979). Food Science And Experimental Foods, Ganesh And Company Madras. 3rd edition
2	Bennion, Marion and O. Hughes (2001). Introductory Foods. Edi: mac millian N. Y. 1st 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 Shadaksharama samy, (2004) .Food: Facts and Principles, New Age International Publishers, New Delhi. 1st edition
Web Resources:	
1	Food Safety and Standards Authority of India (FSSAI)-https://www.fssai.gov.in
2	Institute of Food Technologists (IFT)-https://www.ift.org
3	FSSAI – Manuals of Food Analysis Methods:https://fssai.gov.in/cms/manuals-of-methods-of-analysis-for-various-food-products.php

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

Department of Foods and Nutrition		L	T	P	Credits	Hours	Marks		
Regulation 2026-27									
Course Code	Title of the Course						CIA	ESE	Total
26PNDE11	Macronutrients	3	1	1	3	5	25	75	100
Category	Discipline Centric Elective-1	Theory & Problem							

Learning Objectives	
LO1	To understand energy metabolism, requirements and regulation in the human body.
LO2	To analyze the digestion, absorption and physiological roles of carbohydrates and dietary fibre.
LO3	To evaluate amino acids and proteins in relation to nutritional requirements and health.
LO4	To understand lipid metabolism and its role in health, disease and recent research developments.
LO5	To interpret macronutrient interactions and their role in clinical nutrition and emerging concepts like nutrigenomics.

Unit	Content	Hours
1	**Energy:** Historical background, energy content of foods, measurement of energy (direct and indirect calorimetry), energy utilization in cells, basal metabolism, physical activity and regulatory thermogenesis. Energy requirements and influencing factors (adults, infants, adolescents – ICMR, FAO/WHO), energy balance and body weight regulation, contribution of carbohydrates, proteins and fats.	15
2	**Carbohydrates:** Classification, digestion, absorption, utilization and nutritional importance. Therapeutic uses and role in health and disease. Glycemic index and its applications. **Dietary fibre:** Definition, types, sources, composition, digestion, clinical significance, role in therapeutic nutrition and its effect on nutrient absorption.	15
3	**Amino Acids:** Classification of amino acids, amino acid requirements, amino acid balance and imbalance, protein quality evaluation, ICMR and FAO/WHO standards.	15

	Proteins: Classification of proteins, protein synthesis, functions, digestion, absorption and utilization, factors affecting protein utilization. Protein deficiency – causes, prevalence and management, role of animal and plant proteins in nutrition	
4	**Lipids:** Concepts of visible and invisible fats, classification of fatty acids, essential fatty acids, sources and physiological functions. Role of lipids in health and disease. Recent advances in lipids: Trans fats and cardiovascular risk, omega-3 and inflammation, lipid profile in metabolic syndrome, lipids in gut microbiota and personalized nutrition	15
5	**Macronutrient Interactions and Clinical Nutrition:** Macronutrient metabolism and hormonal regulation – Role of macronutrients in metabolic disorders – Nutrigenomics and nutrigenetics – Microbiome-based nutrition – Precision nutrition and AI-based dietary planning – Free nutrition apps and software: HealthifyMe, DietCal for dietary assessment and meal planning.	15

CO	Course Outcomes	Knowledge Level
CO1	Explain energy metabolism and its role in maintaining body functions	**K1, K2, K3**
CO2	Analyze carbohydrate metabolism, dietary fibre and their clinical significance	**K1, K2, K3, K4**
CO3	Evaluate protein and amino acid requirements and their role in health and disease	**K1, K2, K3**
CO4	Interpret lipid metabolism and its implications in metabolic disorders	**K1, K2, K3, K4**
CO5	Apply knowledge of macronutrient interactions in clinical and personalized nutrition	**K1, K2, K3, K4**

Textbooks:	
1	Berdanier, C.D. (1995). Advanced Nutrition: Macronutrients and Micronutrients. CRC Press.
2	Guthrie, H.A. (1988). Introductory Nutrition. Mosby College Publishing.
Reference Books:	
1	Gardon M. Wardlaw, Paul. M. lunset and Marcia F. Seyler, Contemporary Nutrition, Moshy, Sixth edition.
2	Z.S.C. Okoye, ―Biochemical Aspects of Nutrition‖, Prentice Hall of India Pvt. Ltd., Eastern Economy Edition, 1992.

3	Shils E.M., Olson and Febiger, ―Modem Nutrition in health and disease‖, Philadelphia, 1999,ninth edition
4	Sorimshaw, N.S and Schwrch, B. Protein Energy Interactions Proceedings of DECG Workshop, 1992.
5	Bamji, M.S. et al. (2017). *Textbook of Human Nutrition*. CBS Publishers.
Web Resources:	
1	National Institutes of Health (NIH) – https://www.nih.gov
2	Food and Agriculture Organization (FAO) – https://www.fao.org
3	PubMed – https://pubmed.ncbi.nlm.nih.gov

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	3	3	2	3	2	2
CO2	3	2	3	3	2	2	3	3	3	2	3
CO3	3	2	2	2	2	3	3	2	3	2	2
CO4	3	2	3	3	3	2	2	3	3	2	3
CO5	3	2	3	3	2	3	3	3	3	2	2
Total	15	10	13	13	11	13	14	13	15	10	12
Average	3	2	2.6	2.6	2.2	2.6	2.8	2.6	3	2	2.4

3 – Strong, 2- Medium, 1- Low

Department of Foods and Nutrition		L	T	P	Credits	Hours	Marks		
Regulation 2026-27							CIA	ESE	Total
Course Code	Title of the Course								
26PNDE12	Food Preservation	3	1	1	3	5	25	75	100
Category	Discipline Centric Elective-1	Theory & Problem							

Learning Objectives	
LO1	To Understand food preservation concepts and importance
LO2	To Identify and classify different types of food spoilage
LO3	Define and explain food preservation using high temperature techniques.
LO4	To Understand direct and indirect effects of radiation on food components.
LO5	To Identify different types of fermentation used in food processing.

