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. 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:

1.1Rice - Nutritive value and functional properties. Processing: Parboiling- hot soaking process, Extrusion Technology. By-products –rice bran, wheat bran, ,maiz husk , processed products- rice flakes, rice puff, rice starch.

1.2Wheat- Structure, composition, nutritive value and functional properties, milling, processed products-semolina, macaroni and noodles.

1.3Corn - 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 sute.

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, ketch-up'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:

5.1Food 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 & Distributers 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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

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
4.1Fat Soluble Vitamins: Vitamins A, D, E, K: Functions, absorption, sources, deficiency and toxicity.
4.2Water 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 Care 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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

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, inter actions, 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

T.B.1.Srilakshmi B. (2011)., Dietetics, Seventh Edition, New Age International (P) Ltd. Publishers, Chennai.

T.B.2. Mahan L.K and Arlin M.T (2012), Food and the Nutrition care process, Thirteenth Edition,W.B.Saunder Company, London.

T.B.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

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, Oslon J. A, Shike M., & Ross A.C. (2006), Modern Nutrition in Health & Disease,Tenth Edition, Lippincott Williams and Wilkins.

Web source: www.idaindia.com

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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
I	20PND1CC4P	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

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	20PND1CC4P	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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

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 Homogenity. Chemical properties- Amphoterism of protein, binding of ion, hydration of protein ,Native protein and denatured protein. Determination of protein in food- Kjeldahl method.
2.2Enzymes: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.
4.2Flavour compounds: Flavour compounds present in vegetables, fruits, spices and milk, Flavor enhacers, Flavour analysis methods-chromatography

.

Unit-V **15 hours**

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.

5.3Food additives: Natural- yellow (turmeric) and carotenoids, lycopene ;artificial colorants- red colour no:3(erthrosine),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:

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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

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
- Phytoesterogens
- Phytosterols
- Pigments-anthocyanin, curcumin
- saponins
- Active compounds if spices and condiments (Allicin, trignollin, gingerol, capcisin, 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), Tutuvaḷai, *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)

UNIT – I 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 Chapter – V T. B. 2
UNIT - IV Chapter I , II T. B.4
UNIT – V Chapter -V & VI T. B.5

Web source:

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
www.eufic.org/article/en/expid/basics-functional -foods -
www.Pitt.edu/~super7/45011-46001/45161
www.ipv.pt/millenium/mellineum
www.ashwangandha.com
www.herbwisdom.com/herb-ashwafgandha.html
https://www.pathway.com/blog/what-is-nutrigenomics/

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: **Checked by**

1.R. R. Sangeetha **Dr. A. Sangeetha**

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

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
5. Identify and understand the health problems and health benefit of adult and old age

UNIT -I Meal Planning and Nutrition during Pregnancy 18 hours

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 Nutrition during lactation 18 hours

2.1 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 Nutrition during Infancy 18 hours

3.1 **Nutrition during Infancy -** Growth and development, factors influencing growth. Breastfeeding- 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 Nutrition for Preschool children, School children and Adolescence 18 hours

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 Adulthood and Old Age **18 hours**

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 ConcernsDepartment of Pediatrics, Maulana Azad Medical College, New Delhi (1994).
7. Vinodhini Reddy, Prahlad Roa, 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 forIndians (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: **Checked by**

1. D. Bhuvaneswari **J. Harine Sargunam**

2. R. R. Sangeetha

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50

Relationship	Very poor	Poor	Moderate	High	Very high

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 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 **18 hours**

1.1 Carbohydrates-an overview of intermediatry 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 **18 hours**

2.1. Fatty acids-oxidation of fatty acid (β-Oxidation), synthesis of fatty acids and triglycerides. 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 **18 hours**

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 **18 hours**

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

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

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

UNIT-V Biochemical techniques **18 hours**

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 vaccum, air sensitivity- principle & applications.. Extraction process-Liquid-liquid,solid-liquid, acid-Base phase- principle & applications.

TEXT BOOKS

T.B.1. Ambika Shanmugam, Fundamentals of Biochemistry for Medical Students, Seventh Edition, New Age Publishing Pvt. Ltd., New Delhi(1986).
T.B.2.Principles and techniques of biochemistry & molecular biology-Keith Wilson & john walker,7 th edition,Cambridge university press, 2010.
T.B.3. C.P. Champe and A.R. Harvey, Lippincottís Illustrated Reviews(1987).
T.B.4. U. Sathyanarayana and U. Chakrapani, Textbook of Biochemistry, Third Edition, Books and Allied (P) Ltd, Kolkata (2010).
T.B.5. R. Davidson, Stanley Pass more, Brock and J.H. Heeman, Nutrition and Dietetics, Livingston's Ltd., Edinduragt London(1973).

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 Lehningerís Principles of Biochemistry,Third Edition. Macmillan Worth Publishers.(2000)
4. Davidson, P. Passmore and L.P. Break, 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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50

Relationship	Very poor	Poor	Moderate	High	Very high

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 Dietary management in Pancreatic disorder 18 hours

1.1Diabetes 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 Dietary management in Cardiovascular disease 18 hours

2.1Coronary Heart Disease – Athersclerosis – 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 infraction – 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 – Corriander seeds, garlic, parsely, mustard oil & fennel oil

UNIT – III Dietary Management in Renal disease 18 hours

3.1Renal function in diseases – Glomeuronephritis, 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 Nutritional support in Disability Disease and Developmental disorder 18 hours

4.1 Nutritional care in metabolic disorders – gout, phenylketonuria and lactose intolerance.

4.2Nutritional 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 Nutritional care in cancer and diseases of nervous system 18 hours

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.3
UNIT – IV Chapter – XVIII T. B.1
Chapter – XXX1 T. B.3
UNIT – 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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

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**	**20**	**80**

Course outcomes:

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

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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

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	25	75

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 Human Development 18 hours

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 Physical Growth and Development 18 hours

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 Cognitive Development 18 hours

3.1 **Infancy:** Definition-Behavioral 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 Language Development 18 hours

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: **Checked by**

1. D. Bhuvaneswari **1.J. Harine Sargunam**

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
II	20PND2DE2B	DSE – II	FOOD PACKAGING	6	4	100	25	75

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 1.2Properties 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 18 hours

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. Retort pouches, 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: 1V ModernPackaging 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 Labeling **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 study ……..portion#

Text Book

T.B1. Principal of Food Packaging by Sacharow& Griffin, Van NastrandRainhold Company, New York.

