

M.Sc. NUTRITION AND DIETETICS

SEM	Course Code	Course	Course Title	Ins. Hrs / Week	Credit	Exam Hrs	Marks		Total
							CIA	ESE	
I	20PND1CC1	Core - I	Advanced Food Science	6	5	3	25	75	100
	20PND1CC2	Core - II	Advanced Nutrition	6	5	3	25	75	100
	20PND1CC3	Core - III	Therapeutic Nutrition - I	6	4	3	25	75	100
	20PND1CCP4	Core - IV	Food Analysis Practical	6	4	3	25	75	100
	20PND1DE1	DSE - I #		6	4	3	25	75	100
		TOTAL			30	22			500
II	20PND2CC5	Core - V	Nutrition in Life Span	6	5	3	25	75	100
	20PND2CC6	Core - VI	Chemistry for Nutritionist	6	5	3	25	75	100
	20PND2CC7	Core - VII	Therapeutic Nutrition - II	6	4	3	25	75	100
	20PND2CCP8	Core - VIII	Therapeutic Nutrition Practical	6	4	3	25	75	100
	20PND2DE2	DSE - II #		6	4	3	25	75	100
		TOTAL			30	22			500
III	20PND3CC9	Core - IX	Dietetic Internship	6	5	3	25	75	100
	20PND3CC10	Core - X	Advanced Food Microbiology and Food Safety	6	5	3	25	75	100
	20PND3CC11	Core - XI	Research Methodology and Statistics in Nutrition and Dietetics	6	4	3	25	75	100
	20PND3CCP12	Core - XII	Advanced Food Microbiology and food Safety and Nutritional Biochemistry Practical	6	4	3	25	75	100
	20PND3DE3	DSE - III #		6	4	3	25	75	100
	20PND3EC1	Extra Credit Course - I	Online Course (MOOC)	-	1*	-	-	-	-
		TOTAL			30	22			500
IV	20PND4CC13	Core - XIII	Food Service Management	6	5	3	25	75	100
	20PND4CC14	Core - XIV	Public Health and Community Nutrition	6	5	3	25	75	100
	20PND4CC15	Core - XV	Statistics and Computer Application Practical	6	5	3	25	75	100
	20PND4PW	Project		12	8	-	-	200	200
	20PCNOC	Online Course (Compulsory)		-	1	-	-	-	-
	20PND4EC2	Extra Credit Course - II	Nutrition and Dietetics for career examinations	-	5*	3	-	100	100*
		TOTAL			30	24			500
GRAND TOTAL					90				2000

*Not considered for grand total and CGPA

#Discipline Specific Electives

SEM	Course Code	Core Based Electives
I	20PND1DE1A	Food Chemistry
	20PND1DE1B	Nutraceuticals and Nutrigenomics
II	20PND2DE2A	Life Span Development
	20PND2DE2B	Food Packaging
III	20PND3DE3A	Home Science Extension
	20PND3DE3B	Family Resource Management

Semester	Code	Course	Title of the Course	Hours	Credits	Max. marks	Internal marks	External marks
I	20PND1CC1	Core – I	ADVANCED FOOD SCIENCE	6	5	100	25	75

Course outcomes

1. Understand the nutrient content, different stages of milling process and by products of cereals, millets, pulses and oil seeds.
2. Ability to develop various fruit and vegetable products with quality assurance and safety. and Understand principles and methods of preservation of fruits and vegetables.
3. Be able to understand the different processing and preservation methods in milk, meat, poultry, egg and fish.
4. Depict the functions and types of packaging and packaging materials, labelling.
5. The students once they complete their academic projects, shall get an adequate knowledge on patent and copyright for their innovative research works. During their research career, information in patent documents provide useful insight on novelty of their idea from state-of-the art search. This provide further way for developing their idea or innovations

UNIT-I

18 hours

Cereal and Cereal Products:

- 1.1 Rice - Nutritive value and functional properties. Processing: Parboiling- hot soaking process, Extrusion Technology. By-products –rice bran, wheat bran, maize husk, processed products- rice flakes, rice puff, rice starch.
- 1.2 Wheat- Structure, composition, nutritive value and functional properties, milling, processed products-semolina, macaroni and noodles.
- 1.3 Corn - Nutritive value and functional properties, milling, by products- bran, germ, powder, processed products-flour, syrup, flakes and pop corn. Millet processing- Ragi, Jowar, Bajra.
- 1.4 Breakfast cereal: Rice and Wheat- Ready-to-cooked cereals, ready-to-eat cereals. Extrusion technology

UNIT-II

18 hours

Pulsed and Oil Seeds:

- 2.1. **Pulses:** Nutritive value and functional properties. Milling of Pulses, Traditional Dry Milling Method. Modern CFTRI Method of Milling.
- 2.2. **Oil Seeds:** Nutritive value and functional properties. Processing of Oil seeds-solvent extraction, purification, degumming, refining, bleaching, deodorization, hydrogenation, fractionation, plasticizing and tempering, Cold press technology. By- products-oil cake. Processed products-margarine, shortening, lard etc.
- 2.3 **Sugar :**
Functional Role of Sugars in Foods Crystallization of sugar, factors affecting crystallization, Stages of sugar cookery, Caramelization of sugars, Interfering agents & crystal formation, Fudge, Fondant, Caramel & brittles, Sugar Substitutes.

UNIT-III

Vegetables and Fruits

18 hours

- 3.1 Vegetables: Composition, nutritive value and functional properties. Freezing of vegetables - potato, cauliflower, carrot.
- 3.2 Fruits: Composition, nutritive value and functional properties. Pre-processing of tomatoes –field processing, washing in lye, peeling, freeze peeling, peeling in calcium chloride solution. Dehydrated products-juice powders by foam- mat drier. Preserved products-jam, Jellies, ketchup's and sauces. Transportation and handling of fruits and vegetables, potential applications of volatile monitoring in storage
- 3.3 Irradiation of Fruits, Vegetable, Nuts and Spices
- 3.4 Preservation of fruits and vegetables - Canning, Freezing, Dehydration of Fruits and Vegetables in cabinet drier

UNIT –IV

18 hours

4.1 Milk FSSAI Definition of Milk, Types of Market Milk, Physico-chemical properties of milk, processing of Milk, Concept of Filtration, Clarification, Homogenization, Pasteurization, Introduction to various Milk Products: Butter, ghee, flavored milk, yoghurt, dahi, shrikhand, icecream, condensed milk, milk powder, channa, paneer, cheese (cheddar).

4.2. Meat: Nutritive value, functional properties. Methods of Meat preservation-drying, hanging, meat freezing, canning of meat-high-temperature short-time processing, fat embedding, ionising irradiation. Recent developments in meat processing-mechanically recovered meat (MRM), reformed meat products, protein extraction. Curing of meat, smoking of meat. Chilling and freezing. Processed meat products- cured meat, sausages, additives, other comminuted products, luncheon meat, corned beef, burgers. Drying of meat.

4.3. Poultry: Nutritive values, functional properties. Slaughtering – stunning and killing, scalding, de-feathering, removal of heads and legs, evisceration and inspection. Chilling- water and air. Processed poultry products-battering and breading, tumbling and massaging, smoking, deboning and grinding. Preservation of poultry- canning, dehydration, chilling and freezing. **Egg:** Structure, nutritive value pasteurization, freezing and drying. Preservation of eggs. Processed products- egg yolk oil #Egg powder by spray drier#.

4.3. Fish: Nutritive values, functional properties. Sea food processing. Smoking sea food, hurdle technology, canning, freezing, pickling. Processed fish product- fish protein concentrate.

UNIT-V

18 hours

Food packaging and Labelling:

5.1 Food Packaging: Definition, functions of packaging materials for different foods, characteristics of packaging material. Modern Packaging Materials and Forms: Glass containers, metal cans, composite containers, aerosol containers, rigid plastic packages, semi rigid packaging, flexible packaging. Biodegradable packaging material - biopolymer based edible film. Packaging Methods: Vacuum packaging, Shrink Packaging, CA and MA packaging.