Unit	Content	Hours
1	**Introduction to Food Preservation** Definition and scope of preservation, concept, importance of food preservation, common terms used in food preservation, Classification of food on the basis of Ph value, technology, Principles of food preservation, traditional and modern methods of food preservation. Food additives – definition, types, Class I and Class II preservatives.	15
2	**Food Spoilage**- Definition, types of spoilage - physical, enzymatic, chemical and biological spoilage. Mechanism of spoilage and its end products, shelf-life determination. Prevention Techniques of a Food Spoilage .Emerging technologies in food Preservation. Nanotechnology in Food Preservation	15
3	**Preservation by use of High Temperature**- Pasteurization: Definition, types, Sterilization, Canning - history and steps involved, spoilage encountered in canned foods, types of containers used for canning foods. Food irradiation – Principles, merits and demerits, effects of irradiation and photochemical methods.	15
4	**Food Preservation:** Irradiation and Preservatives Preservation by radiation, chemicals & preservatives. Definition, Methods of Irradiation, Direct &	15

	Indirect effect, measurement of radiation dose, dose distribution, effect on microorganisms. Deterioration of Irradiated foods physical, chemical and biological; effects on quality of foods.	
5	**Food Fermentation and Recent Methods in Preservation:** Preservation of foods by chemicals, antioxidants, mould inhibiters, antibodies, acidulates etc. Preservation by fermentation- Definition, Advantages, disadvantages, types, equipment. Recent and Advanced Methods in Food Preservation, Traditional and Conventional Preservation Methods	15

CO	Course Outcomes	Knowledge Level
CO1	Select appropriate preservation methods for different foods	K2
CO2	Apply knowledge of spoilage mechanisms to improve food safety and quality	K3
CO3	Apply high-temperature preservation methods in food processing.	K1
CO4	Analyze the effects of radiation on microorganisms and food components.	K4
CO5	Analyze the use of advanced technologies in improving food shelf life and quality.	K5

Textbooks:	
1	Handbook of Food Preservation by M. Shafiur Rahman 2nd Edition
2	Rahman MS (2020) Handbook of Food Preservation CRC Press ,USA
Reference Books:	
1	Gould.G.W (1995),New methods of food preservation.Blackie academic and Professional. London.
2	Srilakshmi B (2017) Food Science, New Age International Publications, New Delhi
3	Suganthi.VandSubaratinam.R(2021)Textbookon Food preservation,DiptiPres s (OPC) Pvt.Ltd, Chennai.
4	Rahman MS (2020) Handbook of Food Preservation CRC Pres s,USA
Web Resources:	
1	https://www.sciencedirect.com/topics/agricultural-and-biologicalsciences/ Food-spoilage .
2	http://ecoursesonline.iasri.res.in/mod/page/view.php?id=111436

3	http://ecoursesonline.iasri.res.in/mod/page/view.php?id=111435

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	2	2	2	2	2	2
CO2	3	3	2	2	2	2	2	2	3	2	2
CO3	3	3	3	2	2	2	2	2	3	3	2
CO4	3	3	3	3	2	2	2	2	3	3	2
CO5	3	3	3	3	3	2	2	2	3	3	3
Total	**15**	**14**	**13**	**12**	**11**	**10**	**10**	**10**	**14**	**13**	**11**
Average	**3.0**	**2.8**	**2.6**	**2.4**	**2.2**	**2.0**	**2.0**	**2.0**	**2.8**	**2.6**	**2.2**

3 – Strong, 2- Medium, 1- Low

Department of Foods and Nutrition Regulation 2026-27		L	T	P	Credits	Hours	Marks		
Course Code	Title of the Course						CIA	ESE	Total
26PNDE13	Food Processing & Technology	2	1	1	3	4	25	75	100
Category	Discipline Centric Elective-2	Theory &Problem							

Learning Objectives	
LO1	To Understand the science behind processing of foods and its impact on nutritive value of food stuffs.
LO2	To Acquire in depth knowledge on production of processed food products and the waste utilization techniques
LO3	To Learning the food preservation and its effect on microbiological growth, enzyme activity and food quality
LO4	To 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. **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; fruit processing technologies used in Industries	**12**

	Milk Processing and Technology: Milk types, composition, Milk processing - Separation, centrifugal process, pasteurization, sterilization, homogenization.	
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, Meat Preservation & technology. Microbial Spoilage of meat. Recent technologies Used in Meat processing .**Poultry and Fish;** Processing, storage and preservation methods. Sustainable Fish processing Technologies.	**12**
5	**Introduction of post- harvest technology:** Introduction to post-Harvest technology of agricultural produce; Status of Production, Losses, Need, Scope and Importance. Recent innovations in post-harvest handling.	**12**

CO	Course Outcomes	Knowledge Level
CO1	Understand the concepts and principles of food processing	**K1, K2, K3**
CO2	Identify the various processed food products from plant and animal sources	**K1, K2, K3, K4**
CO3	Plan the by-products utilization from food processing.	**K1, K2, K3**
CO4	Make use of the systematic knowledge of basic and applied aspects in food processing and technology.	**K1, K2, K3, K4**
CO5	Apply the various post-harvest technologies for different food products	**K1, K2, K3, K4**

Textbooks:	
1	Shakuntala Manay N Shadak Cheraswamy M.(2004) Food Facts and Principles. New age publisher. 2 nd edition.
2	Roday S. (2011).Food Science. Oxford publication.1stedition
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. 4thedition.
3	Srivastava.N R, Pand Kumar S.(2006) Fruits and Vegetables Preservation Principles and

	Practices. International Book Distributing Co.3rd edition
4	WB Crusess. (2004).Commercial Unit and Vegetable Products. W.V. Special Indian Edit ion, Pub Agro bios India.2nd edition.
5	Eskein. (2012). Biochemistry of Food. Elsevier publications.1st edition
Web Resources:	
1	https://www.wur.nl/en/Research-Results/Research-Institutes/food-biobased-research/Expertises/Food-Processing-Technology.htm?utm_source=chatgpt.com
2	https://www.foodinfotech.com/?utm_source=chatgpt.com

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	2	2	2	2	2	2
CO2	3	3	2	2	2	2	2	2	3	2	2
CO3	3	3	3	2	2	2	2	2	3	3	2
CO4	3	3	3	3	2	2	2	2	3	3	2
CO5	3	3	3	3	3	2	2	2	3	3	3
Total	**15**	**14**	**13**	**12**	**11**	**10**	**10**	**10**	**14**	**13**	**11**
Average	**3.0**	**2.8**	**2.6**	**2.4**	**2.2**	**2.0**	**2.0**	**2.0**	**2.8**	**2.6**	**2.2**

3 – Strong, 2- Medium, 1- Low

Department of Foods and Nutrition		L	T	P	Credits	Hours	Marks		
Regulation 2026-27									
Course Code	Title of the Course						CIA	ESE	Total
26PNDE14	Innovative Food Product Development	2	1	1	3	4	25	75	100
Category	Discipline Centric Elective-2	Theory & Problem							

Learning Objectives	
LO1	To Understand food product development and consumer-oriented design.
LO2	To Apply sensory evaluation for food quality and acceptability.
LO3	To Analyze packaging systems and technologies for food safety.
LO4	To Evaluate food labelling and regulatory requirements.
LO5	To Assess quality control, pricing, and marketing strategies.