T.B.2. Food Packaging Materials by Mahadeviah&Growramma

T.B.3. A Handbook of Food Packaging by Frank A. Paine

T.B.4 . Ahvenainen. R. (2003). Novel Food Packaging Techniques:CRC Publications.

T.B.5 Robertson, G.L.(2010). Food Packaging and Shelf Life: CRC Publications, New York. 4. Robertson, G. L. (2006).

T.B.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: Priciples 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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
III	**20PND3CC9I**	**CORE–IX**	**DIETETICS INTERNSHIP**	**6**	**5**	**100**	**20**	**80**

Course outcomes:

At the end of the course, students will be able to

1. aware about the hospital diets
2. apply the dietary principles based on the disease conditions
3. depict the diet tray setup according to the menu prescribed by the dietitian
4. plan and prepare the therapeutic diets and calculate the nutrient content according to diet prescription
5. acquire the skills to conduct counseling according to the disease conditions.

List of Activities

i. Visits to the different wards to observe the patients including ICU for monitoring the special feeds given to the patients.

ii. Patient's medical history – Anthropometric measurements and calculating BMI for the given patient

iii. Planning the diet according to medical prescription.

iv. Supervising the food preparation and service in the dietary department of the hospital.

v. Calculating the diet according to medical prescription.

vi. Accompanying the doctor while visiting the patient.

vii. Diet counseling to the patient

viii. Case study- Selecting and observing 2 patients requiring a therapeutic diet in relation to Patient's dietary history - income, occupation, food habits and social factors.

Preparation of the report should include

i. History of the hospital.

ii. Location

iii. Organization structure

iv. Facilities provided

v. Layout of the kitchen

vi. Work organization

vii. Duties of the dietitian

viii. Special dietary preparation

ix. Types of service

x. Equipments

xi. Storage of food

xii. Handling of leftovers and shortages

xiii. Sanitation and hygiene.

xiv. Case study

References Books :

1. Pass more, D, P, Break, J.P, Human Nutrition and Dietetics, English Language Book Society, Livingston, 2008.
2. Rose, M.S, A Laboratory handbook for Dietetics, 4th edition, Mc Millan publishing.2007
3. Mahan, L.K. and Stump, S.E., Krause's Food, Nutrition and Diet Therapy 11th Edition, W.B. Sunders Co.2015.

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

Semester	Code		Title of the Paper			Hours			Credits	
III	20PND3CC9I		Dietetic Internship			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= 38, Relationship : HIGH										

Prepared by:
1. Dr. V. Kavitha

Checked by
1.Rajalakshmi.B
2.Harine sargunam.J

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
III	20PND3CC10	CORE- X	ADVANCED FOOD MICROBIOLOGY AND FOOD SAFETY	6	5	100	25	75

Course outcomes

At the end of the courses, student will be able to

1. know the role of microbes in food
2. identify microbial spoilage of various foods
3. prevent microbial spoilage of various foods.
4. apply quality control in food preparation and service
5. adhere to food safety and standard.

UNIT–I **18 hours**

1.1 Food microbiology – Definition, History and Scope of Food microbiology.

1.2 General Morphology of Microorganisms – Bacteria, Fungi, Algae, Yeast and Virus - Bacteriophage

1.3 Role of micro-organism in food microbiology: Bacteria–lactis, acetics, butryrics, propionics, proteolytic bacteria, lipolytic bacteria, saccharolytic bacteria, pectinolytic bacteria, thermophiles, thermoduric bacteria, psychrotrophs, halophiles, osmophilic bacteria, pigmented bacteria, gas forming bacteria, coliforms. **Moulds–**penicillum, **Yeast–**saccharomyces cerevisiae, **Algae –** red sea weed

UNIT–II **18 hours**

Growth and Multiplication & Importance of microorganisms

2.1 Microorganisms – Microbial Biomass, Growth curve, batch and continuous culture

2.2 Factors affecting growth: Intrinsic factors – nutrient content, pH, Redox potential, antimicrobial barrier and water activity. **Extrinsic factors** – relative humidity, temperature and gaseous atmosphere

2.3 Microbiology in Human Welfare – Importance of microbes in food biotechnology, genetically engineered organisms, #probiotics and single cell proteins#.

UNIT–III **18 hours**

Contamination, spoilage, preservation of foods:

3.1 Contamination, spoilage, preservation of cereals and cereal products, fruits and vegetable products

3.2 Contamination, spoilage, preservation of Milk and milk products, canned foods, sugar and sugar products

3.3 Contamination, spoilage, preservation of Meat, fish, egg and poultry.

UNIT–IV **18 hours**

Food–borne illness

4.1 Food Infection and Food Intoxication: Definition, Classification of food diseases.

4.2 Bacterial Food –borne illness: Staphylococcal intoxication, Botulism, Salmonellosis, Enteropathogenic Escherichia Coli infection.

4.3 Non Bacterial Food-borne illness: mold – aflatoxin, virus- infectious hepatitis, Poliomyelitis, Rickettias, Parasites – trichinosis.

UNIT–V **18 hours**

Recent Concerns in Food Microbiology & Food Safety

5.1Microbiology of food products – Ingredients, packaging material, equipments, sanitizing and preservation process, vending machines for food and beverages, food handling on large scale. Microbiology criteria for food – specification, standards and guidelines.

5.2 Probiotics & Encapsulation –(i) Probiotics, Antimicrobial activity & health promoting effects of Lactic acid bacteria. (ii) Encapsulation – Definition, Microencapsulation technology to protect probiotics.

5.3 Food Safety – HACCP – definition, principles and affiliations, consumer education, food safety education and training, food sampling and analysis of food.