5.2 Introduction and the need for intellectual property right (IPR) - Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication, Plant Varieties and Layout Design – Genetic Resources and Traditional Knowledge – Trade Secret - IPR in India : Genesis and development – IPR in abroad

5.3 Patents - Patent: Definition, requirements, patent law in India, administrator, need for patent system, advantages, precautions to be taken by the applicants, patent procedures, non- patentable. Elements of Patentability: Novelty, Non Obviousness (Inventive Steps), Industrial Application - Non - Patentable Subject Matter - Registration Procedure, Rights and Duties of Patentee, Assignment and licence, Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties – Patent office and Appellate Board

Labelling : Standards, purpose, description types of labels, labelling regulation barcode, nutrition labelling, health claims, and mandatory labelling provision.

#.....# Self-Study portion

Text Books

T.B.1 B. Srilakshmi, “Food Science”, New Age International Pvt. Ltd., Chennai (2006).

T.B.2 V. A. Vaclavik. & E. W. Christian, “Essentials of Food Science”, 2nd edition, Springer, New Delhi (2003).

T.B.3 R. Roday, “Food Science & Nutrition”, Oxford University Press (1999).

T.B.4 B. Sivasankar, “Food Processing & Preservation”, Prentice hall of India Pvt.Ltd, New Delhi(2002).

Reference Book:

1. Vijaya Khader, Text book of Food Science and Technology, Indian Council of Agricultural Research, New Delhi, (2001).
2. Potter, N.N, Food Science, AVI Publishing company, INC, Westport, Connecticut, (1996).
3. A.Chakraverty. “ Post-Harvest Technology of Cereals, Pulses and Oil seeds” CBS Publishers & Distributors Pvt Ltd (2019).
4. Tim Blackmore “ Handbook of Meat Poultry and Sea Food Processing Preservation & Packaging” Black Prints, New Delhi (2016).

UNIT I	Chapter III T.B.1 Chapter XIII T.B.2
UNIT II	Chapter II & III T.B.1, Chapter IV & XV T.B.2
UNIT III	Chapter VIII T.B.1, Chapter VII T.B.2 Chapter VIII T.B.3 Chapter V T.B.6 Chapter V T.B. 7
UNIT IV	Chapter XIV T.B. 2 Chapter XIV T.B.3 Chapter I, II, IV, V, VII, VIII T.B. 8
UNIT V	Chapter V, VI, VII & XII T.B. 1 Chapter IX, X & XI T.B.2 Chapter XXIV T.B.4 Chapter II T.B.5

REFERENCE BOOKS

1. Manoranjan kalia, professor, Dept of Food Science and Nutrition, Himachal Pradesh Agricultural University, Palampur, Himachal Pradesh.
2. Sacharows.S. Handbook of packaging materials, AVI Publishers Co., Westport.
3. Croshy N.T. Food Packaging materials. Applied Science Pub., Ltd., London. 6. Paine F.A. The packaging media. Blackie and Sons Ltd., London

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Paper			Hours		Credits		
I	20PND1CC1		ADVANCED FOOD SCIENCE			6		5		
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	√	√	√	√	√	√		√	√	√
CO2		√	√	√	√	√	√			
CO3	√	√				√		√		√
CO4	√		√	√	√	√	√		√	√
CO5	√		√	√	√	√	√	√		√
Number of Matches= 36, Relationship : HIGH										

Prepared by:

1.Dr. A. Sangeetha
2.D. Bhuvaneswari

Checked by
1.B. Rajalakshmi

Semester	Code	Course	Title of the Course	Hours	Credits	Max. marks	Internal marks	External marks
I	20PND1CC2	Core – II	ADVANCED NUTRITION	6	5	100	25	75

Course Outcomes:

1. Acquire knowledge the physiological role of energy and carbohydrates in the human body.
2. Outline the features of proteins and lipids and their functions.
3. Acquire in depth knowledge of macro and micro minerals and their role in human health.
4. Able to differentiate the functions, deficiency and toxicity of vitamins.
5. Understand the role of water and electrolytes in the human body and apply the knowledge in determining the nutrition during special conditions.

UNIT I

ENERGY AND CARBOHYDRATES

18 hours

1.1 Energy

Energy definition; unit of measurements – Calorie & Joule; Concept of energy balance and sources. Energy value of Carbohydrate, protein & fat; Measurement of energy value of foods by Bomb Calorimeter. Physiological fuel value of food. Total energy requirement.

1.2 Basal Metabolic Rate

Basal metabolic rate - definition, thermic effect of food; Measurement of basal metabolism – direct and indirect calorimetry; Measuring total energy requirement – Energy balance, heart rate monitoring method, doubly labelled water technique, factorial method and Resting Energy Expenditure. Factors influencing basal metabolic rate;

1.3 Carbohydrates

Carbohydrates: Classification, sources and functions; Digestion and absorption process – An overview; dietary fibre meaning, types and sources; Physiological effects and role of fibre in human nutrition, Starch – meaning, nutritional classification, food sources and their role in human nutrition and its physiological benefits; Requirements and food sources; Glycemic index of foods. Maintenance and hormonal control of blood glucose levels.

UNIT II

PROTEINS AND LIPIDS

18 hours

2.1 Proteins and Amino Acids

Nutritional Classification of proteins, functions, food sources, nutritional Classification of Amino Acids, Specific functions of amino acids. Amino acid balance digestion and absorption – An overview.

2.2, Protein quality evaluation methods; Digestibility Coefficient, Biological Value, Net Protein Utilisation, Net Dietary Protein Ratio, Protein Efficiency Ratio and Net Protein Ratio. Scoring systems - Amino Acid Scores and PDCAAS. Complementary value of proteins.

Lipids

2.2 Lipids

Lipids in the human body and foods, nutritional classification, functions, role of fat in the diet, digestion, absorption and food sources – An Overview. Effects of Deficiency and Excess fat.

2.4 Essential Fatty Acids

Fatty acids types: Saturated and unsaturated; Essential Fatty Acids (EFA): Meaning, classification, functions and food sources; Role of n-3, n-6 fatty acids in health and disease

UNIT III

MINERALS

18 hours

3.1 Macro Minerals

Calcium – Distribution in the body, functions, sources, absorption, deficiency and toxicity, Factors influencing the absorption of calcium.

Phosphorus – Distribution, functions, sources, absorption and deficiency, Calcium Phosphorus ratio.

3.2 Magnesium – Distribution, functions, sources, absorption and deficiency.

Iron - Distribution, functions, sources, absorption, deficiency and toxicity, Factors influencing the absorption of iron.

3.3 Micro Minerals

Iodine, Copper, Fluorine and Zinc - functions, sources, absorption, deficiency and toxicity.

3.4 Trace elements

Selenium, Manganese, Chromium, Cobalt and Molybdenum – function and sources.

UNIT IV

18 hours

VITAMINS

4.1 Fat Soluble Vitamins

Vitamins A, D, E, K : Functions, absorption, sources, deficiency and toxicity.

4.2 Water Soluble Vitamins

Thiamine, Riboflavin, Niacin, pantothenic acid, pyridoxine, Cyanocobalamin, folic acid, biotin and ascorbic acid: Function, absorption, sources and deficiency.

UNIT V

18 hours

WATER, ELECTROLYTE AND NUTRITION DURING SPECIAL CONDITIONS

5.1 Water

Distribution and functions of water, water balance – Maintenance and Distribution – physiological variations in the intake and output of water – oedema and depletion – Requirements of water, osmoregulation and water intoxication.

5.2 Electrolyte and Nutrition during special conditions

Distribution, functions, absorption and food sources, deficiency and toxicity of electrolytes – Sodium, Potassium and Chlorine. Electrolyte balance.

Nutrition during special conditions

Nutrition during sports, space travel, nutrition in submarines and nutrition in high altitude

TEXT BOOKS

1. A. Shubhagini Joshi, Nutrition and Dietetics (with Indian Case Studies), Tata Mc Graw Hill Education Private Limited (2010).
2. B. Srilakshmi, Nutrition Science, Third Edition, New Age International PVT Ltd (2008).