Unit	Content	Hours
1	**Introduction to Food Product Innovation**: Concept and significance of new product development, Understanding consumer needs, preferences & market trends, Market survey methods and questionnaire design. **Steps in product development process**: Formulation of nutritious food products & standardization, Factors influencing successful product innovation.	12
2	**Sensory Evaluation of Food Products:** -Evaluation of sensory attributes: color, texture, aroma, taste- Laboratory setup, equipment, panel selection & training -Subjective evaluation techniques: paired comparison, duo-trio, triangle test- Rating and ranking tests for quality assessment- Objective methods for sensory analysis	12
3	**Food Packaging and Innovation**: Importance and functions of food packaging, Principles and design requirements ,Food safety standards (FSSAI guidelines) Types of packaging materials: metal, glass, paper, plastics, edible & eco-friendly options. **Advanced packaging**: aseptic, vacuum, shrink wrap, microwave-safe, cryovac ; Distribution and storage considerations	12
4	**Food Labelling and Regulatory Aspects**: Purpose and importance of food labelling, Nutritional labelling and legal requirements. **Types of labels**: smart labels, barcode, antimicrobial, security labels; General	12

	labelling standards and regulations; Nutrition and health claims on food products.	
5	**Quality Control, Pricing and Marketing**: Product stability and shelf-life evaluation, Impact of environmental factors on quality; Pricing strategies: cost-plus, demand-based, competitive pricing; Profit margin, markup, promotional pricing & discounts ; Advertising and marketing strategies for food products.	12

CO	Course Outcomes	Knowledge Level
CO1	Explain the principles and stages involved in innovative food product development.	**K1, K2, K3**
CO2	Demonstrate sensory evaluation methods to assess food quality and consumer acceptability.	**K1, K2, K3, K4**
CO3	Analyze different packaging materials and technologies for food preservation and safety.	**K1, K2, K3**
CO4	Evaluate food labelling regulations and apply legal standards in product development.	**K1, K2, K3, K4**
CO5	Assess quality control systems, pricing methods and marketing strategies for food products.	**K1, K2, K3, K4**

Textbooks:	
1	Potter, N.N. & Hotchkiss, J.H. – Food Science
2	Fuller, G.W. – New Food Product Development: From Concept to Marketplace
Reference Books:	
1	Lawless, H.T. & Heymann, H. – Sensory Evaluation of Food: Principles and Practices
2	Robertson, G.L. – Food Packaging: Principles and Practice
3	Ranganna, S. – Handbook of Analysis and Quality Control for Fruit and Vegetable Products
4	FSSAI – Food Safety and Standards Regulations Manual
5	Kotler, P. – Marketing Management
Web Resources:	
1	Food Safety and Standards Authority of India (FSSAI): https://www.fssai.gov.in
2	Institute of Food Technologists (IFT): https://www.ift.org
3	FAO Food and Nutrition: https://www.fao.org

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	2	2	2	3	2	2
CO2	3	3	2	2	2	2	2	2	3	3	2
CO3	3	3	3	2	3	2	2	2	3	3	2
CO4	3	3	3	3	2	2	2	2	3	3	2
CO5	3	3	3	3	3	2	2	2	3	3	3
Total	15	14	13	12	12	10	10	10	15	14	11
Average	3.0	2.8	2.6	2.4	2.4	2.0	2.0	2.0	3.0	2.8	2.2

3 – Strong, 2- Medium, 1- Low

Department of Foods and Nutrition		L	T	P	Credits	Hours	Marks		
Regulation 2026-27									
Course Code	Title of the Course						CIA	ESE	Total
26PNDA11	Perspectives of Home science	1	1		2	2	25	75	100
Category	Ability Enhancement Compulsory Course-1	Theory & Problem							

Learning Objectives	
LO1	To provide advanced knowledge in food science, nutrition, textiles, human development, resource management and communication.
LO2	To develop analytical and practical skills related to nutrition, apparel, housing and family studies.
LO3	To enhance understanding of sustainable resource management and community development practices.
LO4	To strengthen competencies in communication, extension education and programme planning.
LO5	To prepare students for research, entrepreneurship and professional applications in Home Science and allied fields.

Unit	Content	Hours
1	**Advanced Food Science, Nutrition & Dietetics:** Advanced concepts in food science and nutrition – food composition and properties – food quality evaluation – food processing and preservation techniques – food additives and functional foods – macro and micronutrient metabolism – therapeutic and public health nutrition.	6
2	**Textile Science & Apparel Technology:** Advanced textile fibres, yarns and weaves – fabric construction techniques – textile processing and finishes – fibre identification methods – apparel production technology – anthropometry and body measurements – fashion theories and forecasting – apparel design principles – garment construction techniques.	6
3	**Resource Management, Housing & Interior Design:** Principles and functions of management – management of time, energy and resources – decision making and work simplification – sustainable resource utilisation – interior design principles – colour concepts and space planning – housing standards and regulations – green buildings – energy efficiency and environmental sustainability.	6

4	**Human Development & Family Studies:** Principles and theories of human development – prenatal and postnatal development – early childhood care and education – personality development – influence of family and society – marriage and family relationships – parenting practices – family welfare programmes – conflict management – care for individuals with special needs**.**	6
5	**Communication, Extension & Community Development:** Communication concepts, process and theories – interpersonal and mass communication – development communication models and approaches – diffusion of innovation – extension education systems – programme planning and evaluation – extension teaching methods – audio-visual aids – curriculum development – community development programmes.	6

CO	Course Outcomes	Knowledge Level
CO1	Apply concepts of food science, nutrition, textiles and human development.	**K1, K2, K3**
CO2	Analyse principles of resource management, housing and interior design.	**K1, K2, K3, K4**
CO3	Evaluate family, child development and community-related issues.	**K1, K2, K3**
CO4	Apply communication and extension education methods in community development.	**K1, K2, K3, K4**
CO5	Develop research and professional competencies in Home Science and allied disciplines.	**K1, K2, K3, K4**

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 Gandhigram: Kavitha Publications
3	Srilakshmi.B. (2015). Food Science. New Delhi. New Age International Pvt.Ltd.
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.
Web Resources:	
1	National Institute of Open Schooling (NIOS) – https://nios.ac.in
2	UNICEF – https://www.unicef.org
3	Indian Council of Agricultural Research (ICAR) – https://icar.org.in