#.....# **Self study portion.**

Text Books:

1. W.C. Fazier, Food Microbiology, Fifth Edition, Tata McGraw Hill Book Company, New Delhi. 2014.
2. Pelczar and Krieg., Microbiology , Fifth Edition, Tata McGraw Hill Book Co., London. 2006.
3. Adams M.R. and Moss M.O, Food Microbiology, New Age International (P) Ltd., New Delhi, 2005.
4. A.K. Joushua (2001)., Microbiology, Fourth Edition, Popular Book Depot Publishers, Chennai. 2001.
5. James G.Cappuccino and Naralie Sherman, Microbiology–A Laboratory Manual, Pearson Education Publishers, USA, 2008.
6. Adam Tamine, Probiotic Dairy products, Blackwell Publishing, USA, 2005.6.
7. Curricula on Food Safety, Directorate of General of Health Services, Ministry of health & family welfare, Govt of India, New Delhi, 2003.

UNIT I Chapter I T.B. 3

UNIT II Chapter II T.B. 3

UNIT III Chapter-XI, XIII, XIV, XV, XVI, XVII, XVIII T.B 1

UNIT IV Chapter –XXIV, XXV T.B 1

UNIT V Chapter – XXVII, XXVIII T.B 3

Books for Reference

1. Salle. A.J , Fundamental Principles of Bacteriology, Seventh Edition, Tat McGraw Hill Book Company, New Delhi, 2007
2. Vijaya Ramesh. K, Food Microbiology, MJP Publishers, Chennai, 2007
3. James M. Jay Modern Food Microbiology, Fourth edition, CBS Publishers and Distributors, New Delhi, 2005.

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

Semester	**Code**			**Title of the Paper**				**Hours**		**Credits**
III	**20PND3CC10**			**Advanced Food Microbiology and Food Safety**				**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. J. Harine Sargunam

Checked by :
1. Dr. M.Angel
2. A. Yasmin Fathima

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
III	20PND3CC11	Core – XI	RESEARCH METHODOLOGY AND STATISTICS IN NUTRITION AND DIETETICS	6	4	100	25	75

Course Outcomes:

At the end of the courses, student will be able to

1. comprehend the different types of research and various tools of data collection.
2. translate the knowledge gained on types of data and tools of data collection in compiling editing and coding of data and hypothesis
3. analyse the Statistical tool for compute the research data for interpretation
4. interpret and justify the significance of research findings
5. able to Design, execute and document a research and research proposal.

UNIT I Introduction to research and research design 18 hours

1.1 Research - Meaning, objectives and characteristics of research and types of Research and their application in the field of Nutrition and Dietetics Research Design–Definition, Steps in Research Design, Qualities of Good Research and problems encountered by a researcher.

1.2 Sampling methods– Introduction, Probability sampling -Random sampling methods random, stratified, systematic, cluster sampling, Non-Probability sampling- Judgement, Convenience, Quota sampling and their application in the field of epidemiological studies. Sampling and non-sampling errors.

UNIT II Methods of data collection 18 hours

2.1 Source of data– Definition, methods- primary and secondary data. Tools of data Collections- Primary data – Questionnaire-, preparation of schedules, Interview method. Secondary data - Sources, precautions while using secondary data. Pre-testing and Pilot Study. Editing and Coding of data.

2.2 Classification of data- Classification-, qualitative, quantitative- frequency distribution, discrete and continuous Tabulation of data parts of a table, preparation of blank tables, Consolidating data and forming tables

UNIT III Representation of Data and Report writing 18 hours

3.1 Diagrammatic and graphical representation- One dimensional diagrams, two dimensional diagrams-pictogram and cartographs. Graphical, frequency graphs- Line, polygon, curve Histogram- cumulative frequency graphs-ogives Components or layout of a thesis scientific writing by using Drawing graphs and diagrams appropriately.

3.2 Report writing- layout of research report, significance of report writing, #Steps in report Writing#, types of research report, oral presentation, mechanism of report writing, precautions and essentials of writing a good research report, footnotes and bibliographical citations. Writing a research proposal- Contents of a research proposal and types of research proposals.

UNIT IV Statistical methods and tools **18 hours**

4.1 Descriptive measures: Measures of central Tendency – Mean, Median, Mode, their applications.

4.2 Measures of dispersion- Mean deviation, standard deviation, quartile deviation, coefficient of variation, percentiles and percentile ranks.

4.3 Correlation- Correlation, co- efficient and its interpretation, rank correlation Regression equations and predictions. Association of attributes, contingency table working out numerical sums and interpretations Rank Difference Method Pearson's Product Moments Correlation Significance of correlation. Concept of Variance. Regression and Multiple Regression equations (concept and applications only)

UNIT V Probability and Test of significance **18 hours**

1.1 Probability - Rules of probability and its applications Normal, binomial, their properties, importance of these distributions in research studies

1.2 Tests of significance- Large and small sample tests, "t" and "f" test and chi-square test.

1.3 ANOVA technique – ANOVA table, types- one way and two way ANOVA and its application in research. Numerical applications and drawing inferences, demonstration of SPSS.

 # # self- study portion.

TEXT BOOKS:

1. C. R. Kothari, Research Methodology, 2002.
2. P. Shanthi Sophia and Bharathi, Second Edition, Computer Oriented Statistical Methods/Probability and Statistics, Charulatha publication 2000.
3. R.S.N.Pillai and V. Bagavathi, Statistics, Chand and Company Limited 2001.
4. Power Analysis for Experimental research A Practical Guide for the Biological, Medical and social Sciences by R. Barker Bausell, Yi-Fang Li Cambridge University Press. 2002
5. Design of Experience: Statistical Principles of Research Design and Analysis, by Robert O. Kuehl Brooks/cole . 2007
6. ROIG (M). Avoiding plagiarism, self-plagiarism, and other questionable writing practices: A guide to ethical writing, (2006)
7. Text book of research ethics, Loue and Sana, Springer publications, 1993.