UNIT I Chapter – I, II T.B. 1

Chapter – VII T.B.2

UNIT II Chapter – IV, III T.B.2

UNIT III Chapter – IX, X, XI, XII T.B.2

UNIT IV Chapter – XIII, XIV, XV, XVI, XVII, XVIII T.B.2

UNIT V Chapter – XX T.B. 2

REFERENCE BOOKS

1. C. Gopalan, Dietary guidelines for Indians, ICMR, National Institute of Nutrition, Hyderabad (2003).
2. M.V. Krause and M.A. Hunsher, Food Nutrition and Diet Therapy, Eleventh Edition, W.B. Saunders company, Philadelphia, London (2004).
3. L.K. Mahan. and S.E. Stump, Krause's Food Nutrition and Diet Therapy, W.B Saunders Company, USA.
4. S. Nix. William's Basic Nutrition and Diet Therapy, Mosby, India.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Paper			Hours		Credits		
I	20PND1CC2		ADVANCED NUTRITION			6		5		
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	√		√	√	√	√	√	√	√	√
CO2	√	√	√	√	√		√	√	√	
CO3	√	√	√		√	√	√	√		√
CO4	√	√		√	√	√		√	√	√
CO5	√	√	√	√	√		√	√		√
Number of Matches= 41, Relationship : HIGH										

Prepared by:

1. Ms. J. Priya
2. Dr. M. Angel

Checked by

R. R. Sangeetha

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
I	20PND1CC3	Core – III	THERAPEUTIC NUTRITION – I	6	4	100	25	75

Course Outcomes

1. Assess the nutritional status and support for patient care
2. Apply various methods and techniques in the field of therapeutic nutrition
3. Modify dietary management for Pulmonary and Gastrointestinal disorder
4. Describe the pathophysiology and dietary regimen for liver, gall bladder and pancreatic disorder
5. Interrelate the interactions of nutrients and drugs

UNIT-I

18 hours

Role of Dietitian in patient care:

- 1.1 Dietician - definition, classification of dietician, code of ethics, role and responsibilities.
Indian Dietetic Association- Objectives and functions
- 1.2 Therapeutic process – Stress of the therapeutics encounter, focus of care- Patient-Centered care and Health care team, Phases of the care process
- 1.3 Nutrition Screening and Assessment – Anthropometric measurements, Biochemical tests, clinical observations and Nutrition physical assessment, nutrition diagnosis nutrition intervention: food plan and management, evaluation: Quality patient care.

UNIT-II

Therapeutic Nutrition and Febrile conditions:

18 hours

- 2.1 Therapeutic Diet- Routine hospital diet- clear fluid, full fluid, soft and bland diet.
Special Feeding Methods- Enteral feeding-oral feeding, Tube feeding- Gastrostomy and Jejunostomy. Parenteral feeding- TPN Formula and complications.
- 2.2 Dietary supplements- definition, requirements, types, forms and supplement pyramid.
- 2.3 Nutrition care in Febrile condition - Immunity – Immune response -Definition and Types.
Infections – Incidence, Nutritional consideration. Fever- Classification-Short term fever – Typhoid and Influenza, Intermittent-Dengue Fever,Malaria , Long term fever – Tuberculosis ,AIDS.

UNIT-III

18 hours

Nutritional Care in Pulmonary and Gastro intestinal disorder

- 3.1 Dietary management in Pulmonary disorders: Pathophysiology, medical nutrition therapy for asthma, broncho pulmonary dysplasia (BPD), chronic obstructive pulmonary disease, respiratory failure.
- 3.2 Dietary management in Gastro Intestinal Tract Disorders: Upper gastro intestinal tract disorders – Aetiology, symptoms and dietary management for Esophagitis, gastritis, peptic ulcer, diarrhoea, Inflammatory bowel disease and short bowel syndrome.
- 3.3 Lower gastro intestinal tract disorders - Aetiology, symptoms and dietary management for Diverticular disease, Irritable bowel syndrome, ulcerative colitis and constipation.

Unit- IV

18 hours

Dietary management in Liver, Gall Bladder Pancreatic disorder

- 4.1 Liver disorder - Pathophysiology, aetiology, symptoms and dietary regimen for Hepatitis, Jaundice, Fatty liver, cirrhosis, hepatic encephalopathy.
- 4.2 Gall bladder disorders: Aetiology, clinical symptoms and dietary regimen for Cholecystitis, cholelithiasis
- 4.3 Pancreatitis- Aetiology, clinical symptoms and dietary management in Acute and chronic Pancreatitis.

UNIT-V

18 hours

Food, Nutrients and Drug Interactions:

- 5.1 Effects of food on Drug therapy – drug absorption, medication and enteral nutrition, interactions, drug distribution, drug metabolism and drug excretion.
- 5.2 Effects of drug on food and nutrition – nutrient absorption, nutrient metabolism and Nutrient excretion.
- 5.3 Effects of drugs on nutritional status – oral, taste, smell, gastro – intestinal effects, appetite changes, organ system toxicity and glucose levels.

#.....# self -study portion.

TEXT BOOKS

- 1.Srilakshmi B. (2011)., Dietetics, Seventh Edition, New Age International (P) Ltd. Publishers, Chennai.
2. Mahan L.K and Arlin M.T (2012), Food and the Nutrition care process, Thirteenth Edition,W.B.Saunders Company, London.
- 3.Joshi S. A (2008) , Nutrition and Dietetics, Second Edition, Tata Mc. Graw Hill Publication, New Delhi.

UNIT- I Chapter – XXIV T.B. 1

Chapter – VIII,XI T.B.2

Net reference-www.idaindia.com

UNIT- II Chapter – XII T.B.1

Chapter –XXXX, XXXXIV T.B.2

UNIT –III Chapter –XXXIX T.B. 2

UNIT - IV Chapter – XXXIX,XXXXI T.B.2

UNIT –V Chapter – IX T.B.2

REFERENCE BOOKS

1. Robinson(1990)., Normal and Therapeutic Nutrition, Seventeenth Edition, Oxford & LBM Publishing, Bombay.
2. Mahtab. S, Bamji Prasad Rao N and Vinodini Reddy(2003)., Textbook of Human Nutrition,Second Edition, Oxford and IBH Publishing Co., Pvt., Ltd
3. Shils M. E, Olson J. A, Shike M., & Ross A.C. (2006), Modern Nutrition in Health & Disease,Tenth Edition, Lippincott Williams and Wilkins.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Paper			Hours		Credits		
I	20PND1CC3		THERAPEUTIC NUTRITION – I			6		4		
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	√	√		√		√		√	√	√
CO2	√	√		√	√		√	√	√	
CO3	√		√		√	√	√	√	√	√
CO4	√			√	√	√			√	√
CO5	√	√	√		√		√	√	√	√
Number of Matches= 36, Relationship : HIGH										

Prepared by:

1. Dr. V. Kavitha

2.Ms. J. Harine Sargunam

Checked by

1.B. R. Rajalakshmi

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
I	20PND1CC4	Core – IV	FOOD ANALYSIS PRACTICAL	6	4	100	20	80

Course Outcomes

1. Understand the principles behind in analytical techniques when presented with a practical problem
2. Demonstrate competency in the use of standard techniques of food analysis
3. Apply modern instrumental methods to analyse chemical and physical properties of foods
4. Compare the purposes and methods of food analysis in research, government and food industry

Objectives:

To enable the students to

- Understand the principles and methods for the proximate analyses of foods.
 - Operate Instrumental methods to analyze the chemical and physical properties of foods
 - Design of experiments in food analysis
 - Apply of Food analysis in research, government, trade and the food industry
1. Determination of Moisture content in the food sample
 2. Determination of pH content in the fruit juice
 3. Determination of Total Acidity content in the fruit juice
 4. Estimation of Crude Fibre content in the food sample
 5. Estimation of Total Carbohydrate content present in the food sample
 6. Estimation of Protein content in the food sample by Lowry's method
 - a) Estimation of amino acid present in food sample by Paper Chromatography
 7. Estimation of Fat content in the Food Sample by Soxhlet Apparatus
 - a) Estimation of Acid Number
 - b) Estimation of Iodine Number
 - c) Estimation of Peroxide Value
 8. Ashing of food sample and preparation of Ash Solution for Mineral estimation
 - a) Estimation of calcium
 - b) Estimation of Iron
 - c) Estimation of Sodium
 - d) Estimation of Phosphorous
 9. Estimation of Vitamins present in the food sample
 - a) Estimation of Carotene
 - b) Estimation of Ascorbic acid
 10. Qualitative analysis of phytochemicals

REFERENCE BOOKS

1. S.Ranganna, HandBook of Analysis and Quality Control for Fruit and Vegetable Products, Tata McGraw-Hill Publishing Company Limited, New Delhi(2004).
2. S.Sadasivam, A. Manickam, biochemical methods, New Age International Publisher, New Delhi (2004).

