MASTER OF SCIENCE (FOOD AND NUTRITION)

REGULATIONS

ELIGIBILITY

A pass in any one of the following Degree Courses of B.Sc Nutrition and Dietetics, Nutrition, Food Service Management and Dietetics, Food Science and Quality Control, B.VOC- Food Processing Technology, Food Science and Nutrition, Botany, Zoology, Biochemistry, Biotechnology, Chemistry, Microbiology, Home science or Family and Community Science or an Examination accepted as equivalent thereto by the Academic Council, subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the **M.Sc Food and Nutrition Examination** of this College after a course study of two academic years.

PROGRAMME EDUCATIONAL OBJECTIVES

The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:

1. To provide advanced knowledge on food science and nutrition to enhance the quality of life through the improvement of human health and nutritional status
2. To enable the students to implement the basic food science in operation
3. To develop skills and techniques in food preparation with conservation of nutrients and palatability using cooking methods generally employed
4. To help the students to contribute proper utilization of foods and prevent wastes
5. To understand the prevalence of malnutrition in our Country and gain knowledge on effective methods to combat malnutrition.

SCHEME OF EXAMINATION

Subject Code	Subject	Ins. Hrs/ Week	Exam Duration	Max Marks			Credit Points
				CA	CE	Total	
First Semester							
17PFN13A	Advanced Food Science	5	3	25	75	100	5
17PFN13B	Nutrition Through Life Cycle	6	3	25	75	100	5
17PFN13C	Nutritional Biochemistry	5	3	25	75	100	4
17PFN13D	Food Chemistry	6	3	25	75	100	5
17PFN13P	Lab-I: Food science and food chemistry	4	3	40	60	100	2
	ELECTIVE I	4	3	25	75	100	4
		30				**600**	**25**
Second Semester							
17PFN23A	Food Processing	5	3	25	75	100	5
17PFN23B	Physiological Aspects of Nutrition	5	3	25	75	100	4
17PFN23C	Macronutrients	5	3	25	75	100	5
17PFN23D	Nutrition in Diseases – I	5	3	25	75	100	5
17PFN23P	Lab-II: Food Analysis	6	3	40	60	100	3
	ELECTIVE II	4	3	25	75	100	4
		30				**600**	**26**
Third Semester							
17PFN33A	Micronutrient	5	3	25	75	100	5

10/1/2018
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	s						
17PFN33B	Nutrition in Diseases – II	4	3	25	75	100	4
17PFN33C	Research Methodology and Statistics	5	3	20	55	75	4
17PFN33D	Computer Applications in Nutrition	3	3	20	55	75	2
17PFN33P	Lab-III: Clinical Nutrition Techniques	6	3	40	60	100	3
17PFN33Q	Lab-IV: Nutrition in Diseases	4	3	20	30	50	2
17PFN33V	Mini Project Viva	-	3	-	50	50	2
	ELECTIVE III	3	3	25	75	100	3
		30				**650**	**25**
Fourth Semester							
17PFN43A	Community Nutrition	5	3	25	75	100	4
17PFN43V	Project Work and Viva Voce	21	3	80	120	200	8
	ELECTIVE IV	4	3	25	75	100	2
		30				**400**	**14**
	TOTAL					**2250**	**90**

Note: Internship for one Month in Food Industry and fifteen days in hospital and submit training report for the programme completion.

ELECTIVE – I

(Student shall select any one of the following course as Elective in first semester)

S. No	Subject Code	Name of the Course
1.	17PFN1EA	Functional Foods and Nutraceuticals
2.	17PFN1EB	Food Product development

ELECTIVE – II

(Student shall select any one of the following course as Elective in second semester)

S. No	Subject Code	Name of the Course
1.	17PFN2EA	Human Physiology
2.	17PFN2EB	Food Packaging

ELECTIVE – III

(Student shall select any one of the following course as Elective in third semester)

S. No	Subject Code	Name of the Course
1.	17PFN3EA	Food Safety and Quality Management
2.	17PFN3EB	Convenience Foods

ELECTIVE – IV

(Student shall select any one of the following course as Elective in fourth semester)

S. No	Subject Code	Name of the Course
1.	17PFN4EP	Lab- V-A: Food Quality Control
2.	17PFN4EQ	Lab-V-B: Nutrition in Health and Wellness

Total Credit Distribution

Course	Credits	Total		Credits	Cumulative Total
Core	5	7 x 100 =	700	35	**77**
Core	4	4 x 100=	400	16	
		1x75=	75	04	
Core	2	1x75=	75	02	
Core Lab	3	2 x 100 =	200	06	
Core Lab	2	1x 50 =	50	02	
		1x100=	100	02	
Mini Project Viva Voce	2	1 x 50 =	50	02	
Project	8	1 x 200 =	200	08	
Elective	4	2 x 100 =	200	08	**13**
Elective	3	1x100=	100	03	
Elective	2	1x100=	100	02	
Total			**2250**	**90**	**90**

FOR PROGRAMME COMPLETION

Students have to complete the following Subjects:

- Core papers in I, II, III and IV Semesters
- Elective papers in the I, II, III and IV Semesters
- Core practical's in I, II, and III Semesters

- Mini Project Viva Voce in III Semester
- Project and Viva - Voce in IV Semester
- One month internship in food industry and 15 days in multi-specialty Hospital to qualify for the Degree

Earning Extra Credits is not mandatory for programme completion Extra Credits

S.No	Course	Credit	Total credits
1.	Publication with ISSN Journal	1	**1**
2.	Hindi /Other Foreign language	1	**1**
3.	Paper Presented in Sponsored National/ International Seminar/conference/ workshop	1	**1**
4.	Online Courses Prescribed By Department / Self study paper	1	**1**
5.	Representation – Academic/Sports /Social Activities/ Extra Curricular / Co-Curricular activities at University/ District/ State/ National/ International	1	**1**
	Total	5	**5**

Rules:

The students can earn extra credits only if they complete the above during the course period (I to III sem) and based on the following criteria. Proof of Completion must be submitted in the office of the Controller of Examinations before the commencement of the IV Semester. (Earning Extra credits are not mandatory for Course completion)

1. Publication with ISSN Journal by a student and co-authored by staff member will be given one credit extra.

2. Student can opt Hindi/ French/ Other foreign Language approved by certified Institutions to earn one credit. The certificate (Hindi) must be obtained from **Dakshina Bharat**

Hindi Prachar Sabha and He/ she has to enroll and complete during their course period (**first to third semester**).

2. Award winners in Paper Presentation in Sponsored International Seminar/conference/Participation in short term workshop (minimum 5 days) will be given one credit extra.
3. Student can earn one credit, if they complete any one online certification courses / Self study paper prescribed by the concerned department.