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	2	2	2	2	2	2
CO2	3	3	2	2	2	2	2	2	3	2	2
CO3	3	3	3	2	2	2	2	2	3	3	2
CO4	3	3	3	3	2	2	2	2	3	3	2
CO5	3	3	3	3	3	2	2	2	3	3	3
Total	15	14	13	12	11	10	10	10	14	13	11
Average	3.0	2.8	2.6	2.4	2.2	2.0	2.0	2.0	2.8	2.6	2.2

3 – Strong, 2- Medium, 1- Low

Department of Foods and Nutrition		L	T	P	Credits	Hours	Marks		
Regulation 2026-27									
Course Code	Title of the Course						CIA	ESE	Total
26PNDC21	Micronutrients	4	1	1	5	6	25	75	100
Category	Core -4	Theory & Problem							

Learning Objectives

LO1	To understand the distribution, functions, requirements and metabolism of macro minerals.
LO2	To analyze the role of Micro and Trace minerals, their interactions and emerging trends in mineral bioavailability and fortification.
LO3	To evaluate the physiological functions, requirements and clinical significance of fat-soluble vitamins.
LO4	To interpret the functions and metabolic roles of water-soluble vitamins in health and disease.
LO5	To examine nutrient interactions, bioavailability and the principles of analytical techniques used in nutrient analysis.

Unit	Content	Hours
1	**Macro minerals:** Distribution, functions, food sources, requirements, deficiency and Current research on Calcium, Phosphorus, Magnesium, Sodium, Potassium and Chloride.	18
2	**Micro and Trace minerals:** Distribution, functions, sources, requirements, deficiency and toxicity of Iron, Zinc, Fluoride, Copper, Iodine and Manganese. **Trace minerals** – Selenium, Cobalt, Chromium, Silicon, Boron and Nickel. Selenium–Vitamin E relationship, Chromium and glucose tolerance factor. Emerging trends in mineral bioavailability, fortification and supplementation**.**	18
3	**Fat-soluble vitamins:** Distribution, functions, food sources, requirements, deficiency and toxicity of vitamins A, D, E and K. Contemporary perspectives on vitamin D in immunity and the antioxidant role of vitamin E.	18
4	**Water-soluble vitamins:** Distribution, functions, sources, requirements, deficiency and toxicity of Vitamin C and B-complex vitamins. Current insights Recent advances: Role of B-vitamins in metabolism and disease prevention.	18
5	**Advanced Nutrient Analysis and Interactions:** Nutrient interactions and bioavailability; emphasis on fortification and supplementation strategies. Analytical techniques: Principles and applications of nutrient analysis using spectrophotometry, chromatography (HPLC, GC–MS), colorimetry and	18

	advanced methods (AAS, ICP–MS).	

CO	Course Outcomes	Knowledge Level
CO1	Identify the distribution, functions, and requirements of macro and micro minerals.	**K1, K2, K3**
CO2	Understand the trace minerals, their interactions and emerging trends in mineral nutrition	**K1, K2, K3, K4**
CO3	Conceptual understanding of functions, sources, and deficiency conditions of fat-soluble vitamins.	**K1, K2, K3**
CO4	Interpret the role of water-soluble vitamins in metabolism and disease prevention	**K1, K2, K3, K4**
CO5	Analyze nutrient interactions and analytical techniques in nutrient evaluation	**K1, K2, K3, K4**

Textbooks:	
1	Berdanier, C.D. (1995). Advanced Nutrition: Macronutrients and Micronutrients. CRC Press.
2	Guthrie, H.A. (1988). Introductory Nutrition. Mosby College Publishing.
Reference Books:	
1	Mahan, L.K. & Raymond, J.L. (2017). Krause's Food & the Nutrition Care Process. Elsevier.
2	Gropper, S.S. & Smith, J.L. (2020). Advanced Nutrition and Human Metabolism. Cengage.
3	Ross, A.C. et al. (2020). Modern Nutrition in Health and Disease. Lippincott.
4	Bamji, M.S. et al. (2017). Textbook of Human Nutrition. CBS Publishers.
5	Gibney, M.J. et al. (2013). Introduction to Human Nutrition. Wiley.
Web Resources:	
1	National Institutes of Health (NIH) – https://www.nih.gov
2	Food and Agriculture Organization (FAO) – https://www.fao.org
3	PubMed – https://pubmed.ncbi.nlm.nih.gov

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	3	3	2	3	2	2
CO2	3	2	3	3	2	2	3	3	3	2	3
CO3	3	2	2	2	2	3	3	2	3	2	2
CO4	3	2	3	3	3	2	2	3	3	2	3
CO5	3	2	3	3	2	3	3	3	3	2	2
Total	**15**	**10**	**13**	**13**	**11**	**13**	**14**	**13**	**15**	**10**	**12**
Average	**3**	**2**	**2.6**	**2.6**	**2.2**	**2.6**	**2.8**	**2.6**	**3**	**2**	**2.4**

3 – Strong, 2- Medium, 1- Low

Department of Foods and Nutrition		L	T	P	Credits	Hours	Marks		
Regulation 2026-27									
Course Code	Title of the Course						CIA	ESE	Total
26PNDC22	Clinical Biochemistry	4	1	1	5	6	25	75	100
Category	Core -5	Theory & Problem							

Learning Objectives

LO1	To comprehend the regulation of glucose homeostasis and identify key carbohydrate metabolic disorders.
LO2	To examine amino acid and lipid metabolism pathways and their related pathological conditions.
LO3	To explore nucleotide and bilirubin metabolism, including associated clinical disorders.
LO4	To analyze liver and renal function tests for their role in disease diagnosis and monitoring.
LO5	To interpret digestive function tests and enzyme patterns in clinical conditions