UNIT I	Chapter-I, II	**T.B- 1**
UNIT II	Chapter- VI	**T.B- 3**
UNIT III	Chapter-VI, VIII,	**T.B- 3**
	Chapter –V	**T.B- 7**
UNIT IV	Chapter –IX, XII, XIII, XX	**T.B- 3**
UNIT V	Chapter –IX	**T.B- 1**

Books for Reference:

1. S.P. Gupta , Statistical Methods, 31st Edition, Sultana Chand and Sons, 2002
2. P. Ramakrishnan, Biostatistics, Saras Publication, 2001.
3. H.M.C. Donald,Burney , Research Methods, Fifth edition, Thomson and Wadsworth Publications, 2002.
4. Thesis and Assignment Writing, J. Anderson, Wiley Eastern Ltd., 1997.

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

Semester	**Code**		**Title of the Paper**		**Hours**		**Credits**		
III	**20PND3CC11**		**RESEARCH METHODOLOGY AND STATISTICS**		**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:
Dr. V. Kavitha

Checked by:
1. J.Priya
2. Dr.A.Sageetha

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
III	**20PND3CC12P**	**Core–XII**	**Advanced Food Microbiology and Food Safety & Nutritional Biochemistry - Practical**	**6**	**4**	**100**	**20**	**80**

Course outcomes

At the end of the courses, student will be able to

1. apply the pure culture techniques & staining techniques in food products
2. examine the bacterial count & bacteriological examination food product.
3. acquire skills to analysis various bloods parameters using different methods
4. apply the techniques to estimate the urine for various parameters.
5. understand and examine the urine by qualitative methods

ADVANCED FOOD MICROBIOLOGY AND FOOD SAFETY PRACTICAL

LIST OF PRACTICALS

A. Safety practices and working principles

1. Safety practices in Microbiological laboratory
2. Microscope and its operation
3. Principles and operations – Autoclave, Hot Air Oven, Incubators, Colony counter,
4. Centrifuge, pH meter, Colorimeter and Spectrophotometer.
5. Preparation of culture media, cleaning of glassware and sterilization methods

B. Culture and Staining Techniques

1. Pure culture techniques – Streak plate, Pour plate and Spread plate.
2. Staining techniques – Spore-staining, Capsular staining.
3. Test for motility of bacteria – Hanging drop technique.
4. Identification of Gram positive organisms (using food strains): Streptococcus pneumonia, Staphylococcus aureus and Bacillus sp. and Gram negative organisms (using food strains): Escherichia coli and Proteus sp.
5. Identification of important bacteria, moulds and yeast in food (by using slides/cultures)–E-coli, rhizopus, pencillium, aspergillus, yeast. Bacteriological examination of milk by methylene blue reduction test.

Related Experience: Visit to an established microbiology laboratory.

NUTRITIONAL BIOCHEMISTRY PRACTICAL

1. Estimation of Urine Glucose (Benedict's Method)
2. Estimation of Urine Urea (DAM Method)
3. Estimation of creatinine in urine.
4. Estimation of phosphorus in urine.
5. Estimation of Blood Urea (DAM Method)
6. Estimation of serum cholesterol (Zak's Method)
7. Estimation of uric acid by Caraway method

References:

1. Tietz, NW. Fundamentals of clinical chemistry WB Saunders Co.1976.
2. Varley, H. Gownakah and Hell, M. Practical clinical biochemistry, William Itanmoen, medical books, London, 1980
3. Raghuramulu, N. Nair, K,M , Kalyanasundaram, S, A, Manual of laboratory techniques, National Institute of Nutrition, ICMR, Hyderabad, 1983
4. Jayaraman, J. Laboratory manual in Bio Chemistry, New Age International Ltd Publishers, New Delhi, 1996.
5. Sadasivam, S,Manickam, M. Biochemical Methods, , New Age International Ltd Publishers, New Delhi, 1996.

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

Semester	**Code**			**Title of the Paper**				**Hours**		**Credits**
III	**20PND3CC12P**			**Advanced food microbiology and food safety & nutritional biochemistry 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. J. Harine Sargunam
2. J.Priya

Checked by:
1. Dr. M.Angel
2. A. Yasmin Fathima

Note:

Note Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
III	20PND3DE3A	DSE -III	Nutritional Biochemistry	6	4	100	25	75

Course outcomes:

At the end of the courses, student will be able to

1. describe and express the biochemical structure and metabolism of carbohydrate metabolism.
2. discuss and express the biochemical structure and metabolism of protein and lipids
3. explain the Illustrate an understanding knowledge about nucleic acid,Enzymes and acid base balance
4. illustrate an understanding of Immunoglobulins and Liver and kidney functions tests.
5. illustrate about the role of hormones in the body.

UNIT-I **18 hours**

CARBOHYDRATES METABOLISM:

1.1 Carbohydrates-an overview of intermediary metabolism of carbohydrates. Glycolysis-Biomedical importance, Formation and fate of pyruvic acid.Tricarboxylic cycle-Amphibolic nature and its regulation.

1.2 Metabolism of Glycogen. Regulation of Glycogenesis, Glycogenolysis, and Gluconeogenesis, Hexose monophosphate shunt-Metabolic significance and its regulation, Uronic acid pathway.Regulation of blood glucose (Homeostasis).

1.3 Diabetes Mellitus- Metabolic changes and Clinical changes of diabetes mellitus. Normal& abnormal-glucose tolerance test, Glycogen storage diseases. Inborn error of carbohydrate metabolism-Glycosuria, Galactosemia**,** Fructosuria, Essential pentosuria.

UNIT-II **18 hours**

PROTEIN AND LIPID METABOLISM:

2.1 Proteins- General pathway of protein metabolism, #Amino acids - Definition, classification#, essential & non-essential amino acids.

2.2 Metabolism: Transformation, Decarboxylation, Ammonia formation & transport, Urea cycle regulation, Inherited disorders associated with urea cycle. Inherited disorders-Phenylketonuria, Alkaptonuria, Albinism, Cystinuria, Cystinosis, Homocystinuria, Maple syrup disease, Alcaptonuria.

2.3 Lipids: Fatty acids- Ketogenesis, Ketolysis, Ketosis, Prostaglandins-Classification , metabolism and function. Inherited disorders-Niemann-pick diseases, Gaucher’s disease, Tay-sach’s diseases.