Self study paper offered by the Department of Nutrition and Dietetics

S. No.	Semester	Course Code	Course Title
1.	III	17PFNSS1	Composite Home science
2.		17PFNSS2	Diet Counseling

List of Online Courses prescribed by the department

1. study.com
2. onlinecollege.org
3. online.colostate.edu
4. careerfaqs.com

5. Award Winners in /Social Activities/ Extra Curricular /Co-Curricular Activities / Representation in Sports at University/ District/ State/ National/ International level can earn one extra credit.

M.SC FOOD AND NUTRITION

PROGRAMME OUTCOMES

On successful completion of the programme, the following are the expected outcomes.

PO Number	PO Statement
PO1	To develop the knowledge of the students in the area of human nutrition, food science, food product development, food safety and quality management.
PO2	Apply recently advanced novel foods in medical nutrition therapy and recommend the physical activity to manage the common diseases and metabolic disorder to achieve the fitness and well being.
PO3	Familiarize with the problems and plan, implement, monitor and evaluate interventional programs related to food and nutrition and security to the community.
PO4	To build entrepreneurial values, attitudes, quality and desire in developing innovative food products by fulfilling quality parameters, used to meet the consumer needs nutritionally and commercially viable.
PO5	To develop skills and techniques for the students to become professionals in service industries.

17PFN13A	ADVANCED FOOD SCIENCE	SEMESTER-I

PREAMBLE

- To understand the structure, classification and nutrient composition of foods
- To appreciate the science of foods

COURSE OUTCOMES

In the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Analyze the structure of foods Compare the nutrient composition of foods Examine the functions of the components of wheat Categorize the role of ingredients in making breads and cakes	K_4
CO2	Classify foods based on food processing Inspect the browning reaction in foods Explain the methods of processing different foods	K_4, K_5
CO3	Interpret the factors which affects the nutritive value of foods Classify the methods of cooking different foods	K_4, K_5
CO4	Examine the postmortem changes in meat Criticize the food quality Analyze the medicinal value of foods	K_4, K_5
CO5	Choose foods based on quality Decide storage conditions for different foods Discuss the subjective and objective evaluation of foods Develop food products	K_5, K_6

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	M	S	S	S
CO3	S	M	S	S	S
CO4	S	M	S	S	S
CO5	S	M	S	S	S

S - Strong; M - Medium; L- Low

17PFN13A	ADVANCED FOOD SCIENCE	SEMESTER-I

Total credits: 5

Hours /Week: 5

CONTENTS

UNIT- I

Rice - Structure, Composition and nutritive value, Cereal cookery

Wheat - Structure, composition and nutritive value. Wheat flour — types, functionality of components, baking qualities, manufacture of bread and cakes.

Millets- Jowar, Bajra, Maize and Ragi, Composition and nutritive value and Products

UNIT- II

Pulses - Composition and nutritive value, methods of processing – dry and wet processing, vegetable protein mixes, Anti nutritional factors and eliminations

Nuts and Oilseeds- Composition and nutritive value, nutritious food mixes from oil seeds

Fats and Oil - Nutritional importance of oil and fats, Functions of oil and fats in foods, Sources, nutritional composition, rancidity — types and prevention, role of fat / oil in food preparations

UNIT- III

Vegetables and Fruits

Classification, Composition and nutritive value, selection, storage, pigments, browning reactions (Enzymatic and Non-Enzymatic), pectic substances, ripening of fruits, changes on cooking

Beverages – Classification: Milk and fruit based beverages, carbonated non-alcoholic beverages

Spices and condiments – Types, uses and abuses, role in cookery and medicinal uses

Evaluation of foods - Subjective and objective evaluation of foods. Study of proximate constituents

UNIT- IV

Milk and milk products- Composition, physical and chemical properties - effects of heat, acid and enzymes, processing of milk – pasteurization, homogenization, types of milk
Milk products – Butter, cheese, milk powder, khoa, ice cream
Egg - Structure, composition, grading and selection, effects of heat on egg protein, egg foam (factors affecting foam formation) and role in cookery

UNIT- V
Meat - Structure, composition, postmortem changes, Rigor mortis, Aging and Tenderization of meat, colour of meat, changes of meat in cookery and methods of cooking
Poultry - Classification, composition, market forms, selection factors and methods of cooking
Fish - Classification, composition, kinds of fish, characteristics of fresh fish, fish products and methods of cooking

TEXT BOOKS:

1. *Srilakshmi, B*, **Food Science**, New Age International Private Ltd., New Delhi,
India, 2015.
2. *Swaminathan,M*, **Food Science Chemistry and Experimental Foods**, Bappco
Publishers, Bangalore, India.
3. *Manay,S.N,Shadaksharaswamy.M*., **Food, facts and Principles**, New Age International(P Ltd. Publishers., NewDelhi.,India,2008

REFERENCE BOOKS:

1. *Manay,S.N , Shadaksharaswamy.M*., **Food, facts and Principles**, New Age International(P) Ltd. Publishers.,NewDelhi.,India,2008
2. *Potter.N.N and Hotchkiss,* Food **Science**, CBS Publishers, 1996
3. *Sunetra Roday*, **Food Science and Nutrition**, Oxford Publishers, 2015

17PFN13B	NUTRITION THROUGH LIFE CYCLE	SEMESTER-I

PREAMBLE

- To understand the role of adequate nutrition in stages of life cycle
- To gain advanced knowledge about nutrition for the betterment of health

COURSE OUTCOMES

Upon successful completion of the course, students will able to

CO Number	CO Statement	Knowledge Level
CO 1	Plan diet for the different stages of the life span. Make use of nutritional requirements needed for health promotion and disease prevention for each stage of the life cycle	K_4
CO 2	Analyze specific dietary practices during lactation and design foods to increase milk production, supplementary and weaning foods for infants. Compare and contrast the unique nutritional needs of premature and low birth weight infants with those of full term infant	K_4, K_5
CO 3	Recommend the nutrition for toddlers-physiological and cognitive development, feeding skill and behavior, common nutrition problems List the factors that influence food intake in children and discuss potential options for improving food choice in children.	K_4, K_5
CO 4	Evaluate physical growth, eating disorders, physiological psychological and socio economic factors effect nutritional status	K_4, K_5

	Determine nutrition for medical problems its requirements for adolescents, adults and old age	
CO5	Choose the fitness assessments and plan nutritional needs during exercise and sports. Design the nutritional requirements during space voyage and mentally challenged.	K_5

Mapping with programme outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO 1	S	S	S	S	S
CO 2	S	S	S	S	S
CO 3	S	S	S	S	S
CO 4	S	S	S	S	S
CO5	S	S	S	S	S

S-Strong; M-Medium; L-Low

17PFN13B	NUTRITION THROUGH LIFE CYCLE	SEMESTER-I

Total credits: 5
Hours/Week: 6

CONTENTS

UNIT- I

Nutrition in Preconception-Introduction, factors contributing infertility in female, premenstrual syndrome, obesity and fertility, eating disorder and fertility, polycystic ovary syndrome, nutrient intake for pre-conceptual women.