Unit	Content	Hours
1	**Glucose Homeostasis and Metabolic Disorders:** **Blood glucose homeostasis:** Renal threshold and hormonal regulation. Diabetes Mellitus: types, pathophysiology and metabolic complications. OGTT: interpretation in normal and diabetic conditions. **Carbohydrate metabolic disorders:** Glycogen storage diseases, renal glycosuria, fructosuria and galactosemia. Recent advances in glucose metabolism include CGM, precision nutrition, gut microbiome, AI-based glucose prediction and novel therapeutics.	18
2	**Amino Acid & Lipid Disorders:** **Amino acid metabolic disorders:** phenylketonuria, cystinuria, albinism, Fanconi syndrome, tyrosinemia and alkaptonuria. **Lipid metabolic Disorders:** Lipoproteins: types and functions, dyslipoproteinemias, fatty liver and atherosclerosis. Lipid storage diseases: Niemann-Pick, Fabry and Tay-Sachs disease.	18
3	**Disorders of Nucleotide & Bilirubin Metabolism:** **Purine and pyrimidine disorders:** Gout, Lesch-Nyhan syndrome, xanthinuria and orotic aciduria; hyperuricemia **Bilirubin metabolism:** Formation, transport, conjugation and excretion. Jaundice: Classification, clinical features, biochemical findings and	18

	differential diagnosis. Inherited disorders: Gilbert, Crigler-Najjar, Dubin-Johnson	
4	**Liver & Renal Function Tests:** **Liver Function Tests:** Tests based on abnormalities of bile pigment metabolism, carbohydrate metabolism, lipid metabolism, amino acid metabolism, detoxification and excretory function of liver. Liver disorders – hepatitis and cirrhosis. **Renal Function Tests:** Tests based on GFR, renal plasma flow and tubular function; clearance tests (urea, creatinine, inulin, PAH) and concentration and dilution tests. Renal disorders – diabetes insipidus, nephrotic syndrome, renal failure and UTI.	18
5	**Digestive Function Tests & Enzymology**: **Digestive function tests:** Assessment of gastric and pancreatic functions; collection of gastric contents, examination of gastric residue, fractional test meal (FTM) stimulation test, tubeless gastric analysis, analysis of gastric secretion, and pancreatic enzymes (amylase and lipase). **Enzymology:** Enzyme patterns in acute pancreatitis, myocardial infarction and bone disorders.	18

CO	Course Outcomes	Knowledge Level
CO1	Understand the glucose homeostasis and carbohydrate metabolic disorders.	**K1, K2, K3**
CO2	Analyze amino acid and lipid metabolism and related disorders.	**K1, K2, K3, K4**
CO3	Evaluate nucleotide and bilirubin metabolism and associated disorders.	**K1, K2, K3**
CO4	Interpret liver and renal function tests and their clinical significance.	**K1, K2, K3, K4**
CO5	Examine digestive function tests and enzymology in disease diagnosis.	**K1, K2, K3, K4**

Textbooks:	
1	Textbook of Medical Physiology by Guyton and Hall (2021). Elsevier.
2	Harper's Illustrated Biochemistry (2022). McGraw Hill.
Reference Books:	
1	Clinical Biochemistry by D.M. Vasudevan (2019). Jaypee.
2	Tietz Textbook of Clinical Chemistry and Molecular Diagnostics (2018). Elsevier.
3	Lippincott Illustrated Reviews: Biochemistry (2021). Wolters Kluwer.
4	Practical Clinical Biochemistry by Varley (2006). CBS Publishers.
5	Biochemistry by U. Satyanarayana (2020). Elsevier.
Web Resources:	
1	National Institutes of Health (NIH) – https://www.nih.gov
2	PubMed – https://pubmed.ncbi.nlm.nih.gov
3	World Health Organization (WHO) – https://www.who.int

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	2	2	2	3	2	2
CO2	3	2	3	3	2	2	2	3	3	2	2
CO3	3	2	2	2	2	2	2	2	3	2	2
CO4	3	2	3	3	2	2	2	3	3	2	2
CO5	3	2	3	3	2	2	2	3	3	2	2
Total	15	10	13	13	10	10	10	13	15	10	10
Average	3.0	2.0	2.6	2.6	2.0	2.0	2.0	2.6	3.0	2.0	2.0

3 – Strong, 2- Medium, 1- Low

Department of Foods and Nutrition		L	T	P	Credits	Hours	Marks		
Regulation 2026-27									
Course Code	Title of the Course						CIA	ESE	Total
26PNDC23P	Techniques in Food Analysis- Practical	0	0	5	3	5	25	75	100
Category	Core -6	Theory & Problem							

Learning Objectives

LO1	To learn preparation of standard solutions
LO2	To Summarize food analysis experiments, analyzing data and reporting their findings.
LO3	To understand chemical basis of carbohydrate and protein estimation
LO4	To apply titrimetric methods in lipid analysis
LO5	To gain exposure to advanced food analysis techniques

Unit	Content	Hours
1	Ashing of Food and Preparation of Ash Solution Preparation and Standardizations of Solution	05
2	**Analysis of Minerals & Vitamins in foods:** Estimation of calcium by titrimetric method Estimation of Iron UV spectrophotometry method Estimation of Phosphorous by colorimetry method Estimation of Vitamin C by titrimetric method using 2,6-dichlorophenol indophenol method	20
3	**Analysis of Carbohydrates and Protein in foods:** Quantitative Estimation of Reducing Sugars by Benedict's method Qualitative Analysis of Carbohydrates (Glucose, Fructose, Lactose & Starch) Estimation of Glycine by Sørensen's formal titration method	25
4	**Analysis of Fat in foods:** Estimation of Iodine value in oil/fat by Wij's Method Estimation of Acid value in oil/fat by Titrimetric Method,	10
5	**Demonstration Experiments:** Demonstration on food analysis using HPLC Estimation of proteins using kjeldhal method Pigment Analysis by Paper Chromatography Techniques	15

CO	Course Outcomes	Knowledge Level
CO1	Demonstrate skills in sample preparation techniques including ashing and solution preparation	K1, K2, K3
CO2	Apply volumetric (titrimetric) and colorimetric methods for quantitative analysis of food components.	K1, K2, K3, K4
CO3	Estimate macro and micronutrients in food samples using standard procedures.	K1, K2, K3
CO4	Interpret analytical results and evaluate the nutritional quality of food samples.	K1, K2, K3, K4
CO5	Acquire hands-on experience in modern analytical techniques such as HPLC, Kjeldahl method, and chromatography.	K1, K2, K3, K4

Textbooks:	
1	Biochemical Methods 1992, S.Sadasivam and A. Manickam, Second Edition, New Age International Publishers, New Delhi.
2	Laboratory Manual in Biochemistry, 1981. J.Jayaraman, New Age International publishers, New Delhi.
Reference Books:	
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	Raghuramulu,N, Nair K.M & Kalayana Sundaram, S.A,(1983),"Manual of Laboratory Techniques", National Institute of Nutrition, ICMR
Web Resources:	
1	Food Safety and Standards Authority of India (FSSAI)https://www.fssai.gov.in
2	Institute of Food Technologists (IFT)https://www.ift.org
3	FSSAI – Manuals of Food Analysis Methods:https://fssai.gov.in/cms/manuals-of-methods-of-analysis-for-various-food-products.php