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Paper			Hours		Credits		
I	20PND1CC4		FOOD ANALYSIS PRACTICAL			6		4		
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	√	√	√	√		√	√	√	√	√
CO2	√	√	√	√	√	√		√	√	
CO3	√	√	√	√	√		√	√	√	√
CO4	√	√		√	√	√		√	√	√
CO5	√		√	√	√	√	√	√	√	√
Number of Matches= 43, Relationship : HIGH										

Prepared by:
1. Dr. A. Sangeetha
2. Dr. M. Angel

Checked by
1.D. Bhuvaneswari

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
I	20PND1DE1A	DSE – I	FOOD CHEMISTRY	6	4	100	25	75

Course Outcomes:

1. Identify the chemical properties of the compounds present in foods
2. Explain the chemical changes and reactions that occurs during cooking of food
3. Learn various procedures for the quality of food.
4. Understand the role of chemical constituents present in foods.
5. Acquire the knowledge of artificial chemicals used in preservation of food

Unit-I

15 hours

Physico-chemical properties of foods

1.1. Definition of food chemistry, Moisture in Foods, Hydrogen Bonding, Bound Water, Water Activity in Foods.

1.2 Chemistry of Carbohydrates & Starch

Classification- Monosaccharide, disaccharides, oligosaccharides, polysaccharides. Starch- Structure of amylose and amylopectin, Modified and Unmodified starches. Changes of carbohydrates on cooking- solubility, Hydrolysis, Gelatinization, Maillard Browning reaction, Caramelization. Determination of carbohydrates- Anthrone test.

Unit-II

15 hours

Chemistry of Proteins

2.1 Classification of protein, Physical properties- molecular weight and Homogeneity. Chemical properties- Amphoterism of protein, binding of ion, hydration of protein, Native protein and denatured protein. Determination of protein in food- Kjeldahl method.
2.2 Enzymes: Classification, kinetics, important enzymes and its role in food systems

Unit-III

15 hours

Chemistry of Fats and Lipids

3.1 Lipids- Physical properties- melting point, polymorphism, turbidity point. Chemical properties- saponification number, Iodine number.

3.2 Changes in fats and oils- Rancidity & Reversion, Hydrogenation, Lipolysis, Autooxidation, Changes in Fats and Oils during Heating. Tests for assessing the quality of frying oils.

Unit-IV

15 hours

Chemical Constituents in vegetables and fruits:

4.1 Volatile acids, organic acids present in vegetables and fruits. Pectic substances: pectin, pectic substances, changes occurs during cooking: gel formation.

4.2 Flavour compounds: Flavour compounds present in vegetables, fruits, spices and milk, Flavor enhancers, Flavour analysis methods- chromatography

pH, Dispersion, Food additives:

5.1 pH-definition, acid, base, buffer systems and salts, determination of pH, chelating Agents.

5.2 Colloid system: Emulsion-definition, emulsion formation, types, coalescence, Emulsifiers-definitions, types. Foam-formation and stability.

5.3 Food additives: Natural- yellow (turmeric) and carotenoids, lycopene ;artificial colorants- red colour no:3(erythrosine),yellow no:5(tartrazine),yellow no:6 (sunset yellow)

TEXT BOOKS

- 1.Lillian Hoagland Meyer , “Food chemistry”, CBS publishers & distributors PVT.LTD(2004)
- 2.B.Srilakshmi, “Food Science”, New age international (P) limited, publishers(2015)
- 3.Ion C. Baianu, “Physical Chemical of food process”, Vol 1 fundamental aspects, CBS publishers & distributors PVT.LTD(2004)
- 4.H.K.Chopra, P.S.Panesar ,” Food chemistry”, Narosa Publishing House (2010)
- 5.Alex V Ramani ,“Food chemistry”, mjp publishers.,Trichirappalli(2009)
6. Owen R. Fennema, “Food Chemistry”, marcel dekker, inc. new York(1996)

UNIT I

Chapter I, III T. B. 1

Chapter I, III T. B.3

UNIT II

Chapter IV T. B.1

Chapter III T. B.4

UNIT III

Chapter II T. B.1

Chapter III, T. B.4

Chapter IV T. B.5

UNIT IV

Chapter VII, T. B.1

Chapter VI, T. B.4

Chapter VIII T. B. 2

UNIT V

Chapter XVI, T. B.2

Chapter VII T. B.3

REFERENCE:

1. Shakuntala Manay, Shadaksharaswamy. M (2000) Foods, Facts and Principles, New Age International Pvt Ltd Publishers, 2nd Edition
2. Chandrasekhar, U. Food Science and applications in Indian Cookery (2002) Phoenix Publishing House, New Delhi
1. Swaminathan, M. Food Science, (2005) Chemistry and Experimental Foods, Bappco Publishers, Bangalore

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Mapping Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes.										
Semester	Code		Title of the Paper			Hours		Credits		
I	20PND1DE1A		FOOD CHEMISTRY			6		4		
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	√	√		√	√	√	√	√	√	√
CO2	√	√	√		√	√	√	√		√
CO3	√		√	√	√	√	√	√	√	√
CO4	√	√	√	√		√	√	√		√
CO5	√	√	√		√	√			√	
Number of Matches= 40, Relationship : HIGH										

Prepared by:
1.B. Rajalakshmi
2. A. Yasmin Fathimaa

Checked by
1.J. Priya

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
I	20PND1DE1B	DSE – I	NUTRACEUTICALS AND NUTRIGENOMICS	6	4	100	25	75

Course Outcomes:

1. Know about Functional foods and its sources
2. Understand about the effects of pre & probiotics on human health and potential applications in risk reduction of diseases.
3. Gain knowledge about Herbal Supplements and their effects on health.
4. Interrelations of Nutrigenomics in Human Health.
5. Role of Nutrigenomics and Disease Condition.

UNIT- I

18 hours

Functional Foods and Nutraceuticals

1.1 Definition – History of functional foods- Classification of Functional Foods.

1.2 Primary, Secondary metabolites in plants. a) Terpenoids, b) Phenols and Polyphenols c) Sulphur containing compounds d) Nitrogen containing alkaloids. structural lipids & fatty acids, carbohydrates and derivatives, amino acid base substances, minerals, microbes

1.3 Food Source: Plant, dairy, microbial

UNIT- II

18 hours

2.1 Prebiotics: Definition, Source, effects on human health and potential applications in risk reduction of diseases Perspective for food applications for the following:

- Non-digestible carbohydrates/Oligosaccharides

- Dietary fibre , Resistant Starch, Gums

2.2 Probiotics : Important features of probiotic. mechanism of action of probiotics and its health benefits. Probiotics in various foods: fermented milk products, non-milk products, safety of probiotics.