Nutrition in pregnancy - Stages of gestation, maternal physiological adjustments, weight gain during pregnancy and nutritional requirements for pregnancy, miscarriage, preterm delivery, multi fetal pregnancies, eating disorders and complications of pregnancy

UNIT- II

Nutrition in Lactation - Physiological adjustments during lactation, Physiology of milk Production - hormonal controls and reflex action, lactation in relation to growth and health of infants, problems of breast feeding, nutritional components of colostrums and mature milk, special foods during lactation, nutritional requirements during lactation. Expressing and storing breast milk, Breast promotion network of India.

Nutrition in infants - Rate of growth, weight as the indicator, premature infant, feeding premature infants, low birth weight, breast vs. bottle feeding, nutritional allowances, supplementary feeding, weaning foods.

UNIT- III

Nutrition in Toddlers-Physiological and cognitive development, feeding skill and behavior, common nutrition problems Nutrition in Preschool Children - Growth and development of preschool children, food habits, nutritional requirements, supplementary foods.

Nutrition in School Age – Early and middle childhood, physiological development, food habits, nutritional needs and feeding, RDA, Foods habits

UNIT- IV

Nutrition During Adolescence - Physical growth, physiological and psychological problems associated with pubertal changes, nutritional needs, eating disorders – anorexia nervosa, bulimia nervosa, nutrition and medical problems in adolescent pregnancy and its requirements and complications.

Nutrition during Adulthood – Physiological changes of adulthood Nutrition and work efficiency for maintenance of health, RDA

Nutrition for Old Age – theories of ageing, physiological changes, Socio economic and psychological factors – nutritional requirements, factors affecting food intake, institutionalized changes in old age. Advances in geriatric nutrition

UNIT- V

Nutrition for Special Condition

Sports and Exercise Fitness - Physical fitness assessment – cardio respiratory fitness, assessment of body composition, muscular fitness assessment, flexibility assessment, Role of carbohydrate, fat and protein as a fuel for exercise, fluid and electrolyte balance during prolonged exercise, nutritional requirements in sports, dietary intake before, during and after exercise. Concept of aerobic exercises, Nutrition during higher altitudes, Nutrition during Space voyage soldiers, Nutrition for special children

TEXT BOOKS:

1. *Mahan.K and Escott.S.,* 2000., "**Food Nutrition and Diet Therapy**", 11thEdition.,W.S. Saunder's Company, Philadelphia, USA.
2. *Srilakshmi .B.,* "**Dietetics**"., 2010, 6th Edition., New Age International Pvt. Ltd., New Delhi, India.

REFERENCE BOOKS:

1. *Brown .J.E.,* "**Nutrition Through The Lifecycle**"., 2002., Wadsworth Thomson Learning, USA.
2. *Shills E.M., Olson, Shike.M and Ross. A.C*. 1999, "**Modem Nutrition in Health and Disease**". 9th Edition. Lippincott Williams and Wilkins Publications., Philadelphia.

17PFN13C	NUTRITIONAL BIOCHEMISTRY	SEMESTER-I

PREAMBLE

- To enable the students to understand the application of biochemistry in the field of Food and Nutrition
- To gain knowledge on assay techniques and instrumentation

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Discover how carbohydrates are converted as energy through its metabolism. List the renal threshold for glucose and the inborn errors of carbohydrate metabolism.	K_4
CO2	List the biosynthesis and oxidation of saturated and unsaturated fatty acids, cholesterol and phospholipids. Explain the inborn errors of fat metabolism.	K_4 , K_5
CO3	List the biosynthesis of proteins and the metabolism of amino acids. Explain the biosynthesis and breakdown of haemoglobin and list the inborn errors of protein metabolism.	K_4 , K_5
CO4	Compare the structure and properties of DNA and RNA. Analyze the biosynthesis and breakdown of purine and pyrimidine nucleotides. Explain Bioassay techniques, microbiological assay of vitamin B_2 and B_{12}. ELISA	K_4 , K_5

CO5	Invent the separation of sugars and amino acids by chromatography and separation of proteins by electrophoresis. Compare the principle and procedure of colorimetry and spectrophotometry. Elaborate on working and application of pH meter and Explain the principle and procedure of operation of the Techniques – GC, HPLC.	K_5 , K_6

Mapping with programme outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO 1	S	S	S	M	S
CO 2	S	S	S	M	S
CO 3	S	S	S	M	S
CO 4	S	S	S	M	S
CO 5	S	S	S	M	S

S-Strong; M-Medium; L-Low

17PFN13C	NUTRITIONAL BIOCHEMISTRY	SEMESTER-I

Total Credits: 4
Hours/Week: 5

CONTENTS

UNIT- I

Carbohydrates – classification, functions. Glycolysis, TCA cycle, HMP shunt and energy production, glycogenesis, gluconeogenesis. Renal threshold for glucose. Inborn error of carbohydrate metabolism – lactose intolerance, galactosemia.

UNIT- II

Fatty Acids - classification, functions and oxidation of saturated and unsaturated fatty acids, Biosynthesis of cholesterol, structure and functions of lecithin, cephalin, phospholipids. Inborn errors of fat metabolism – niemann-pick disease, gouchers disease.

UNIT- III

Protein- classification, functions and bio-synthesis.
General procedure for metabolism of amino acids –phenylalanine and methionine. Denaturation, transamination, deamination, decarboxylation, urea formation. Synthesis and breakdown of haemoglobin. Inborn errors of protein metabolism – maple syrup urine disease, phenyl ketonuria.

UNIT- IV

Nucleic acids – structure, function and properties of DNA and RNA. Biosynthesis and breakdown of purine and pyrimidine nucleotides.

Assay Techniques: Bioassay techniques, microbiological assay of vitamins. ELISA.

UNIT- V

Techniques in nutritional biochemistry - Separation of sugars and amino acids by chromatography. Electrophoresis' separation of proteins.
Colorimetry and spectrophotometry - principle and procedures.
pH meter – working and application.
Principle and procedure of operation of GC and HPLC.
Elemental analysis by atomic absorption spectroscopy and flame photometry.

TEXT BOOKS:

1. *Lehininger, A.L.*, 2000., "**Biochemistry**"., Worth Publishers Inc., New York,.
2. *Deb A.C.*, 2004., "**Fundamentals of Biochemistry**", 8th Edition., New Central Book Agency Pvt Ltd., Kolkata, India.