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	3	3	3	3	3
CO2	3	3	3	3	3	2	3	3	3	3	3
CO3	3	2	3	2	3	3	3	2	3	3	3
CO4	3	3	3	3	3	3	2	2	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	14	15	14	15	14	14	13	15	15	15
Average	3	2.8	3	2.8	3	2.8	2.8	2.6	3	3	3

3 – Strong, 2- Medium, 1- Low

Department of Foods and Nutrition		L	T	P	Credits	Hours	Marks		
Regulation 2026-27									
Course Code	Title of the Course						CIA	ESE	Total
26PNDE21	Nutrition in Emergencies	3	1	1	3	5	25	75	100
Category	Discipline Centric Elective-3	Theory &Problem							

Learning Objectives	
LO1	To understand disasters and emergency situations in the Indian subcontinent
LO2	To recognize nutritional problems and deficiency conditions in vulnerable groups.
LO3	To examine communicable diseases, surveillance, and control measures.
LO4	To apply methods for assessing nutritional status using various indicators.
LO5	To plan nutrition relief, rehabilitation, and food distribution strategies.

Unit	Content	Hours
1	**Disasters and Emergencies** : 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.	15
2	**Nutrition in Emergencies** : Nutritional problems in emergencies in vulnerable groups. Causes of malnutrition in emergency situations. Major deficiency diseases in emergencies-Vitamin A Deficiency (VAD) ,Iodine Deficiency Disorders (IDD) (Thiamine/Vitamin B1 Deficiency) Protein – energy malnutrition. Specific deficiencies.	**15**
3	**Communicable diseases**: Surveillance- Disease Surveillance, Disease Surveillance, The Surveillance Cycle and treatment-Clinical Management , Isolation and Quarantine. Control of communicable diseases in emergencies Role of immunization and sanitation. Public nutrition approach to tackle nutritional problems in emergencies.	**15**
4	**Nutritional Assessment**: 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. Anthropometric assessment of nutritional status-body composition analysis, advanced indices and ratios, specialized equipment and standardization,	**15**

	assessment of special population	
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.	**15**

CO	Course Outcomes	Knowledge Level
CO1	Identify natural and man-made disasters leading to emergencies.	**K1, K2, K3**
CO2	Recognize nutritional problems and deficiency diseases in emergencies.	**K1, K2, K3, K4**
CO3	Outline surveillance, treatment, and control of communicable diseases.	**K1, K2, K3**
CO4	Assess nutritional status using clinical signs and anthropometric measures.	**K1, K2, K3, K4**
CO5	Apply principles of nutrition relief and rehabilitation programmes.	**K1, K2, K3, K4**

Textbooks:	
1	The Management of Nutrition in Major Emergencies. WHO, UNHCR, IFRC, WFP. Geneva,. World Health Organization. 2000.
2	Nutrition in Public Health: A Handbook for Developing Programs and Services" by Arlene Spark.
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 Willdens.
2	yet, fish.. V.; Seaman, J. and Geiger, u-(2008): The Management of Nutritional Emergencies in Large Populations, World Health Emergency 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:	
1	Handbook of Nutrition and Food, Third Edition by Carolyn D. Berdanier (Editor); Johanna T. Dwyer (Editor); David Heber (Editor).
2	Dietary Reference Intakes by Jennifer J. Otten (Editor); Jennifer PitziHellwig (Editor); Linda Meyers (Editor)
3	Collins, S., & Duffield, A. (2003). *Assessments of Nutritional Status in Emergency-Affected Populations*. London: ACC/SCN. (Key reference for adult and elderly assessment in emergencies).

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

Department of Foods and Nutrition		L	T	P	Credits	Hours	Marks		
Regulation 2026-27									
Course Code	Title of the Course						CIA	ESE	Total
26PNDE22	**Health Psychology**	**3**	**1**	1	3	5	25	75	100
Category	**Discipline Centric Elective-3**	**Theory & Problem**							

Learning Objectives

LO1	To understand the basic concepts of psychology, biology and brain–behavior relationship.
LO2	To gain knowledge on mental health, sleep psychology and factors influencing wellbeing.
LO3	To understand counselling psychology and its applications in different settings.
LO4	To study health psychology models and behavioural theories related to health practices.
LO5	To develop skills in psychological assessment, screening and interpretation of mental health status.

Unit	Content	Hours
1	**Basics of Psychology and Biology:** Introduction to psychology and biology. Structure and function of neuron. Brain–behavior relationship. Methods of research in psychology. Ethical issues in physiological psychology.	15
2	**Mental Health and Sleep Psychology:** Concept of mental health and wellbeing. Determinants of mental wellbeing. Relationship between behaviour and mental health. Psychophysiology of sleep and sleep disorders. Factors affecting psychological wellbeing.	15
3	**Counselling and Applied Psychology:** Concept, scope and ethics of counselling psychology. Characteristics of a good counsellor. Types of counselling – individual, group, family, premarital and marital, and career counselling. Applications in family, educational, organizational and clinical settings.	15
4	**Health Psychology and Behavioural Theories:** Concept and assumptions of health psychology. Biomedical and biopsychosocial models. Health behaviour theories – Social Cognitive Theory, Health Belief Model, Theory of Planned Behaviour, Protection Motivation Theory, Trans-theoretical Model and Self-regulatory Model.	15
5	**Psychological Assessment and Healthcare System:** Psychological health assessment parameters, screening tools and mental health scales. Assessment of stress, anxiety and depression. Indian healthcare system, attitude of health professionals, burnout in healthcare professionals, healthcare work environment and future trends in health psychology.	15

CO	Course Outcomes	Knowledge Level
CO1	Understand psychology and biological basis of behaviour.	K1, K2, K3
CO2	Identify factors affecting mental health and wellbeing.	K1, K2, K3, K4
CO3	Apply counselling techniques in different settings.	K1, K2, K3
CO4	Analyze health behaviour theories and models.	K1, K2, K3, K4
CO5	Use psychological assessment tools and screening methods.	K1, K2, K3, K4

Textbooks:	
1	Health Psychology – Shelley E. Taylor
2	An Introduction to Health Psychology – Val Morrison & Paul Bennett
Reference Books:	
1	Health Psychology: A Textbook – Jane Ogden
2	Handbook of Health Psychology – Andrew Baum
3	Introduction to Psychology – Clifford T. Morgan
4	Abnormal Psychology – James N. Butcher
5	Counselling Psychology – Raymond Corsini
Web Resources:	
1	World Health Organization. Available from: https://www.who.int
2	American Psychological Association. Available from: https://www.apa.org
3	NPTEL – Introduction to Psychology. Available from: https://nptel.ac.in