2.3 Synbiotics : Introduction and importance of synbiotics.

UNIT – III

18 hours

3.1. Useful food components with potential health benefits: Definition, Sources, bioavailability, Effects on human health and potential applications in risk reduction of disease:

- Carotenoids: lycopene, betalin, chlorophyll

- Polyphenols: flavonoids, catechins

- Isoflavones, tannins

- Phytoestrogens

- Phytosterols

- Pigments-anthocyanin, curcumin

- saponins

- Active compounds if spices and condiments (Allicin, trigonellin, gingerol, capsaicin, piperine, cinnamaldehyde, eugenol)

3.2. Role of Herbs in Health and its Efficacy status

a) Nervous System-Ashwagandha (withania Somnifera)

b) Heart and Circulatory System- Green tea, Garlic

c) Immune System –Neem, Shallot(small onion)

d) Digestive System-Ginger , fennel

e) Respiratory System-Tulsi(ocimum Sanctum), Tutuvalai, *Athimathuram*.

f) Musculoskeletal System-Indian gooseberry, Indian Aloe Vera

UNIT – IV

18 hours

4.1 Nutrigenomics: Introduction, Definition, Importance, Effects of antioxidants on gene expression, Methods and applications, Advantage and disadvantage of Nutrigenomics.

4.2 Genetic determination of dietary antioxidant stress: Radical Production, antioxidant and oxidative stress. Endogenous antioxidant, dietary antioxidant – vitamin C, vitamin E & Carotenoids

UNIT – V

18 hours

NUTRIGENOMICS AND DISEASE CONDITION

5.1 Modulating the Risk of Cardiovascular Disease through Nutrigenomics-Introduction, Nutrigenetics and Lipid Metabolism, Nutrigenetics and Hypertension.

5.2 Modulating the Risk of obesity and Diabetes through Nutrigenomics- Introduction, Genetic Determinants of Diabetes, and Potential role of different nutrient.

TEXT BOOK:

1. Hari Niwas Mishra, Rajesh Kapur, Navneet Singh Deora, Aastha Deswal, "Functional Foods", New India Publishing Agency, India(2016)
2. Bibek Ray and Arun Bhunia, Fundamental Food Microbiology, CRC Press (2008)
3. Robert E C Wildman Handbook of Nutraceuticals and Functional Foods (2001).
4. Gerald Rimbach, Jürgen Fuchs, "Nutrigenomics", CRC Press, (2005).
5. Lynnette R. Ferguson, "Nutrigenomics and Nutrigenetics in Functional Foods and Personalized Nutrition" CRC Press, (2014)

REFERENCES:**Web Referebces**

UNIT – I

www.ajpcr.com/vol3Issue1/265.pdf

www.ncbi.nlm.nih.gov/pubmed/-

www.nutrition.org/content/136/6/1636s.long

www.bodybuilding.com/store/cla.html

[www.whfoods.com/gen page.php? tname = nutrient](http://www.whfoods.com/gen_page.php? tname = nutrient)

www.eufic.org/article/en/expid/basics-functional -foods -

Chapter-I,II T. B. 1

UNIT- II

Chapter – XV T. B. 1

Chapter – X T. B. 2

Chapter – XVII T. B.3

UNIT – III

Net Reference www.Pitt.edu/~super7/45011-46001/45161

Net Reference www.ipv.pt/millennium/mellineum

Chapter – V T. B. 2

Net Reference www.ashwangandha.com

www.herbwisdom.com/herb-ashwafgandha.html

UNIT - IV

chapter I ,II T. B.4

Net Reference <https://www.pathway.com/blog/what-is-nutrigenomics/>

UNIT – V

chapter -V & VI T. B.5

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code					Title of the Paper			Hours	Credits
I	20PND1DE1B					NUTRACEUTICALS AND NUTRIGENOMICS			6	4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	√	√	√	√	√	√	√	√	√	√
CO2	√		√		√	√		√	√	√
CO3	√	√		√	√	√	√		√	√
CO4	√		√	√		√		√	√	√
CO5	√	√	√	√	√		√		√	√
Number of Matches= 40, Relationship : HIGH										

Prepared by:
1.R. R. Sangeetha

Checked by
Dr. A. Sangeetha

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
II	20PND2CC5	Core – V	NUTRITION IN LIFE SPAN	6	5	100	25	75

Course outcomes

1. Be able to design food plans to meet the needs of humans at various life cycle stages
 2. Acquire the knowledge about the physiological basis for nutritional needs of pre-conception, pregnancy, lactation
 3. Understand to overcome the feeding problem during infancy
 4. Be able to understand the nutritional issues from preschool to adolescent
- Identify and understand the health problems and health benefit of adult and old age

UNIT-I

18 hours

Meal Planning and Nutrition during Pregnancy:

- 1.1. Essential of meal planning- meal pattern, factors to be considered in meal planning
- 1.2. Importance of nutrition in pre gestational and gestational periods. Effect of malnutrition on maternal and fetal health.
- 1.3. Nutritional requirements during pregnancy, nutritional adaptations in pregnancy, complication of pregnancy and management.

UNIT-II

18 hours

Nutrition during lactation:

- 1.1. Growth and development of mammary gland, physiology of lactation-synthesis of milk
Components let down reflex, role of hormones, and effect of breast feeding on maternal health.
- 2.2 Feeding problems due to – sore nipples, inverted nipples, engorged breast, nutrient need and dietary modification. Nutrient requirement during lactation.

UNIT-III

18 hours

Nutrition during Infancy:

- 3.1. **Nutrition during Infancy** - Growth and development, factors influencing growth. Breast Feeding- Colostrum, Transition milk, Fore milk and Hind milk, Advantages of breastfeeding to the infant, Difference between breast feeding and bottle feeding, factors to be considered in bottle feeding. Different types of milk formulae.
- 3.2. **Weaning Foods** - Weaning foods and homemade baby foods. Supplementary foods and low cost supplementary foods. Uses of growth chart to monitor growth and development. Nutritional requirement of infants. Feeding problems encountered for normal and premature infants.

UNIT-IV

18 hours

Nutrition for Preschool children, School children and Adolescence:

- 4.1. **Nutrition for Preschool Children** - Growth and development, nutritional requirements. Food habits, meal pattern and dietary modification, supplementary foods – provided by ICDS and nutritional composition for homemade supplementary foods. Malnutrition – under nutrition and over nutrition.
- 4.2. **Nutrition for School children** - Growth and development, nutritional requirements, Factors influencing nutritional status, packed lunch, establishing healthy eating habits,
Nutritional problems – under weight and obesity, iron deficiency anemia, anorexia nervosa, bulimia nervosa and dental caries#.
- 4.3. **Nutrition for Adolescents** - Growth and development during adolescence. Nutritional Requirements, food habits and dietary practices. Nutrient demand during adolescent - Adolescent pregnancy, during increased physical activity – exercise and sports.

UNIT-V**18 hours****Adulthood and Old Age:**

- 5.1. **Nutrition in Adulthood-** Reference man and woman, nutritional requirements based on occupation – sedentary, moderate and heavy. Menopausal, pre-menopausal and post-menopausal women.
- 5.2. **Old Age** - The ageing process- physiological, socio-psychological. Aspects of ageing. Nutritional problems of elderly. Nutritional requirements of elderly and dietary management.

#.....# self -study portion.

TEXT BOOKS

1. B.Srilakshmi, Dietetics, Sixth edition, New Age International Pvt Ltd (2010).
2. S.Ghosh, The Feeding and Care of Infants and Young Children, VHAI, Sixth edition, New Delhi (1992).
3. M.Swaminathan, Essentials of Food and Nutrition, Vol I, Ganesh & Co. Madras (1985).
4. M.Swaminathan, Essentials of Food and Nutrition, Vol II, Ganesh & Co. Madras (1985).
5. C.Gopalan, Recent Trends in Nutrition, Oxford University Press (1993).
6. H.P.S.Sachdeva, P. Chaudhary, Nutrition in Children. Developing Country Concerns Department of Pediatrics, Maulana Azad Medical College, New Delhi (1994).
7. Vinodhini Reddy, Prahlada Rao, Govmth Sastry and Kashinath, Nutrition Trends in India, NIN, Hyderabad, 1993.

UNIT I Chapter – VII T. B.1**UNIT II** Chapter – VIII T. B.1**UNIT III** Chapter – III T. B.1**UNIT IV** Chapter – IV, V T. B.1**UNIT V** Chapter – II, IX T. B.1**REFERENCE BOOKS**

1. WHO, A Growth Chart for International Use in Maternal and Child Health, Geneva (1978).
2. C. Gopalan, Indian Council of Medical Research Recommended Dietary Intakes for Indians (1989).