REFERENCE BOOKS:

1.*Shanmugam.A.,* 2004.,"**Fundamentals of Biochemistry for Medical Students**"., Karthik Printers, 7th Edition., India.
2. *Sathyanarayana .U and Chakrapani U.*, 2004., "**Biochemistry**", 3rd Edition, Books and Allied Pub., Kolkata, India.
3. *Tom brody*, 2007, **Nutritional Biochemistry, 2nd Edition,** Academicpress,UK
4. *D.C.Sharma and Devanshi Sharma*,2015, **Nutritional Biochemistry,** 2ndedition,CBS publishing pvtltd,New Delhi.

17PFN13D	FOOD CHEMISTRY	SEMESTER-I

PREAMBLE

- To gain insight into the chemistry of foods
- To understand the various properties exhibited by foods

COURSE OUTCOMES

In the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO 1	Elaborate the structure and properties of water and ice, types of water , solutions and colligative properties, Water activity and Food spoilage, Sorption phenomena, Elucidate the structure, formation, strength, types and permanence Emulsions: formation, stability, surfactants and emulsifiers, Foams: Structure, formation and stabilization.	K_2 ,K_3
CO 2	Explicate the chemistry of Reactions of mono and oligosaccharides, Use of Polysaccharides in foods. Illuminate the Non-starch Polysaccharides: Cellulose, hemicelluloses, pectins, gums. Describe the effects of ingredients and conditions on gelatinization, retrogradation. Explain on Sugars and Sweeteners	K_3,K_4
CO 3	Illustrate the structure, physicochemical properties, functional properties of amino acids, peptides. Explain the chemical and enzymatic modifications Discuss the processing induced physical, chemical and nutritional changes.	K_3,, K_4
CO 4	Explicate the classification, sources, composition, and properties, role of lipids in food flavor. Evaluate the effect of processing on chemical structure and physical properties, functional properties of fat and uses in food preparations, inter-esterification of fats.	K_3, K_4

	Discuss the lipids exposed to frying conditions.	
CO 5	Illuminate the chemistry of Individual aroma compounds- vegetable, fruit and spice and condiment flavors, flavors from lactic acid and ethanol fermentation, flavors volatiles from fats and oils, flavor volatiles in muscle foods and milk. Infer the Composition, flavorings extracts – natural and Synthetic. Thermally induced process flavors, Natural and synthetic flavors, interactions with other constituents.	K_4, K_5

Mapping with Program Outcomes

CO s	PO 1	PO 2	PO 3	PO 4	PO 5
CO_1	S	S	M	M	M
CO_2	S	S	M	M	M
CO_3	S	S	S	S	M
CO_4	S	S	S	S	S
CO_5	S	S	S	S	S

S- Strong; M-Medium

17PFN13D	FOOD CHEMISTRY	SEMESTER-I

Total Credits: 5
Hours/Week: 6

CONTENT

UNIT - I

Physico-chemical properties of water and foods: Structure and properties of water and ice, types of water, solutions and colligative properties, Water activity and Food spoilage, Sorption phenomena,
Gels: Structure, formation, strength, types and permanence Emulsions: formation, stability, surfactants and emulsifiers, Foams: Structure, formation and stabilization.

UNIT - II

Chemistry of Starch and Sugars: reactions of mono and oligosaccharides, use of polysaccharides in foods: non-starch polysaccharides: cellulose, hemicelluloses, pectins, gums (gum arabic, guar gum, xanthan gum), agar, alginates, carrageenan
starch: structure, properties of amylose and amylopectin, effect of processing-gelatinization, methods for following gelatinization. Characteristics of some food starches. Effects of ingredients and conditions on gelatinization- retro gradation, polysaccharide hydrolysis, sugars and sweeteners: sugars, syrups, sugaralcohols, sugar products, caramelization.

UNIT - III

Chemistry of Proteins: Amino acids, peptides and proteins - structure, physicochemical properties, functional properties, chemical and enzymatic modifications - denaturation, non-enzymatic browning, and other chemical changes, processing induced physical, chemical and nutritional changes, texturized proteins, protein isolates, concentrates, protein hydrolysate

UNIT - IV

Chemistry of Fats and Oils: classification, sources, composition, and properties, role of lipids in food flavor. Effect of processing on chemical structure and physical properties; functional properties of fat and uses in food preparations, inter-esterification of fats. Lipids exposed to frying

conditions, hydrogenated fat and irradiated foods Lipid-protein complexes, emulsions. Fat deterioration and antioxidants and fat substitutes.

UNIT - V

Chemistry of Pectic Substances, Plant Pigments, Spices and Condiments
Pectins, phenolic components, enzymatic browning in fruits and vegetables, volatile compounds from vegetables during cooking, different types of plant pigments – water and fat soluble pigments, properties and active principles of spices and condiments.

TEXT BOOKS:

1. *ShakuntalaManay, 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
3. *Swaminathan, M.* **Food Science, (2005) Chemistry and Experimental Foods,**Bappco Publishers, Bangalore.

REFERENCE BOOKS:

1. *Meyer, L.H*, **Food Chemistry,** (2004) CBS Publishers and Distributors, 4th edition
2. *Paul, P.C. and Palmer*, **H.H. Food Theory and Applications** (2000) JohnWiley and Sons, New York, (Revised Edition)
3. *Chopra H.K, Panesar, P.S*, **Food Chemistry** (2010) Narosa Publishing House, New Delhi

17PFN13P	LAB - I : FOOD SCIENCE AND FOOD CHEMISTRY	SEMESTER-I

Total Credits: 2

Hours /Week: 4

PREAMBLE

To enable the students to understand the scientific principles involved in food preparation and physio-chemical changes that occurs during cooking

CONTENTS

1. Gelatinization of Starch, Retrogradation and Syneresis
2. Microscopic examination of uncooked and gelatinized
3. Gluten Formation
4. Stages of Sugar Cookery, Preparation of Fondant, Fudge, Caramel and Toffee
5. Scum formation, Boiling over and scorching of milk
6. Effect of Soaking, germination and fermentation of Pulses
7. Coagulation of egg white and egg yolk, Boiled Egg, Poached Egg, Omlettes, Custards, Cake and Mayonnaise
8. Coagulation and precipitation of milk proteins
9. Changes observed in cooking meat, fish and poultry, testing the tenderness of meat
10. Smoking Temperature of different fats, Factors affecting absorption of fats
11. Effect of acids, alkali and heat on water soluble and fat soluble pigments
12. Enzymatic Browning and Methods of prevention

17PFN23A	FOOD PROCESSING	SEMESTER-II

PREAMBLE

- Explore the students to gain knowledge on unit operations, government strategies in emerging food processing sectors
- Appreciate the latest techniques involved in processing of cereals, pulses, oil seeds, meat, poultry, vegetables and fruits in food processing industries