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	2	2	2	2	2	2
CO2	3	3	2	2	2	2	2	2	3	2	2
CO3	3	3	3	2	2	2	2	2	3	3	2
CO4	3	3	3	3	2	2	2	2	3	3	2
CO5	3	3	3	3	3	2	2	2	3	3	3
Total	**15**	**14**	**13**	**12**	**11**	**10**	**10**	**10**	**14**	**13**	**11**
Average	**3.0**	**2.8**	**2.6**	**2.4**	**2.2**	**2.0**	**2.0**	**2.0**	**2.8**	**2.6**	**2.2**

3 – Strong, 2- Medium, 1- Low

Department of Foods and Nutrition		L	T	P	Credits	Hours	Marks		
Regulation 2026-27									
Course Code	Title of the Course						CIA	ESE	Total
26PNDE23	Functional Foods & Nutraceuticals	3	1	1	3	5	25	75	100
Category	Discipline Centric Elective-4	Theory &Problem							

Learning Objectives	
LO1	To gain knowledge about functional foods and Nutraceuticals
LO2	To have thorough understanding about the health effects
LO3	To be familiar with applications in industry
LO4	To Identify other Nutraceuticals and its Benefits.
LO5	To gain knowledge about how Nutraceuticals in Medical Foods and their Functions

Unit	Content	Hours
1	**Introduction to Functional Foods:** Functional foods and Nutraceuticals Introduction, definition, ,Types, importance, Health attributes of functional foods– Introduction, Health living Index provides information on healthy diet.	15
2	**Prebiotics and Probiotics:** Prebiotic and Probiotic immune system, sources of microalgae health supplement, Colonic Functional Foods: Introduction, Metabolism, Probiotics, Symbiotic Health aspects of functional colonic foods Host–microbe interaction treatment of GI tract disorders	15
3	**Phytochemicals and Microgreens:** Introduction, sources and functions of phytochemicals. Terpenoids, polyphenolics, anthocyanins, isoflavones, silymarin, tangeretin, saponins and other dominant phytochemicals. Introduction to microgreens, nutritional importance, cultivation methods and health benefits.	15
4	**Functional Food Preparation:** Source and Functions, Functional foods in the control of aging, mood and performance. Difference between nutrients and phytochemicals, Interaction with other nutrients	15
5	**Nutraceuticals in Disease Management:** Anti-Tumor properties: Nature of tumor growth, mode of carcinogenesis, Diet and gene interactions, Mechanisms of action, Nutrients & their role of functional foods. Bioactivity of Functional Foods and Nutraceuticals.	15

CO	Course Outcomes	Knowledge Level
CO1	Outline sources, chemistry, and uses of natural nutraceuticals.	**K1, K2, K3**
CO2	Classify phytochemicals based on occurrence, chemical nature, and medicinal benefits.	**K1, K2, K3, K4**
CO3	Identify types of dietary fiber and complex carbohydrates as functional food ingredients.	**K1, K2, K3**
CO4	Analyze the role of free radicals in disease development and aging.	**K1, K2, K3, K4**
CO5	Evaluate natural and synthetic antioxidants and functional foods in health promotion.	**K1, K2, K3, K4**

Textbooks:	
1	Functional Foods and Nutraceuticals by Rotimi E. Aluko
2	Functional Foods and Nutraceuticals: Bioactive Components, Formulations and Innovations (2020)
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:	
1	https://www.routledge.com/Advances-in-Nutraceuticals-and-Functional-Foods-Concepts-and- Applications/Gopi-Balakrishnan/p/book/9781774637524?utm_source=chatgpt.com
2	**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	3	2	2	2	2	2	2	2	2	2	2
CO2	3	3	2	2	2	2	2	2	3	2	2
CO3	3	3	3	2	2	2	2	2	3	3	2
CO4	3	3	3	3	2	2	2	2	3	3	2
CO5	3	3	3	3	3	2	2	2	3	3	3
Total	**15**	**14**	**13**	**12**	**11**	**10**	**10**	**10**	**14**	**13**	**11**
Average	**3.0**	**2.8**	**2.6**	**2.4**	**2.2**	**2.0**	**2.0**	**2.0**	**2.8**	**2.6**	**2.2**

3 – Strong, 2- Medium, 1- Low

Department of Foods and Science		L	T	P	Credits	Hours	Marks		
Regulation 2026-27									
Course Code	Title of the Course						CIA	ESE	Total
26PNDE24	Bakery Techniques	3	1	1	3	5	25	75	100
Category	Discipline Centric Elective- 4	Theory & Problem							

Learning Objectives	
LO1	To know principles of baking, functions of ingredients, and preparation of doughs and batters.
LO2	To analyze quality parameters of bakery products including rheology, sensory aspects, staling, and nutrient losses.
LO3	To examine principles and processes in confectionery manufacture and sugar chemistry.
LO4	To identify sugar processing, types, by-products, and applications in confectionery and chocolate production.
LO5	To study chocolate and related products, processing methods, and quality evaluation.

Unit	Content	Hours
1	**Principles of Baking**:Principles of Baking Raw Material and their Role flour, leavening agents, sugars, fats, additives, spice, Types of Bakery Products and Technology for their Manufacture - dough and batters; cakes, pies, pastries, bread, biscuits Icings and Fillings.	15
2	**Quality Parameters of Bakery Products:** - chemistry of dough and batters; rheological testing and interpretation of data; sensory evaluation Staling and Nutrient Losses in Bakery Products, Sanitation and Hygiene in a Bakery Unit Equipment used in the Bakery Industry.	15
3	**Principles of Confectionery** :Manufacture. Raw Material and their Role - interfering agents, inversion of sugars, etc. Types of Confectionery Products and Technology for their Manufacture. Quality Parameters of Confectionery Products. Nutrient and other Losses in Confectionery Products. Sanitation and Hygiene in a Confectionery Unit Equipment used in the Confectionery Industry.	15
4	**Sugar and Chocolate Processing**: Sugar- Manufacturing of sugar, types of sugar, byproducts, jaggery, honey.. Additional ingredients: colours, flavors, gums, pectin and gelatin, chocolate processing. Types: imitation chocolate, milk chocolate. Crystalline and non crystalline candies.	15
5	**Chewing Gum and Pan Coating**: Chocolate - raw material, types, and	15

	manufacture, Ingredients of chocolate-sucrose, invert sugars, corn syrup, non-nutritive sweeteners, sugar substitutes Chewing Gum - raw material, types, and manufacture Pan Coating - hard and soft panning; problems in coating; glazing, polishing, and tableting Nutritional Value, Quality Parameters.	