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Paper			Hours		Credits		
II	20PND2CC5		NUTRITION IN LIFE SPAN			6		5		
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	V	√	√	√	√	√	√	√	√	√
CO2	√		√		√	√		√	√	√
CO3	√	√		√	√	√	√		√	√
CO4	√		√	√		√		√	√	√
CO5	√	√	√	√	√		√		√	√
Number of Matches= 40, Relationship : HIGH										

Prepared by:

1. D. Bhuvaneswari
2. R. R. Sangeetha

Checked by**J. Harine Sargunam**

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
II	20PND2CC6	Core – VI	Chemistry for Nutritionist	6	5	100	25	75

Course outcomes:

1. Describe and express the biochemical structure and metabolism of protein & carbohydrate metabolism.
2. Illustrate an understanding of the metabolism of lipids and lipoproteins
3. Discuss the structure and functions of nucleic acid & explain the mechanism of enzyme action.
4. Integrate and apply the knowledge on spectroscopy.
5. Integrate and apply the techniques in Analytical biochemistry, Distillation and extraction process.

UNIT-I

Carbohydrates & proteins metabolism:

1.1 Carbohydrates-an overview of intermediary metabolism of carbohydrates. Glycolysis, Tricarboxylic cycle. Glycogenesis, glycogenolysis, Gluconeogenesis, Hexose monophosphate shunt, Regulation of blood glucose.

1.2 Proteins- General pathway of protein metabolism, Nitrogen metabolism. metabolism of protein .Deamination, transamination & transmethylation. Urea cycle.

UNIT-II

Lipids:

2.1. Fatty acids-oxidation of fatty acid (β -Oxidation), synthesis of fatty acids and triglycerides. E synthesis of cholesterol & its regulation.

2.2 Lipoproteins-plasma lipoproteins, metabolism of lipoproteins, primary disorder of plasma lipoproteins-Hyperlipoproteinemia & Hypolipoproteinemia.

UNIT-III

Nucleic acids & Enzymes:

3.1 Nucleic acids-Composition, structure & functions. Metabolism of purine & pyrimidine. DNA replication, mutation & Repair.Genetic code-An overview.

3.2 Enzymes-Classification, mechanism of enzyme action. Coenzymes- mechanism of action, factors affecting enzyme action, Isozymes.

UNIT-IV

Spectroscopy:

4.1 Spectrophotometry-Beer Lambert's Law-principle. Colorimetry, Atomic Absorption, Flame photometry- principle & applications.

4.2 Infra Red Spectrophotometry- principle, fundamental band,important group frequencies,detection of hydrogen bonds.

4.3 NMR-principle,chemical shift,splitting of signals,NMR spectra of some basic organic compounds.

UNIT-V

Biochemical techniques:

5.1 Chromatography-Gel filtration, Ion exchange, Affinity, Paper, High performance liquid chromatography & Gas chromatography - principles & applications.

5.2 Electrophoresis-polyacrylamide gel electrophoresis(SDS), Agarose gel electrophoresis - principles & applications.

5.3 Distillation & Extraction process: Distillation process- simple, fractional, steam, Reduced pressure vacuum, air sensitivity- principle & applications.. Extraction process-Liquid-liquid,solid-liquid,acid-Base phase- principle & applications.

TEXT BOOKS

1. Ambika Shanmugam, Fundamentals of Biochemistry for Medical Students, Seventh Edition, New Age Publishing Pvt. Ltd., New Delhi(1986).
2. Principles and techniques of biochemistry & molecular biology-Keith Wilson & John Walker, 7th edition, Cambridge University Press, 2010.
3. C.P. Champe and A.R. Harvey, Lippincott's Illustrated Reviews(1987).
4. U. Sathyanarayana and U. Chakrapani, Textbook of Biochemistry, Third Edition, Books and Allied (P) Ltd, Kolkata (2010).
5. R. Davidson, Stanley Passmore, Brock and J.H. Heeman, Nutrition and Dietetics, Livingston's Ltd., Edinburgh London(1973).

Textbooks:

Unit-I Chapter XVII & XXI T. B. 1

Unit-II Chapter XIX & XX T. B. 1

Unit-III Chapter IV & VI T. B. 1

Unit-I Chapter III & IX T. B. 1

Unit-I Chapter X & XI T. B. 1

REFERENCE BOOKS

1. T.M. Devlin, Text book of Biochemistry with Clinical Correlations, Fourth Edition, Wiley Liss Inc. (1997).
2. R.K. Murray, D.K. Granner, P.A. Mayes and V.W. Rodwell, Twenty Fifth Edition, Harper's Biochemistry Macmillan Worth Publishers(2000).
3. D.L. Nelson and M.M. Cox Lehninger's Principles of Biochemistry, Third Edition. Macmillan Worth Publishers.(2000)
4. Davidson, P. Passmore and L.P. Brock, Human Nutrition and Dietetics, English language book society, Livingstone (1986).

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Paper			Hours		Credits		
II	20PND2CC6		Chemistry for Nutritionist			6		5		
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	√	√	√	√	√	√	√	√	√	√
CO2	√		√	√	√	√		√	√	√
CO3	√	√		√	√	√	√	√	√	√
CO4	√		√	√		√		√	√	√
CO5	√	√	√	√	√		√		√	√
Number of Matches= 43, Relationship : HIGH										

Prepared by:
1. Dr. M. I. Fazal Mohamed
2. J. Priya

Checked by
Dr. A. Sangeetha

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
II	20PND2CC7	Core – VII	THERAPEUTIC NUTRITION – II	6	4	100	25	75

Course outcomes:

1. Apply the principle of diet and role of Glycemic Index and Glycemic load food to overcome or manage Diabetes
2. Interpret the risk factors associated with Cardiovascular disease and dietary management
3. Review the renal disorders, clinical symptoms and treatment by nutritional therapy
4. Assess the nutritional care in metabolic disorders and disabilities
5. Plan nutritional care for cancer therapy and nervous disorder

UNIT – I

18 hours

Dietary management in Pancreatic disorder:

- 1.1 Diabetes Mellitus – Recent Classification, symptoms and complications. Management – Insulin therapy and oral hypoglycemic agents. Dietary considerations, meal plan with and without insulin. Glycemic index and glycemic load of food.
- 1.2 Other conditions – Gestational diabetes – causes, complications and dietary management.
- 1.3 Hypoglycaemia – causes, complications and dietary management. Therapeutic life style changes of diet in Diabetes Mellitus. Role of five Indian foods in controlling Diabetes Mellitus – fenugreek seeds, gooseberry, bittergourd, green tea & drumstick leaves

UNIT II

18 hours

Dietary management in Cardiovascular disease

- 2.1 Coronary Heart Disease – Atherosclerosis – role of fat in the development of atherosclerosis, risk factors and dietary modification.
- 2.2 Hypertension – pathophysiology, types, symptoms and dietary modification and special dietary considerations. Hyperlipidemia - pathophysiology, types, symptoms and dietary modification and special dietary considerations.
- 2.3 Cardiovascular disease – (i) Acute : Myocardial infarction – pathophysiology, clinical symptoms, and nutritional management (ii) Chronic: congestive heart failure – aetiology, clinical symptoms, nutritional management. Therapeutic life style changes of diet in Heart disease. Role of five Indian foods in prevention of Cardiovascular disease – Coriander seeds, garlic, parsley, mustard oil & fennel oil

UNIT – III

18 hours

Dietary Management in Renal disease

- 3.1 Renal function in diseases – Glomerulonephritis, Nephrotic syndrome - aetiology, clinical symptoms, nutritional management.
- 3.2 Renal failure – Acute & Chronic renal failure – aetiology, clinical symptoms, Nutritional Therapy. Diet during post kidney transplant and dialysis.
- 3.3 Renal Calculus – etiology, clinical symptoms, Treatment and Nutritional Therapy. Urinary tract infection – etiology and treatment. Role of five Indian foods in controlling renal disease – Bottle gourd leaves, Onion leaves, Indian sorrel (seed), mulethi & Ashwagandha (Indian ginseng)

UNIT – IV

18 hours

Nutritional support in Disability Disease and Developmental disorder

- 4.1 Nutritional care in metabolic disorders – gout, phenylketonuria and lactose intolerance.
- 4.2 Nutritional care in musculo-skeletal disease – muscular dystrophy, osteoarthritis & rheumatoid arthritis.
- 4.3 Developmental Disorder – Attention deficit hyperactivity disorders – Autism, cerebral palsy, Epilepsy, muscular dystrophy – etiology and dietary needs.