UNIT-III **18 hours**

Nucleic acid, Enzymes &Acid-base balance:

3.1 Nucleic acids: Nucleoproteins, Nucleosides, Nucleotides-Definition and biological importance. Uric acid metabolism, Inhibitors of purine and pyrimidine metabolism.Genetic code-An overview. DNA repair.

3.2 Enzymes -diagnostic value of serum enzymes - Creatinine kinase, Alkaline phosphatase, Acid phosphatase, LDH, SGOT, SGPT, Amylase, Lipase, Carbonic anhydrase etc.

3.3 Acid base balance: concepts & disorders - pH, Buffers, Acidosis, Alkalosis

UNIT-IV **18 hours**

Immuno Globulins, Liver functions Test &Renal functions Test

4.1 Immuno globulins: General concepts & functions of immunoglobulins

4.2 Liver function Test: Test based on-Excretory function, metabolic function, capacity for detoxication, Enzymes, vitamin and mineral metabolism

4.3 Renal functions tests – Inulin Clearance test, Urea clearance test, Endogenous creatinine clearance test, Concentration test, Addis test, Mosenthal test, Urea concentration test, Dye test.

UNIT-V **18 hours**

Hormones:

5.1 Thyroxine, Insulin, Glucogan-biosynthesis, metabolism and metabolic effects

5.2 Adrenal and adrenal cortex hormones-Epinephrine and Norepinephrine, Corticosteroids-biosynthesis, metabolism and metabolic effects

5.3 Sex hormones-Androgens, Estrogens, Progesterone- biosynthesis, metabolism and metabolic effects. Pituitary hormones-Thyroid stimulating hormones, Follicle stimulating hormones, Luteinizing hormones- biosynthesis, metabolism and metabolic effects

#.....# Self - study portion.

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,7 th edition, Cambridge university press, 2010.
3. C.P. Champe and A.R. Harvey, Lippincottís 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 Pass more, Brock and J.H. Heeman, Nutrition and Dietetics, Livingston's Ltd., Edinduragt London 1973.

UNIT-I Chapter XVII T. B. 1
UNIT-II Chapter III, XIX, XX & XXI T. B. 1
UNIT-III Chapter IV, VI & XIV T. B. 1
UNIT-IV Chapter XIX & XX T. B. 1
Chapter XXX T. B. 4
UNIT-V Chapter XXVI 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 Lehningerís Principles of Biochemistry,Third Edition.Macmillan Worth Publishers.(2000)
4. Davidson, P. Passmore and L.P. Break, 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**
III	**20PND3DE3A**			**Nutritional Biochemistry**				**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:
J. Priya

Checked by:
Dr. V.Kavitha

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

Semester	Code	Course	Title of the Course	Hours	Credits	Max. marks	Internal marks	External marks
IV	20PND3DE3B	DSE III	NUTRITIONAL COUNSELLING AND EDUCATION	6	4	100	25	75

Course outcomes

At the end of the courses, student will be able to

1. understand the counselling psychology and principles and methods of counselling.
2. ability to get insight knowledge on different counselling sessions.
3. be able to become familiarise in the stages in counselling process and the types of Counselling
4. ability to gain in-depth knowledge on counselling and educating patients
5. understand the role of computer in counselling process

UNIT I **18 hours**

1.1 Importance of nutrition counselling and patient education – Introduction to nutrition counselling and its importance.

1.2 Psychology- Introduction, definition., basic concepts –attention, perception, learning,memory,# personality, cognition, motivation #. **Counselling Psychology**-Introduction, definition, meaning and importance.

1.3 Nutritional Counselling - counselling techniques, stage of change. Activities that facilitate behavior change, understanding cultural factors, developing Discrepancy, avoiding arguments /defensiveness, rolling with resistance, supporting self- efficacy.

1.4 Intervention Model – Interviewing, assessment of current eating behavior and #assessment of readiness to change#.

UNIT II **18 hours**

2.1 Nutritional Counselling Sessions – not ready to change counselling sessions **–** asking open–ended questions, reflective listening, affirming, summarizing, eliciting self-motivational statements, #intention to change, ending the session#.

2.2 Ready to change counselling sessions- action plan, arranging for the next contact, resistance behaviors & potential strategies to modify them-reflecting, double-sided refection, shifting focus, emphasizing personal choice, reframing.

UNIT III **18 hours**

3.1 Counselling Process-various phases/ stages in counselling process. Types of Counselling: crisis counselling, facilitative counselling, preventive counselling and # development counseling #.

3.2 Counsellor-Counselee Relationship - Practical consideration in giving dietary advice and counseling- Factors affecting and individual food choice, Communication of dietary advice, consideration of behavior modification and motivation

UNIT IV **18 hours**

4.1 Counselling and educating patients –Determining the role of nutrition counseller, responsibilities of the nutrition counseller, practitioner v/s client managed care, conceptualizing entrepreneur skills and behavior, communication and negotiation skills. values in counselling. Counselling Guidelines.

4.2 Teaching aids used by dietitians- charts, leaflets, posters etc., preparation of Teaching material for patients suffering from Digestive disorders, Hypertension, Diabetes, Atherosclerosis, Hepatitis and Cirrhosis.

UNIT V **18 hours**

5.1 **Use of computer in diet counselling** - interview techniques, artificial intelligence, nutrition care plan, bedside monitoring, follow-up.

5.2 **Use of computers in nutrition education**, nutrition on web, Use of computers by dietitian, Dietary computations, Dietetic management, Education/training and Information storage.

5.3 **Model counselling** -family planning counselling, abortion counselling, counselling for children, adolescents, patients with specific diseases like HIV/AIDs, cancer and diabetes.

#.....# Self - study portion.

Text Book

1. L.K. Mahan and M.T. Arlin, Krause's Food Nutrition and Diet Therapy, Eleventh Edition, W.B. Saunder Company, London, 2000.
2. Robinson, Normal and Therapeutic Nutrition, Seventeenth Edition, Oxford & LBM Publishing, Bombay (1990).