CO	Course Outcomes	Knowledge Level
CO1	Understand the role of ingredients and processing techniques in bakery product preparation.	K1, K2, K3
CO2	Evaluate quality characteristics and testing methods for bakery products.	K1, K2, K3, K4
CO3	Describe confectionery manufacturing processes and ingredient functionalities.	K1, K2, K3
CO4	Analyze sugar processing and chocolate manufacturing techniques.	K1, K2, K3, K4
CO5	Assess production and quality parameters of chocolate, chewing gum, and coated products.	K1, K2, K3, K4

Textbooks:	
1	Bakery Science and Cereal Technology – Neelam Khetarpaul
2	Technology of Bakery Products – Yogambal Ashokkumar
Reference Books:	
1	Baking Science and Technology – E.J. Pyler & L.A. Gorton
2	The Science of Bakery Products – W.P. Edwards
3	Sugar Confectionery Manufacture – E.B. Jackson
4	Industrial Chocolate Manufacture and Use – S.T. Beckett
5	Handbook of Food Science and Technology (Vol II) – K.K. Sinha
Web Resources:	
1	National Institute of Open Schooling (NIOS) – Food Processing https://nios.ac.in -
2	Food and Agriculture Organization (FAO)- https://www.fao.org
3	Institute of Food Technologists (IFT)- https://www.ift.org

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	3	3	3	2
CO2	2	3	3	2	2	3	2	2	2	3	2
CO3	3	3	2	2	3	2	3	2	3	2	2
CO4	3	3	3	3	2	3	3	2	3	2	2
CO5	3	2	3	3	3	3	2	2	2	3	3
Total	14	14	14	13	13	13	13	11	13	13	11
Average	2.8	2.8	2.8	2.6	2.6	2.6	2.6	2.2	2.6	2.6	2.2

3 – Strong, 2- Medium, 1- Low

Department of Foods and Nutrition		L	T	P	Credits	Hours	Marks		
Regulation 2026-27									
Course Code	Title of the Course						CIA	ESE	Total
26PNDS21	Digital Applications in Nutrition and Dietetics	2	1		2	3	25	75	100
Category	Skill Enhancement Course-1	Theory & Problem							

Learning Objectives	
LO1	Understand the basic concepts of computers, hardware, software, and their relevance in nutrition and dietetics.
LO2	Develop skills in using MS Office tools (Word, Excel, PowerPoint) for nutrition documentation, diet planning, and presentations.
LO3	Apply database management and statistical tools for dietary data collection, analysis, and interpretation.
LO4	Explore multimedia and internet applications for nutrition education, counseling, and research.
LO5	Utilize computer applications in clinical nutrition, food service management, and research practices.

Unit	Content	Hours
1	**Fundamentals of Computers:** Introduction, characteristics and classification of computers. Components of computer system: Hardware and software. Input, output, storage devices, CPU and memory. Operating systems, file management and internet applications. Cyber security and safe internet practices. Applications of computers in nutrition and dietetics.	9
2	**MS Office and Google Applications:** • MS Word – document creation, formatting and report writing. • MS Excel – worksheets, formulas, charts and BMI calculations. • MS PowerPoint – presentations, slide design and animations. • Google Docs, Sheets and Slides for collaboration. Preparation of nutrition education materials using digital tools.	9
3	**Database and Statistical Applications:** Introduction to database concepts and Microsoft Access. Creation of tables, forms and reports. Dietary data entry, coding and interpretation. Data organization and database management. Basics of statistical software used in nutrition research.	9
4	**Multimedia and Nutrition Software:**	9

	• Introduction to multimedia and its applications in nutrition education • Basic audio and video editing for preparation of counselling materials • Digital libraries and e-journals in food science and nutrition • Introduction to nutrition software such as Nutritics, Diet Cal and Nutrition Discovery • Use of nutrition software for diet planning and nutrient analysis	
5	**Applications in Nutrition and Research:** • Computer applications in nutrition counselling and clinical nutrition • Diet planning, nutrient calculation and maintenance of medical records • Menu planning, inventory and costing in food service management • Data collection and management using Google Forms and MS Excel • Statistical analysis using SPSS: Frequency analysis, cross tabulation, chi-square test, t-test and ANOVA	9

CO	Course Outcomes	Knowledge Level
CO1	Understand the fundamentals of computers and their applications in nutrition and dietetics.	**K1, K2, K3**
CO2	Apply MS Office tools for diet planning, documentation, and nutrition education.	**K1, K2, K3, K4**
CO3	Utilize database and statistical software for dietary data analysis and interpretation.	**K1, K2, K3**
CO4	Analyze multimedia and internet resources for nutrition education and research.	**K1, K2, K3, K4**
CO5	Evaluate the application of computers in clinical nutrition, food service management, and research.	**K1, K2, K3, K4**

Textbooks:	
1	*Computer Fundamentals* – P.K. Sinha & Priti Sinha
2	*Microsoft Office 365 & Office 2019 Step by Step* – Joan Lambert
Reference Books:	
1	Fundamentals of Computers – V. Rajaraman
2	Introduction to Information Technology – ITL Education Solutions

3	Statistical Methods – S.P. Gupta
4	Nutrition Software Applications in Dietetics
5	Computer Applications in Food and Nutrition
Web Resources:	
1	National Institute of Open Schooling – https://nios.ac.in
2	Food and Agriculture Organization – https://www.fao.org
3	Institute of Food Technologists – https://www.ift.org

Mapping with Programme Outcomes and Programme Specific Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	2	2	2	2	2	3	2	2
CO2	3	3	3	2	3	2	2	2	3	3	2
CO3	3	3	3	3	2	3	2	2	3	3	3
CO4	3	3	3	3	2	3	3	2	3	3	3
CO5	3	3	3	3	3	3	3	2	3	3	3
Total	**15**	**15**	**14**	**13**	**12**	**13**	**12**	**10**	**15**	**14**	**13**
Average	**3.0**	**3.0**	**2.8**	**2.6**	**2.4**	**2.6**	**2.4**	**2.0**	**3.0**	**2.8**	**2.6**

3 – Strong, 2- Medium, 1- Low