UNIT – V**18 hours****Nutritional care in cancer and diseases of nervous system**

- 5.1 Cancer – definition, aetiology, pathophysiology, risk factors, types, symptoms, dietary management.
- 5.2 Nutritional effects of cancer therapy – problems related to surgery, chemotherapy, radiation therapy. Nutritional requirements. #Role of food in the prevention of cancer – turmeric, black brussel sports, orange, beetroot & tomatoes#
- 5.3 Disease of Nervous system – Pathophysiology and nutrition therapy in Alzheimer’s disease, epilepsy, migraine, multiple sclerosis and Parkinson’s disease. Foods good for the nervous system – Avacado, Eggs, Fish (Salmon), Walnut & broccolli

#.....# self-study portion.

TEXT BOOKS

1. Srilakshmi B. (2011)., Dietetics, Seventh Edition, New Age International (P) Ltd. Publishers, Chennai.
2. Mahan L.K and Arlin M.T (2012), Food and the Nutrition care process, Thirteenth Edition, W.B. Saunder Company, London.
3. Joshi S.A (2008), Nutrition and Dietetics, Second Edition, Tata Mc. Graw Hill Publication, New Delhi.

UNIT – I Chapter- XXX, XXV T. B.3

UNIT - II Chapter – XVI T. B.1

UNIT - III Chapter – XIV T. B.1
Chapter – XXXII T. B.3UNIT – IV Chapter – XVIII T. B.1
Chapter – XXXI T. B.3UNIT – V Chapter – XV, XIX T. B.1
Chapter – XXIV T. B.3**REFERENCE BOOKS**

1. Robinson(1990)., Normal and Therapeutic Nutrition, Seventeenth Edition, Oxford & LBM Publishing, Bombay.
2. Mahtab. S, Bamji Prasad Roa N and Vinodini Reddy (2003)., Text book of Human Nutrition, Second Edition, Oxford and IBH Publishiling Co., Pvt., Ltd.
3. Shils M.E, Oslon J.A, Shike M & Ross A.C. (2006), Modern Nutrition in Health & Disease, Tenth Edition, Lippincott Williams and Wilkins.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Paper				Hours		Credits	
II	20PND2CC7		THERAPEUTIC NUTRITION – II				6		4	
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	√	√	√	√	√	√	√	√	√	√
CO2	√	√		√		√	√	√	√	√
CO3	√	√	√	√	√			√	√	√
CO4		√		√	√	√	√		√	√
CO5	√	√	√	√		√	√	√	√	√
Number of Matches= 41, Relationship : HIGH										

Prepared by:**1.Dr. V. Kavitha****2. J. Harine Sargunam****Checked by****B. Rajalakshmi**

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
II	20PND2CC8P	Core – VIII	THERAPEUTIC NUTRITION PRACTICAL	6	4	100	25	75

Course outcomes:

After studying this paper, students will be able to

1. Plan, prepare and modify the therapeutic diets for disease condition
2. Justify and recommend the nutrient allowance to maintain the nutritional status.

Objectives

To enable the students to

1. Develop skills in planning, calculating, modifying the nutrient requirements and in preparation of therapeutic diets
2. Develop skills in diet counseling and feeding of patients.

Plan, calculate, modify the nutrient requirements and prepare the diets for the below mentioned pathological conditions:

1. Routine hospital diet: clear fluid, full fluid, soft and bland diet.
2. Diet in febrile conditions:
Short term fever – typhoid, intermittent fever – Malaria, Dengue. Long term fever- Tuberculosis, Acquired immune deficiency syndrome
3. Diet in burns and surgery- post operative conditions.
Diet in special feeding: Enteral feeding (any one blend preparation for tube feeding).
4. Diet in metabolic conditions: Gout
5. Diet in gastro-intestinal disorders: Ulcer, irritable bowel syndrome.
Diet in Liver diseases: Fatty liver, hepatic encephalopathy.
6. Diet in diabetes mellitus conditions: Insulin dependent, Non –insulin dependent, Gestational diabetes mellitus.
7. Diet in weight management: Obesity grade-II, underweight.
8. Diet in renal diseases: chronic renal failure, Renal calculi.
9. Diet in Heart diseases: Hypertension, Atherosclerosis, Congestive heart failure.
10. Diet in cancer
11. Prepare a diet counselling chart for any one disease condition.

REFERENCE BOOK

1. Vimla.V(2010), Advances in diet therapy- practical manual, New age international publication, New Delhi.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Paper			Hours		Credits		
II	20PND2CC8P		THERAPEUTIC NUTRITION PRACTICAL			6		4		
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	√	√	√		√	√	√	√	√	√
CO2	√	√		√		√	√	√		√
CO3	√		√	√	√			√	√	√
CO4		√		√	√	√	√		√	√
CO5	√	√	√	√		√	√	√	√	√
Number of Matches= 38, Relationship : HIGH										

Prepared by:
1. Dr. V. Kavitha
2.J. Harine Sargunam

Checked by
D. Bhuvaneswari

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
II	20PND2DE2A	DSE – II	LIFE SPAN DEVELOPMENT	6	4	100	20	80

Course Outcomes

1. Be able to understanding of different stages of development through the lifespan.
2. Describe physical developmental changes occurring throughout the lifespan.
3. Describe changes in cognitive development and moral reasoning throughout the lifespan
4. Understand the critical thinking and communication skills.
5. Explain family interactions and relationships and describe the change in lifespan.

UNIT I

18 hours

Human Development

- 1.1. Study of Human Development: Early Approaches, Studying the life Span.
- 1.2. Human Development-Developmental Process, domains of Development, Periods of the life span.
- 1.3. Influences on Development: Heredity, environment and maturation, Major Contextual Influences
- 1.4. Forming a New Life: conceiving New Life-fertilization, multiple birth. Prenatal Development-stages of prenatal development, # environmental influences #.

UNIT II

18 hours

Physical Growth and Development

- 2.1. **Infancy:** the birth process-stages of birth, methods of delivery. The new born baby-size and appearance, body system, states of arousal. **Early childhood:** bodily growth and change, nutrition and oral health, sleep patterns and problems. Health and safety-minor illness, health in context. **Middle childhood:** growth, nutrition, motor development.
- 2.2. **Adolescence:** puberty-the end of childhood, puberty begins, timing, sequence and signs of maturation. Physical and mental health-physical fitness, sleep patterns # nutrition and eating disorders #, use and abuse of drugs, depression.
- 2.3. **Young adulthood:** health and physical condition- health status, genetic influences on health, behavioural influences on health and fitness. **Middle adulthood:** Physical changes-sensory and psychomotor functioning, structural and systemic changes. **Late adulthood:** longevity and aging- trends and factors in life expectancy.

UNIT III

18 hours

Cognitive Development

- 1.1. **Infancy:** Definition-Behavioural approach, Psychometric approach, Information-Processing approach, cognitive neuroscience approach, social-contextual approach.
Early childhood: Piagetian approach-advances in preoperational thought, immature aspects of preoperational thought. **Middle childhood:** Piagetian approach-cognitive advances, # moral reasoning #, memory and other processing skills.
- 3.2. **Adolescence:** aspects of cognitive maturation-piagets stages of formal operations.
- 3.3. **Young adulthood:** emotional intelligence, culture and moral development, gender and moral development, education and work. **Middle adulthood:** the role of expertise, integrative thought, practical problem solving, creativity and intelligence, work versus early retirement, work and cognitive development. **Late adulthood:** intelligent and processing abilities, memory.