UNIT I Chapter – I, II T.B. 2
UNIT II Chapter – II T.B.1
UNIT III Chapter – III T.B.2
UNIT IV Chapter – IV T.B.1
UNIT V Chapter – V T.B.2

Reference Books

1. M. E. Shils, J. A. Oslon, M. Shike, & A.C. Ross, Modern Nutrition in Health & Disease, Tenth Edition, Lippincott Williams and Wilkins, 2006.
2. K.K. Bhatia, Principles of Guidance and Councelling, Kalyani Publishers Ludhiana, 2002.
3. Nelson–Jones, Richard, Practical Counselling and helping Skills, Better Yourself Books, Bombay, 1994.

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

Semester	Code	Title of the Paper	Hours	Credits
IV	20PND3DE3B	NUTRITIONAL COUNSELLING AND EDUCATION	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:
Dr. M. Angel

Checked by
J. Harine Sargunam

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
IV	20PND4CC13	CORE-XIII	FOOD SERVICE MANAGEMENT	6	5	100	25	75

Course outcomes

At the end of the courses, student will be able to

1. Understand and acquire the knowledge about the various service systems, current trends in food service industry
2. Develop skills to obtain the various managerial function in food service units.
3. Gain confidence to work in food purchase, production and service departments in food service industry.
4. Know to manage the financial concept in food service units
5. Apply concept of Food waste management, Hygiene and sanitation Guidelines by FSSAI in food service institutions

UNIT–I **18 hours**

Food service industry

1.1 Different Type of catering institutions - commercial and non-commercial, Institutional food service- definition, objectives, types of institutional food service.

1.2 Food service system - Conventional systems, Convenience systems, ready food system,cook chill, cook freeze and vending systems.

1.3 Current trends in food service industry – Artificial Intelligence (AI) in food service technology-concept and application.

UNIT-II **18 hours**

Management and resources

2.1 Management – Definition, Principles and Tools of Management- tangible and intangible tools, Quality of Management -MBO, TQM, SWOT Analysis

2.2 Resources-money, space, time, energy. Equipments- classification of equipments, care and maintenance of equipment.

2.3 Requirement Legal Licences in starting a food business in India

UNIT-III **18 hours**

Food management

3.1 Menu planning – definition, functions and types of menu. Designing the menu card.-points to be considered while writing menus.

3.2 Food purchase-Purchasing procedure, food specification-objectives, methods of purchasing, forms used in food purchase, receiving, storing and issue.

3.3 Food production and service-process, effective use of leftover foods. Styles of service -Formal and Informal styles of service

UNIT-IV **18 hours**

Financial management.

4.1 Financial and management accounting -definition, application of management accounting in catering operation.

4.2 Concept and components of cost, cost control, pricing of food.

4.3 Accounting system – Accounting techniques-single and double entry system, advantages. Types and book of accounts.

UNIT–V **18 hours**

Fuel, Food waste management, Hygiene and Sanitation

5.1 Fuel management- types of fuel, merits and demerits, fuel saving economy in relation to food service industries.

5.2 # Food waste management in food service industry-Guidelines by FSSAI#

5.3 Hygiene and sanitation - definition, importance, environmental hygiene and sanitation. Hygiene in food handling, personnel hygiene, importance of pest and rodent control in food service units

Industrial visit: A visit to Food service industry

#.....# Self study portion

Text Books

1. Mohini Sethi, Institutional Food Management, New Age International (P) Limit Publishers New Delhi., 2011
2. West's and Wood's., Introduction to Food service, Second Edition, Mac Millan Publishing New York, 1998

UNIT I	Chapter I, IV	**T.B- 1**
UNIT II	Chapter I, III	**T.B- 1**
UNIT III	Chapter IV	**T.B- 1**
UNIT IV	Chapter V	**T.B- 1**
UNIT V	Chapter VII	**T.B- 1**

Books for Reference:

1. Jag Mohan Negi (2009), Food and beverage management and cost control, Knanishka Publishers, New Delhi.
2. Sudhir Andrews (2008), Text book of Food and Beverage Management, Tata McGraw- Hill Publishing Company Limited New Delhi.
3. Mohini Sethi and Malham (2007), Catering Management and Integrated Approach, John Wiley & Sons, Eastern Limited New Delhi.

Web Source:

1. medium.com, eatos, ai-the-future-of-food-service-tec.
2. emerj.com › ai-sector-overviews › ai-in-restaurants-foo...
3. https://www.marketingtutor.net/swot-analysis-of-the-food-and-beverage-industry/taxguru.in, corporate-law, 10-legal-licenses-required-...

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

Semester	**Code**			**Title of the Paper**			**Hours**		**Credits**
IV	**20PND4CC13**			**Food Service Management**			**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= 35, Relationship : HIGH										

Prepared by:
1. B.Rajalakshmi

Checked by:
1. Dr.V.Kavitha
2. Dr.A.Sangeetha

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External marks
IV	**20PND4CC14**	**CORE-XIV**	**PUBLIC HEALTH AND COMMUNITY NUTRITION**	**6**	**5**	**100**	**25**	**75**

Course outcomes :

At the end of the courses, student will be able to

1. disseminate the nutrition for National development.
2. assess the nutritional status and health problems in the community.
3. know the various organizations related with food and nutrition with its functions
4. apply the strategies for improving the nutritional status and dissemination of nutrition education.
5. know about epidemiology and apply the nutrition process during disasters.

UNIT- I **18 Hours**

1.1 Food and Nutrition Security Food production, access, distribution, per capita food availability of food grains, losses, consumption, Food Security

1.2 Determinants of Nutritional Status -Nutritional Assessment – Anthropometry, Clinical Examination, Laboratory and Biochemical Assessment, Dietary Assessment.

UNIT-II **18 hours**

2.1 Major Nutritional problems – Etiology, prevalence, clinical manifestations, preventive and nutritional measures of malnutrition – causative factors - Low birth weight, faulty child feeding practices, dietary inadequacy, frequent infections, large families, illiteracy, taboos and superstitious, viscious cycle, Under Nutrition in Children and Adults Macro and Micro Nutrient Deficiencies–PEM, Anaemia, Fluorosis, #Iodine deficiency# Osteoporosis, Prophylaxis Programme–Vitamin A.