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Construct the SWOT of food sector Choose the Processing methods for Rice, wheat, millets	K_3
CO2	Identify the nutrient loss during processing Classify the convenience foods from rice, wheat and pulses	K_3,K_4
CO3	Examine the Processing technology of oil seeds Analyze the techniques used for manufacturing egg, meat and poultry products	K_4
CO4	Compare the drying techniques used for vegetables and fruits processing Explain the steps involved in canning and bottling	K_4,K_5
CO5	Choose the recent non-thermal processing techniques concerned in food industries Justify the advantages and disadvantages of latest technologies in food processing	K_5

Mapping with Program Outcomes

CO s	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	S	S	S	S	S
CO 2	S	S	S	S	S
CO 3	S	S	S	S	S
CO 4	S	S	S	S	S
CO 5	S	S	S	S	S

S- Strong; M-Medium; L-Low

17PFN23A	FOOD PROCESSING	SEMESTER-II

Total Credits: 5
Hours/week: 5

CONTENTS

UNIT- I

Food processing sector –vision and mission, opportunities, strategies in the Indian food processing sector. Post harvest priority requirements, Strengths, Weakness, Opportunities and Challenges of food processing operations. Government initiatives and strategies towards entrepreneurship development. Role of Governmental organizations in up gradation of food industries. Role of Indian food industries in the current scenario.

UNIT- II

Paddy Processing-milling of paddy, parboiling, processes by products of rice and their utilization. Nutrient loss during processing.
Wheat Processing – Cleaning, Conditioning and milling, manufacture of breakfast cereals
Millets Processing –wet milling of ragi and dry milling sorghum

UNIT- III

Legume Processing – Traditional and Modern methods
Extraction of Oil seeds – List of vegetable oil seeds, Soybean Processing - meal concentrates and isolates, hydrogenation of fats - vanaspathi, industrial fats, and low-fat spreads.

UNIT- IV

Meat – Slaughtering, processing, grading. Meat preservation- smoking and curing. Meat products.
Poultry - processing, dressing and packaging.
Fish - Selection, types and handling practices.
Egg- Selection, grading and testing. Production of egg products- egg powders and frozen eggs.

UNIT- V

Fruits and Vegetables Processing:

Drying and dehydration- Drum drying, tunnel, cabinet drying, spray drying and fluidized bed drying. **Mushroom -** Production, processing.

Thermal Processing: Canning –aseptic canning, types of spoilages, advantages, disadvantages. Bottling –steps, advantages, disadvantages.

Advances in food Processing – Principles, Mechanism, advantages and disadvantages of Non - thermal processes – nanotechnology and high pressure processing.

TEXT BOOKS:

1. *Subbulakshmi and Udipi.S.*, 2001. "**Food processing and Preservation Technology**"., New Age Publications., New Delhi, India.
2. *Khader.V*, 2001. "**A Textbook of Food Processing Technology**", ICAR, New Delhi, India.
3. *Srilakshmi, B*. 2003. *Food science*. New Age International publishers,

REFERENCE BOOKS:

1. *Sivashankar. B.*,2002 ."**Food Processing and Preservation**", PHI, New Delhi, India.
2. **Modern Technology of Food Processing and Agro Based Industry**, 2nd Edition, NIIR Board, Asia Pacific Business Press, 2002.
3. *Fellows, P. J.* 2009. Food processing technology: principles and practice. Elsevier.

17PFN23B	PHYSIOLOGICAL ASPECTS OF NUTRITION	SEMESTER-II

PREAMBLE

- To enable the students to gain knowledge on enzymes and its activities, immunological aspects, function tests
- To understand the physiological aspects of hormones, drugs and nutrient interactions

COURSE OUTCOMES

On the successful completion of the course, students will able to

CO Number	CO Statement	Knowledge Level
CO 1	Classify the different types of enzymes Utilize the enzymes in medical diagnosis Explain the functions of enzymes	K_2, K_3
CO 2	Identify the factors influencing enzyme action Discover the biological effect of hormones Examine the synthesis and secretion of hormones	K_3, K_4
CO 3	Distinguish the immunity changes in deficiency Categorize cells of immune system and immune responses Examine the measurements of body fluid volumes	K_4
CO 4	Inspect the composition of body fluids Analyze the mechanism of water and electrolytes, acid-base balance Examine the gastric, renal, liver and endocrine function test	K_4
CO 5	Determine absorption, biotransformation, and drug metabolism. Elaborate drug and nutrient interaction. Discuss physiological and psychological factors affecting food intake.	K_5

Mapping with Program Outcomes

CO s	PO 1	PO 2	PO 3	PO 4	PO 5
CO_1	S	S	M	M	S
CO_2	S	S	M	M	S
CO_3	S	S	M	M	S
CO_4	S	S	M	M	S
CO_5	S	S	M	M	S

S- Strong; M-Medium; L-Low

17PFN23B	PHYSIOLOGICAL ASPECTS OF NUTRITION	SEMESTER-II

Total Credits: 4
Hours/Week: 5

CONTENTS

UNIT- I

Enzymes- Introduction, functions, major classification of enzymes in human body- **Metabolic enzymes** (Ligase, Lyase, Hydrolase, Transferase, Isomerase, Oxido-reductase and Kinase), **Digestive enzymes** (Amylase, protease and lipase) , **Food enzymes** (Lipase, Lactase, Protease, Amylase, Cellulase) and its action. Clinical significance of enzymes -(**Pancreatic-** α-amylase Lipase, **liver**- Aspartate transaminase, Alanine transaminase, Alkaline phosphatases, Gamma-glutamyl-transferase (GGT), Glutamate dehydrogenase and **muscles**- creatine kinase and lactate dehydrogenase.)

UNIT- II

Hormones - Principles of hormone action and endocrine control, synthesis, secretion and biological effect of pituitary, thyroid, parathyroid, adrenal, pancreas, male and female reproductive hormones.

UNIT- III

Immunity - Types of immunity, cells of the immune system, immune response – humoral immunity, cell mediated immunity, immune changes in malnutrition, vitamin deficiency, iron deficiency and zinc modulation, neuro-endocrine control of stress and immunity, immune mechanisms in infections, auto-immunity and hypersensitivity.

UNIT-IV

Water and Electrolyte Balance - Total body water, intake versus output of water, body fluid compartments, composition of body fluid, measurement of body fluid volumes, forces controlling the water and electrolyte balance between cells and extra cellular fluid, metabolism of water and electrolytes, regulation of acid balance, effect of diet on water, electrolyte and acid base balance.

Function tests - Gastric function test, liver function test, renal function test and endocrine function test.

UNIT- V

Drugs - Introduction, absorption, biotransformation and excretion of drugs, drug metabolism, routes of drug administration, and mechanisms of drug action factors modifying drug effects, receptor theories, drug and nutrient interactions and drug induced malnutrition.