UNIT IV

18 hours

Language Development

- 4.1. **Infancy:** sequence of early language development, characteristics of early speech, influence on early language development, the benefits of reading aloud. **Early childhood:** language development, memory development. **Middle childhood:** vocabulary, grammar and syntax. Knowledge about communication. Literacy. # Importance of preschool education #.
- 4.2. **Adolescence:** language development, influences on school assignment, educational and vocational preparation.

UNIT V

18 hours

Psychological Development

- 5.1. **Infancy:** emotions, temperament, development trust, effect of parental employment, impact of early child care. **Early childhood:** the self-concept and cognitive development, understanding emotion, self-esteem, gender differences, # types of play, forms of discipline #. Child abuse and neglect, playmates and friends. **Middle childhood:** emotional growth, family atmosphere, family structure, friendships, common emotional disorders.
- 5.2. **Adolescence:** parents, siblings, peers, antisocial behaviour and juvenile and delinquency.
- 5.3. **Young adulthood:** friendship, marriage, become parents. **Middle adulthood:** adolescent children issues for parents, parenting grown children, prolonged parenting, relationship with aging parents, grandparenthood. **Late adulthood:** lifestyle and social issues related to aging, living arrangement, mistreatment of the elderly, social contact, friendships.

#.....# Self Study Portion

TEXT BOOK

1. Diane E.Paplia, Sally Wendkos Olds, Ruth Duskin Feldman, Human Development, McGraw Hill Education (India) private limited (2004).

UNIT I Chapter 3 T.B. 1

UNIT II Chapter 4, 7, 9, 11, 13, 15, 17 T.B. 1

UNIT III Chapter 5, 7, 9, 11, 13, 15, 17 T.B. 1

UNIT IV Chapter 5, 7, 9, 11 T.B. 1

UNIT V Chapter 6, 8, 10, 12, 14, 16, 18 T.B. 1

REFERENCE BOOKS

1. Sushila srivastava and K. Sudha Rani, Text Book of Human development A life span developmental approach, First Edition, S. Chand & company pvt (2014).
2. A.C.Harris, Child development. St. Paul: West Pub. (1986)
3. R.M. Lerner, and F. Hultsch, Human development: A life-span perspective (pp.247-253), New York: McGraw Hill Book Co. unit VI, Unit VII (1983).
4. P. Mussen, J.J. Conger, J.Kagan, and A.C. Huston, Child Development and Personality. New York: Harper and Row. Unit I pp 12-18 (1990).

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Paper			Hours		Credits		
II	20PND2DE2A		LIFE SPAN DEVELOPMENT			6		4		
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	√	√	√	√	√	√	√	√	√	√
CO2	√	√				√	√	√		√
CO3	√		√	√	√			√	√	√
CO4	√	√			√	√	√		√	√
CO5		√	√	√		√	√	√	√	
Number of Matches= 37, Relationship : HIGH										

Prepared by:

1. D. Bhuvaneswari

Checked by

1.J. Harine Sargunam

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
II	20PND2DE2B	DSE – II	FOOD PACKAGING	6	4	100	20	80

Course outcomes:

1. Understand the concept and advance knowledge of properties of packaging
2. Comprehend advance knowledge production of various packaging materials and effect of various indicators used in supply chain management to indicate the food quality
3. Understand various types of scavengers and emitters for improving the food shelf life and food-package interaction between package-flavour, gas storage systems for food storage, recycling and use of green plastics for reducing the pollution and their effect on food quality.
4. Learn about consumer response about new packaging systems
5. Acquire knowledge about safety and legislative requirements packaging

Unit I : Concept and properties of packaging

18 Hours

1.1 Basic concept of packaging: functions of a food package, package development factors, food package development, current status and trends in food packaging in India and abroad. **1.2 Properties of Packaging Materials:** Selection of packaging materials, properties of materials such as tensile strength, bursting strength, tearing resistance, puncture resistance, impact strength, their methods of testing and evaluation.

Unit II : Packaging Materials and Types of packaging

18 Hours

2.1 Packaging materials and forms- Glass containers and closures tin-plate containers, tin free steel containers, aluminum and other metal containers. Protective lacquers and coatings for metal containers. Wooden crates, cellulosic papers, pouches, bags and card board / corrugated paper boxes.

2.2 Types of Packaging

Rigid and flexible plastics (polyamides, polyester, PVC, PVDC, PVA, polycarbonates, olefins, cellophane, inomers, copolymers, phenoxy, acrylic, and polyurethanes) containers and films (oriented, coextruded, laminates, metallized) and their mechanical sealing and barrier properties. Retortpouches, biodegradable and edibles packaging materials and films. Aseptic packaging

Unit III: Packaging Equipment and Active and Intelligent packaging system

18 Hours

3.1Packaging equipment and machinery-Vacuum packaging machine, gas packaging machine, seal and shrink packaging machine, form and fill sealing machine, bottling machines, carton making machines.

3.2Active and intelligent packaging techniques, oxygen, ethylene and other scavengers: Oxygen scavenging technology, selection of right type of oxygen scavengers, ethylene scavenging technology, carbon dioxide and other scavengers, antimicrobial food packaging, Effectiveness of antimicrobial packaging

Unit : IV

18 Hours

4.1 Modern packaging systems: Green plastics for food packaging, problem of plastic packaging waste, range of biopolymers, developing novel biodegradable materials

4.2 Integrating intelligent packaging: Role of packaging in the supply chain, creating integrated packaging, storage and distribution: alarm systems and time temperature indicators, traceability: radio frequency identification, recycling packaging materials: recyclability of packaging plastics, improving the recyclability of plastics packaging, Testing the safety and quality of recycled material, using recycled plastics in packaging,# methods for testing consumer responses to new packaging concepts#

Unit V: Food safety and labelling**18 Hours**

5.1 Food packaging systems and safety-Different forms of packaging such as rigid, semi-rigid, flexible forms and different packaging system for (a) dehydrated foods (b) frozen foods (c) dairy products (d) fresh fruits and vegetables (e) meat, poultry and sea foods.

5.2 Labelling and patent : Standards, purpose, description types of labels, labelling regulation barcode, nutrition labelling, health claims, and mandatory labelling provision.

self studyportion#

Text Book

1. Principal of Food Packaging by Sacharow& Griffin, Van NastrandRainhold Company, New York.
2. Food Packaging Materials by Mahadeviah&Growramma
3. A Handbook of Food Packaging by Frank A. Paine
- 4Ahvenainen. R. (2003). Novel Food Packaging Techniques: CRC Publications.
5. Robertson, G. L. (2010). Food Packaging and Shelf Life: CRC Publications, New York. 4. Robertson, G. L. (2006).
6. Food Packaging: Principles and Practice (2 ed.): CRC Publications, Boca Raton.

UNIT I Chapter III T. B. 2

Chapter XIII T. B 3

UNIT II Chapter II & III T. B 1

Chapter IV & XV T. B 2

Chapter IV T. B 3

UNIT III Chapter VIII T. B 1

Chapter VII T. B 2

Chapter VIII T. B 3

Chapter V T. B 6

UNIT IV Chapter XIV T. B 2

Chapter VI T. B 3

UNIT V Chapter V, VI, VII & XII T. B 1

Chapter IX, X & XI T. B 2

Chapter XXIV T. B 4

Chapter II T. B 5

Reference Book

1. Food Packaging Materials by N.T.Crosby
2. Canning and Aseptic Packaging by Ranganna, TMH.
3. Food Packaging: Principles and Practices by Gordon L.Robertson
4. Food Science and Processing Technology Vol. II by MridulaMirajkar and Sreelata Menon.
5. Jung, H. H. (2014). Innovations in Food Packaging: Oxford, London.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Paper			Hours		Credits		
II	20PND2DE2B		FOOD PACKAGING			6		4		
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	√	√	√	√	√	√	√	√	√	√
CO2	√	√				√	√	√		√
CO3	√		√	√	√			√	√	√
CO4	√	√			√	√	√		√	√
CO5	√	√	√	√	√	√	√	√	√	√
Number of Matches= 40, Relationship : HIGH										

Prepared by:**1.Dr. A. Sangeetha****Checked by****D. Bhuvaneswari**