2.2 Special Health Problems – Smoking, alcoholism, Drug addiction, AIDS and AIDS Control Programme

UNIT-III **18 hours**

National, International organization

3.1 National Nutrition policy–XII five year plan, Recommendations, Action Plan

3.2 Action Programmes (**International)–**WHO, ICDS, FAO, UNICEF, World Bank, Voluntary Services, CARE

3.3 National organization–ICMR, NIN, CSWB, SSWB, FNB, NNMB, CFTRI, DFRL, NIPCCD

UNIT- IV **18 hours**

Approaches and strategies for improving nutritional status and health, Nutrition Education and IEC

4.1 Food based interventions and nutrition gardens Food based interventions including fortification and genetic improvement of foods, Supplementary feeding and Nutrition gardens.

4.2 Social protection measures- PDS, TPDS

4.3 Nutrition Education - Definition, importance, Principle in Planning, Programme Execution and Evaluation, Mass Media, Types, Preparation of Educational Material- Coverage, Evaluation.

4.4 Introduction to IEC - Aims and Objectives, Importance of IEC.

UNIT- V **18 hours**

Epidemiology and Nutrition In Emergencies and Disasters

5.1 Epidemiology- concept and definitions; Basic measurements in epidemiology; Types of epidemiology- descriptive epidemiology.

5.2 Defining the population, describing the diseases, measurement of diseases and comparing with known indices,

5.3 Analytical epidemiology and Experimental epidemiology - Design and planning of nutritional epidemiology studies; Evaluation of epidemiological studies; Uses of epidemiology.

5.4 Nutrition approach during emergencies and disasters.

 # ….. # self -study portion.

Text Books:

1. M.S. Bamji, N. Prahlad Rao, V. Reddy. Textbook of Human Nutrition, Second Edition, Oxford and PBH Publishing Co, Pvt.Ltd, New Delhi 2004.
2. M. Swaminathan, Essentials of Food and Nutrition. An Advanced Textbook Vol. I,
3. Printing and Publishing Co. Ltd, Bangalore 2007.
4. B. Srilakshmi, Nutrition Science, Sixth Edition, New Age International (Pvt) Ltd, New Delhi 2007.

UNIT I Chapter VIII **T.B – 1**

UNIT II Chapter IX, X, XI, XII, XIII, IXX, XX , XXI , XXII, XXXVII **T.B - 1**

UNIT II Chapter XVIII, XV **T.B - 2**

UNIT III Net Ref www.oxfamindia.org

www.planningcommission.nic.in

UNIT IV Net Ref www.oxfamindia.org

www.fao.org

UNIT V Chapter – XXII **T.B – 3**

Books for Reference:

1. A. Park, Textbook of preventive and Social Medicine, Nineteenth Edition, M/S Banarasids, Bharat Publishers, Jabalpur, 2007
2. D.P Bhatt, Health Education, Khel Sahitya Kendra Publishers, New Delhi, 2008
3. M.J. Gibney, B.M Margetts, J.M Kearney, L. Arab, Public Health Nutrition, Blackwell Publishing Co.UK, 2004
4. Michael, *et, al*, "Public Heath Nutrition", Blackwell Science, UK (2004).

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

Semester	**Code**		**Title of the Paper**			**Hours**			**Credits**	
IV	**20PND4CC14**		**PUBLIC HEALTH AND COMMUNITY 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:
Dr.M.Angel

Checked by:
J.Harine Sargunam
A.Yasmin Fathimaa

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
IV	**20PND4CC15P**	**CORE –XV**	**COMPUTER APPLICATION - PRACTICAL**	**6**	**5**	**100**	**20**	**80**

Course out comes:

At the end of the course, students will be able to

1. acquire skill in basic techniques in the computer.
2. able to work with MS word, excel and PowerPoint on nutrition related topics.
3. acquire skill to Statistical analysis of data – mean and standard deviation.
4. know about the application of SPSS in nutrition related research.
5. gain knowledge in online article publication in journal.

1.1 Basic technique in computer

- Working with files and folders. **Control panel:** Installation of new programs, changing password and security options
- Working with mail: creating e-mail ID, composing, sending and receiving mails

1.2 Application of Ms Word in Nutrition related content framing.

- Starting, creating, editing, saving, print previewing and printing a document, encryption of document
- Hyperlink setting, Data representation in Tabular form, manipulation of tables, tabulating nutrient content of foods, working with chart.

1.3 Application of Ms Power point in presentation with animation.

- Starting, Creating, Inserting pictures and slides, transition and effects, hyperlink setting and recording.
- Creating slide show presentation with animations on nutrition related topics. encryption of document

1.4 Application of Ms Excel to analyze Mean, standard deviation and dietary calculation

- Starting Excel, working with spread sheet, tabulating data, Formulation Bar diagram, Pie diagram, Line diagram from the data.
- Applying Excel for nutrient calculations and formatting chart and encryption of document
- Statistical analysis of data – mean and standard deviation.

1.5 Statistics and Online publication in Journals

- Application of SPSS software in nutrition related research- Computation of mean, median, Standard deviation, t-test, f test, ANOVA, Chi square test.
- Writing of a review or a research article
- Framing the content and Submission of the article through online.

Web Source:

1. http://www.bcpls.org/Docs/Computer_Handouts/PowerPoint101.pdf
2. https://corporatefinanceinstitute.com/resources/excel/study/basic-excel-formulas-beginners/
3. https://business.tutsplus.com/tutorials/how-to-learn-powerpoint--cms 29884#:~:text=Think%20of%20slides%20as%20the,your%20content%20to%20in%20Power Point.
4. https://www.instructables.com/How-to-Create-a-PowerPoint-Presentation/

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

Semester	**Code**		**Title of the Paper**		**Hours**		**Credits**		
IV	**20PND4CC15P**		**Computer Application Practical**		**6**		**5**		
Course Outcomes (Cs)	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= 31, Relationship : moderate										

Prepared by:
R.R.Sangeetha

Checked by:
Dr.M.Angel

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal marks	External marks
IV	**20PND4EC2**	**Extra Credit Course - II**	**Nutrition and Dietetics for Career Examinations**	**----**	**5***	**100**	**----**	**----**

Course outcomes

At the end of the courses, student will be able to

1. Update their knowledge to face their competitive aptitude in the field of Nutrition and Dietetics.
2. Acquire knowledge in facing government competitive exam in the field of Nutrition and Dietetics
3. Apply and update knowledge in nutrition and dietetics related research
4. Compete their knowledge and skills in the teaching profession
5. Gain wide knowledge to face competitive competition as registered dietitian

UNIT-I: Food Science and Food Service Management

1.1 Food science and nutrition- Properties of food – physical and chemical properties. Quality evaluation of foods- objectives and subjective. Effects of cooking and processing techniques on nutritional components and other physical parameters, food preservation and application. Food pigments and additives.