TEXT BOOKS:

1. *Sembulingam.K and Sembulingam.P.*, 2013., "**Essentials of Medical Physiology**"., 6th Edition, JAYPEE Brothers, Medical Publishers., New Delhi, India.
2. *Stites.D.P., Terr.A.I. and Parsiow.T.G.*, 1994., "**Basic and Clinical Immunology**"., 8th Edition.,Prentice Hall International Inc.,

REFERENCE BOOKS:

1. *Guyton, A.G. and Hall, J.B*. (1996): **Text Book of Medical Physiology**, 9th Edition, W.B. Sanders Company, Prism Books (Pvt.) Ltd., Bangalore.
2. *Subrahmanyam.S.*,2007., "**Text Book of Human Physiology**"., S.Chand Publications.,New Delhi, India.

17PFN23C	MACRONUTRIENTS	SEMESTER-II

PREAMBLE

- To enable students to gain knowledge on the macro nutrients and its functions
- To update the requirements of nutrients, sources and its significance in terms of health and disease

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO 1	Distinguish direct and indirect calorimetry Explain the energy utilization in cells, basal metabolism, physical activity and the variables influencing the energy requirements with reference to adults, infants, adolescents.	K_4 , K_5
CO 2	Classify Carbohydrates and explain its digestion, absorption, utilization Classify types of fibre in plant foods, sources Analyze the role of dietary fibre in therapeutic nutrition and the effect of fibre in the absorption of different nutrients.	K_4 , K_5
CO 3	Classify proteins and amino acids, their functions, digestion, absorption and utilization. Assess amino acid requirements, amino acid pattern, essential amino acids, amino acid balance, imbalance and toxicity. Compute protein requirements through factorial method and balance study. Construct the ICMR and FAO / WHO requirements, Examine the quality of protein through animal studies and estimate the need of amino acids and protein.	K_4 , K_5

CO 4	Classify fats and fatty acids, Explain the digestion and absorption of fats, Examine the mechanism of transport of lipid in blood, lipid transformation in the liver and the role of essential fatty acids, deposition of fats in the body. Determine the effect of deficiency and toxicity, role of fats in the etiology of arteriosclerosis.	K_4 , K_5
CO 5	Explain the Hormone and Nutrient Interactions - carbohydrate, protein and fat metabolism. Determine the role of Nutrition in alcoholism Assess the effect of alcohol in digestion and absorption of nutrients.	K_4 , K_5

Mapping with Program Outcomes

COs	PO 1	PO 2	PO 3	PO 4	PO 5
CO_1	S	S	S	S	S
CO_2	S	S	S	S	S
CO_3	S	S	S	S	S
CO_4	S	S	S	S	S
CO_5	S	S	S	S	S

S- Strong; M-Medium; L-Low

17PFN23C	MACRONUTRIENTS	SEMESTER-II

Total Credits: 5
Hours/Week: 5

CONTENTS

UNIT- I

Energy -Historical background,energy content of food, energy measurements - direct and indirect calorimetry, energy utilization in cells, basal metabolism, physical activity, resting energy expenditure. Regulatory thermogenesis, energy requirements, variables which influencing the energy requirements with reference to adults, infants, adolescents. ICMR, FAO and WHO requirements, energy balance and control of body weight, the interaction between three main energy nutrients - carbohydrates, proteins and fats.

UNIT- II

Carbohydrates - Classification, digestion, absorption, utilization and nutritional importance. **Dietary fibre** - types of fibre in plant foods, sources, composition, digestion, clinical aspects. Role of dietary fibre in therapeutic nutriton. Effect of fibre in the absorption of different nutrients.

UNIT- III

Protein - Classification of proteins and amino acids, function, digestion, absorption and utilization. Factors affecting protein utilization. Amino acid requirements, amino acid pattern, essential amino acids, amino acid balance, imbalance and toxicity. Computation of protein requirements through factorial method and balance study, ICMR and FAO / WHO requirements, evaluation of quality of protein, conduct of animal studies, food sources, role of animal proteins and vegetable protein mixture in combating malnutrition, estimation of amino acids and protein needs.

UNIT- IV

Fats and lipids - Classification of fats and fatty acids, digestion and absorption of fats, transport of lipid in blood, lipid transformation in the liver, role of essential fatty acids, deposition of fats in the body. Effect of deficiency and toxicity, role of fats in the etiology of arteriosclerosis.

UNIT- V

Hormone and Nutrient Interactions - Interaction over carbohydrate, protein and fat metabolism. Nutrition in alcoholism – effect of alcohol in digestion and absorption of nutrients, Alterations of nutrient metabolism and organ damage.

TEXT BOOKS:

1. *Groff J.L.and Gropper.S*.S., 2000. "**Advanced Nutrition and Human Metabolism**", 3rd Edition, Thomson Wardsworth, USA.
2. *Swaminathan M*., 2002., "**Advanced Textbook on Food and Nutrition**" Vol I, Bangalore Printing press and Publishing Co.Ltd. India.
3. Srilakshmi, B., (2012), Nutrition Science, New Age Publishers, New Delhi.

REFERENCE BOOKS:

1. *Mahan.K and Escott.S*., 2000., "**Food Nutrition and Diet Therapy**", 11th Edition.,W.S. Saunder's Company, Philadelphia, USA.
2. *Shils E.M., Olson, Shike.M and Ross*. A.C. 1999, "**Modem Nutrition in health and disease**", Philadelphia,ninth edition.Lippincott Williams and Wilkins Publications, Philadelphia.
3. *Whitney, E. N., Cataldo, C. B., & Rolfes, S. R*. (1998). *Understanding normal and clinical nutrition* (No. Edition 5). Wadsworth Publishing Company, Inc..

17PFN23D	NUTRITION IN DISEASES -I	SEMESTER-II

PREAMBLE

- To understand the etiology, symptoms and complications of various diseases
- To appreciate the significance of therapeutic diet for different diseased conditions

COURSE OUTCOMES

In the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Analyze the principles of diet therapy and therapeutic diets Assume the roles of dietitians in a hospital and the community List the functions of Indian Dietetics association Explain total enteral and parenteral nutrition	K_4 , K_5
CO2	Discover the routes of tube feeding List therapeutic diet for different diseases Explain the six principles of diet planning	K_4 , K_5
CO3	Compare the causes and symptoms of various disease conditions Select tube feeding formulas	K_4 , K_5
CO4	Classify the glycemic index of foods Classify exogenous insulin Assess the nutritional care given to patients with different diseases	K_4, K_5
CO5	Solve nutrition diagnosis of different diseases Design nutrition care process for different disease conditions Design nutrition recommendations for different diseased conditions	K_5,K_6

	Explain the biochemical parameters of different disease conditions Construct menu plan for different diseases with the help of exchange lists	

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S - Strong; M - Medium; L- Low

17PFN23D	NUTRITION IN DISEASES -I	SEMESTER-II

Total Credits: 5
Hours/Week: 5

CONTENTS

UNIT – I

Therapeutic Diets – Principles, objectives and diet therapy, review of hospital diets, type of dietitians, role of dietitian in the hospital and community, Nutrition Care Process (NCP), diet planning and use of exchange list in nutrient calculation, diet counseling.