1.2 Food service management- Food standards, microbiological safety of food, HACCP, food packaging. Perspectives of food service-menu planning, food cost analysis. New product development-nano technology . Food service management of institutional level-hospital, educational institutions, social and special institutions.

1.3 Research methods- fundamental issues, concept, need relevance, scope and ethics in research.

UNIT-II: Nutrition and Dietetic

2.1 Food groups – balanced diet, food pyramid, macro and micro nutrition. Nutrients- role of nutrients in the body, nutrient deficiencies and requirements for Indians. Public health nutrition

2.2 Nutrition through life span-physiological changes, growth and development from conception to adolescence, nutritional needs and dietary guidelines for adequate nutrition through life cycle, nutrition concerns.

2.3 Community nutrition, sports nutrition, nutrition in emergencies and disasters.

Nutritional assessment-methods and techniques. Nutritional intervention-national nutrition policies and programmes, food and nutrition security. Clinical and therapeutic nutrition. Diet counseling and management. Research methods- research designs, principles and purpose of research

UNIT-III: Textiles and Apparel designing

3.1 Textiles - Textile terminologies- fibre, yarn, weave, fabric etc., classification of fibers, yarns and weaves, identification of fibres and weaves. Manufacturing process of major natural and manmade fibres, properties and their end uses. Different methods of fabric construction-woven, knitted and non woven fabrics, their properties and end uses.

3.2 Textile Testing and quality control-need of testing, sampling method, techniques of testing fibres, yarn, fabrics and garments. Testing of colour-fastness, shrinkage, pilling and GSM of fabrics. Textile and environment-banned dyes, eco-friendly textiles, contamination and effluent treatment, Eco-label and eco marks. Recent developments in textiles and apparels- nano textiles, technical textiles, occupational clothing, zero waste designing, up cycling and recycling.

3.3 Apparel designing: Body measurements-procedure, need, figure types and anthropometry. Equipments and tools used or manufacturing garments-advancements and attachments used for sewing machine. Types of machines used and their parts. Elements and principles of design and its application to apparel. Illustrations and parts of garments. Fashion-Terminologies, fashion cycle, fashion theories, fashion adoption, fashion forecasting and factors affecting fashion.

UNIT-IV Resource management and Interior design

4.1 Resource Management - Management-concept, approaches, management of time, energy, money, space, motivating factors, motivation theories, decision making. . Functions of management-planning, supervision, controlling, organizing, evaluation, family life cycle-stages, availability and use of resources. Resources-classification, characteristics, factors affecting use, resource conservation, time management, work simplification techniques,

4.2 Human resource management- functions, need, human resource development challenges, functions, manpower planning, training need assessment, training methodologies, training evaluation

4.3 Interior design- Design fundamentals – elements of art, principles of design, principles of composition. Colour- dimensions of colour, psychological effects of colour, colour schemes, and factors affecting use of colour. Ergonomics - significance, scope, anthropometry, man, machine, environment relationship, factors affecting physiological cost of work, body mechanics, functional design of work place, time and motion study, energy studies. Furniture and furnishing - historical perspectives, architectural styles, contemporary tends, wall finishes, window and window treatments

UNIT-V: Child /Human development and extension education

5.1 Child development: Principles of growth and development care during pregnancy and pre-natal and neonatal development. 2. Theories of human development and behavior. 3. Early childhood care and education – activities to promote holistic development. 4. Influence of family, peers, school, community and culture on personality development. 5. Children and

persons with special needs, care and support, special education, prevention of disabilities, rehabilitation

5.2 Extension education: Historical perspectives of extension–genesis of extension education and extension systems in India and other countries, objectives of extension education and extension service, philosophy and principles of extension programme development. 2. Programme management- need assessment, situation analysis, planning, organization, implementation, monitoring and evaluation. 3. Extension methods and materials- interpersonal, small and large group methods, audiovisual aids-need, importance, planning, classification, preparation and field testing, use and evaluation of audio-visual materials.

5.3 Curriculum development and planning for extension education and development: Activities, Bloom's taxonomy of educational objectives and learning. 5. Non-Formal, adult and lifelong education-historical perspectives, concept, theories, approaches, scope, methods and materials used, challenges of implementation and evaluation, issues to be addressed.

Text Books:

1. Srilakshmi, Nutrition Science, Fifth Edition, New Age International (P) Ltd, New Delhi, 2008.
2. Ambika Shanmugam, Fundamentals of Biochemistry for Medical Students, Seventh Edition, New Age Publishing Pvt.Ltd., New Delhi (1986).
3. B. Srilakshmi,Dietetics, Sixth edition, New Age International Pvt. Ltd 2010.
4. B. Srilakshmi,Nutrition Science, Fourth edition, New Age International Pvt. Ltd 2012.
5. MohiniSethi and Malham-Catering Management and integrated approach, JohnWiley & Sons, eastern limited, New Delhi, Reprint 2007

Reference Books:

1. Williams, S.R., Nutrition and Diet Therapy, 6th Edition, Times Mirror / Mosby College Publishing, St. Louis, 1989.
2. Kotschevar LH and Terrell ME, Food Service Planning Layout and Equipment, 2nd Edition, John Wiley and sons, New York, 1977.

Web source:https://gradeup.co/ugc-net-home-science-syllabus-i

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

Semester	Code	Title of the Paper	Hours	Credits
IV	**20PND4EC2**	**Nutrition and Dietetics for career examinations**	**------**	**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= 44, Relationship : HIGH										

Prepared by:
Dr.V.Kavitha

Checked by:
Dr.M.Angel

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high