Enteral and Parenteral nutrition – types, applications, types and nutrient composition of feeds, complications, merits and demerits. Functions of Indian Dietetic Association.

UNIT- II

Gastro Intestinal Disease

Diseases of Oesophagus: Esophagitis and Hiatus hernia.

Disease of Stomach: Indigestion, hypochlorhydria, acute and chronic gastritis and peptic ulcer.

UNIT- III

Disease of Intestine: Flatulence, constipation - atonic, spastic and obstructive, diarrhoea - acute and chronic and steatorrhea.

Inflammatory Diseases -Diverticulosis, diverticulitis, regional enteritis,ulcerative colitis, malabsorption syndrome - sprue.

UNIT- IV

Diabetes Mellitus - Epidemiology / Incidence - Classification - symptoms. Metabolic changes : Long term and short term complications, clinical findings - diagnostic tests - glycemic index of foods, types of insulin, dietary complications, dietary modifications in energy, carbohydrate, fat, protein, fibre and micronutrients. Herbal plant remedies for diabetes mellitus.

UNIT- V

Diseases of the Heart and Circulatory System - Acute and chronic cardiac disorders, risk factors of cardiac diseases, dietary management in

hypertension, atherosclerosis, congestive heart failure, hyperlipoproteinemia, hypercholesterolemia, role of antioxidants in the prevention and treatment of CVD.

TEXT BOOKS:

1. *Mahan.K and Escott.S***, Food Nutrition and Diet Therapy**, 11th Edition.,W.S. Saunder's Company, Philadelphia, USA.2000.
2. *Davidson*, *S.S. Passmore, P., Branch, J.F.,* **Human Nutrition and Dietetics**
   9th Edition., F andS, Lingstons Ltd., Edinburgh and London. 1993.
3. *Jennifer .k et al* **Mayo Clinic Diet Manual** 7th edition ,NY Mosby 1994.

REFERENCE BOOKS:

1. *Antia, F.P.,* **Clinical Dietetics and Nutrition** Oxford University., Mumbai 1989
2. *Shills E.M., Olson, Shike.M and Ross. A.C.* **Modem Nutrition in health and disease.** 9th Edition., Lippincott Williams and Wilkins Publications., Philadelphia.1999.
3. *Garrow , J.S & James WPT* , **Human Nutrition &dietetics**,UK, Churchill Livingstone 2006.

17PFN23P	LAB-II: FOOD ANALYSIS	SEMESTER- II

Total Credits: 3
Hours/Week: 6

I ANALYSIS OF FOOD FOR

A. Calories
B. Moisture
C. Fibre
D. Ash
E. Calcium
F. Iron
G. Phosphorus
H. Protein by Micro-Kjeldahl Method
I.Water Soluble Protein-by Lowry's Method
J.Fat-by Soxhlet Extraction
K. Thiamine
L. Riboflavin
M. Vitamin-C

(Foods have to be analyzed before and after processing)

II. Glycogen extraction and estimation
III. Analysis of fat-sap no, iodine no, acid no and RM value
IV. Estimation of lipid in egg yolk
V. Sorensen's formal titration for estimation of amino acid.
VI. Demonstration of HPLC, GC-MS

17PFN33A	MICRONUTRIENTS	SEMESTER -III

PREAMBLE

- Enable students to acquire knowledge in the role of micronutrients in health and disease
- To understand the recent advances in the study of micro-nutrients

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Explain the absorption, utilization, deficiency, toxicity, sources and requirements of macro minerals.	$K_{2\&}$ K_3
CO2	Assess the functions, intake, utilization, bio availability, storage, and output of micro minerals.	K_3
CO3	Explain the chemistry, biosynthesis, transport, utilization, storage and assay methods. Classify the dietary sources and requirements of human deficiency and toxicity of Fat soluble vitamins.	K_3 K_4
CO4	Explain the chemistry, physiological action, storage, transport, and biosynthesis of water soluble vitamins, coenzymes, cofactors and ascorbic acid. Examine the dietary sources deficiency and toxicity of water soluble vitamins.	K_3 K_4
CO5	Examine the chemistry, functions and metabolism of Pseudo vitamins. Explain the deficiency, excess and dietary consideration of the Pseudo vitamins.	K_4 K_5

Mapping with Program Outcomes

CO s	PO 1	PO 2	PO 3	PO 4	PO 5
CO_1	M	M	M	S	S
CO_2	S	S	S	S	S
CO_3	S	S	S	S	S
CO_4	S	S	S	S	S
CO_5	S	S	S	S	S

S- Strong; M-Medium; L-Low

17PFN33A	MICRONUTRIENTS	SEMESTER -III

Total Credits: 5
Hours /Week: 5

CONTENTS

UNIT- I

Calcium – Distribution of calcium in the body, functions. Calcium absorption and utilization, regulation of calcium, requirements, sources, deficiency, toxicity, requirements.
Phosphorus - Concentration in the body, calcium - phosphorus ratio, phosphorus absorption and utilization, deficiency, toxicity, sources requirements.
Sodium, Potassium, Magnesium and Sulphur - Distribution, absorption, utilization, functions, sources, deficiency, toxicity and requirements.

UNIT- II

Trace Elements
Iron- Functions, intake, utilization, bio availability of iron, storage, output and iron balance, deficiency, toxicity and sources, requirements.
Iodine - History, functions, metabolism, deficiency.
Fluorine- functions, sources, requirements of fluoride in the prevention of dental caries, toxic effects of fluoride.
Functions, sources, requirements, deficiency and toxicity of zinc, copper, molybdenum, cobalt, nickel, manganese, selenium, chromium and cadmium.

UNIT- III

Fat soluble vitamins — A, D, E and K; History, Chemistry, biosynthesis, Physiological action, transport, utilization and storage, methods of assay, dietary sources and requirements of human deficiency and toxicity.

UNIT- IV

Water Soluble Vitamins - Thiamine, riboflavin, niacin, vitamin B12, folic acid, pyridoxine, pantothenic acid, biotin and ascorbic acid: History, Chemistry, Physiological action, storage, transport, biosynthesis -of vitamins dietary sources deficiency and toxicity.

UNIT- V

Pseudo vitamins -Choline, carnitine, inositol, taurine, flavanoid, pangamate, laetrile -chemistry, functions and metabolism, deficiency, excess and dietary consideration.

TEXT BOOKS:

1. *Williams.S.R.,* 1989., "Nutrition and Diet Therapy", Times Mirror Masby College Publishing St. Laws, Toronto, Boston.
2. *Mahan.K and Escott.S*., 2000., "Food Nutrition and Diet Therapy", 11th Edition.,W.S. Saunder's Company, Philadelphia, USA.

REFERENCE BOOKS:

1. *Whitney P.N.,* and Roes S.R., 1996., "Understanding Nutrition"., West Publication Co,
2. *Swaminathan, M.,* 2000., "Advanced Text Book foods Nutrition", Vol.1.,Bappco Publication., Bangalore., India

17PFN33B	NUTRITION IN DISEASES – II	SEMESTER-III

PREAMBLE

- To understand the etiology, symptoms and complications of various diseases
- To appreciate the significance of therapeutic diet for different diseased conditions

COURSE OUTCOMES

In the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Examine the aetiological factors and dietary modifications of fever and nutritional imbalances.	K_4
CO2	Assess the nutritional needs of patients with inborn errors of metabolism. Evaluate the compliance to the diet intervention.	K_4, K_5, K_6
CO3	Assess the nutritional needs of patients with respiratory and Musculo-skeletal disorders and Diseases of Liver, Gall Bladder and Pancreas Evaluate the compliance to the diet intervention	K_4, K_5, K_6
CO4	Assess the nutritional needs of patients with Diseases of Kidney Evaluate the compliance to the diet intervention	K_4, K_5, K_6
CO5	Assess the nutritional needs of patients with AIDS and Cancer Evaluate the compliance to the diet intervention	K_4, K_5, K_6

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	M	S	M
CO2	M	M	M	S	M
CO3	M	M	M	S	M
CO4	M	M	M	S	M
CO5	M	M	M	S	M

S - Strong; M - Medium; L- Low

17PFN33B	NUTRITION IN DISEASES – II	SEMESTER-III

Total Credits: 4
Hours/Week: 4

CONTENTS

UNIT – I

Etiological factors and Dietary modifications in a)Fevers and infection; b)Burns, surgery; c)Diet in allergy d)Dental diseases -Dental caries and periodontitis. Nutritional Imbalances- Obesity and underweight, types of obesity, etiological factors, assessment of obesity, grades of obesity, theories - set point and fat cell theory, thermo genesis in obesity. Dietary modifications for obesity.

UNIT- II

Inborn errors of Metabolism- Etiology, symptoms and dietary treatment -
Disorders of Amino Acid Metabolism-Phenylketonuria, tyrosemia, histidinemia, maple syrup urine diseases and gout.
Disorders of Carbohydrate Metabolism-Galactosemia, fructose and lactose intolerance.
Diseases of Adrenal Cortex and Thyroid Gland-Etiology, symptoms and dietary management of Addison disease, hypothyroidism, hyperthyroidism, tetany, hypocalcaemia.

UNIT- III

Respiratory and Musculo-skeletal disorders
Arthritis, rheumatoid and osteoarthritis, asthma, chronic obstructive pulmonary diseases, epilepsy and multiple sclerosis.
Diseases of Liver, Gall Bladder and Pancreas-Etiology, dietary management in liver, gall bladder and pancreas diseases - jaundice, viral hepatitis, cirrhosis, hepatic coma and fatty liver, cholecystitis, cholelithiasis, acute and chronic pancreatitis.

UNIT- IV

Diseases of Kidney -Etiology, dietary Management for kidney diseases- acute and chronic glomerulonephritis, nephrosis, acute renal failure,

chronic renal failure, end stage renal disease, uremia, nephrosclerosis, nephrolithiasis, kidney transplantation, dialysis.

UNIT- V

HIV Infection and AIDS- Epidemiology, transmission of HIV, pathophysiology, clinical manifestations, HIV infection and other diseases, Immunity and AIDS virus, dietary management, Prevention and Control.
Nutrition in Cancer –Epidemiological studies, classification of neoplasms, principles of cancer pathogenesis. Causes of cancer cell development, metabolic and nutritional alterations in malignancy, nutritional therapy for cancer, nutritional problems for cancer.

TEXT BOOKS:

1. Mahan.K and Escott.S., 2000., "Food Nutrition and Diet Therapy", 11th Edition.,W.S. Saunder's Company, Philadelphia, USA.

2. *Williams.S.R., 1989,* "Nutrition and Diet Therapy", Times Mirror Masby College Publishing St. Laws, Toronto, Boston.

REFERENCE BOOKS:

1. *Antia, F.P., 1989.,* "Clinical Dietetics and Nutrition" Oxford University., Mumbai, India.
2. *Shils E.M., Olson, Shike.M and Ross. A.C. 1999*, "Modem Nutrition in Health and Disease", 9th Edition, Lippincott Williams and Wilkins Publications, Philadelphia.

17PFN33C	RESEARCH METHODOLOGY AND STATISTICS	SEMESTER -III

PREAMBLE

- Understand the principles and methods of research
- Apply statistical procedure to analyze numerical data and draw inferences

COURSE OUTCOMES

By the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Distinguish the types of research and their application Choose a hypothesis and plan a research Analyse the sampling techniques	K_3,K_4
CO2	Choose and simplify the data collection methods Organize and analyse the data	K_4, K_5
CO3	Prioritise and design the data representation suitable for the research Inspect and explain the data collected Compare and contrast the results obtained from the data	K_4, K_5
CO4	Statistically analyse the research data and explain the results Measure the reliability of the research data	K_4, K_5
CO5	Justify the results using the test of significance Provide a theoretical conclusion from the obtained data	K_5 , K_6

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	M	M	S	S	S
CO3	M	M	S	S	S
CO4	M	M	S	S	S
CO5	M	M	S	S	S

S - Strong; M - Medium; L- Low

17PFN33C	RESEARCH METHODOLOGY AND STATISTICS	SEMESTER III

Total Credits: 4
Hours /Week: 5

CONTENTS

UNIT- I

Meaning of research, objectives of research, types of research and their application, selection and formulation of research problems, hypothesis, designing a research – different types, census and sample method, theoretical basis of sampling, sampling methods – random sampling methods and non-random sampling methods, size of sample, sampling and non-sampling errors.

UNIT- II

Methods of Collecting Primary Data - Questionnaire, preparation of schedules, interview method, case study method, experimentation method, sources of secondary data, precautions while using secondary data.

Editing and Coding the Data

Organization of Data - Classification - meaning and objectives, types of classification, formation of discrete and continuous frequency distribution, tabulation - role, part of a table, general rules of tabulation, types of tables.

UNIT- III

Representation of Data - Diagrammatic and graphical representation - significance of diagrams and graphs - general rules for constructing diagrams - types of diagrams, graphs of time series, graphs of frequency distribution.

Interpretation and Report Writing - Meaning of interpretation, technique, precautions, format of research report, types, steps and stages, mechanism and style, precautions and essentials for good report, footnotes and bibliographical citations.

UNIT- IV

Measures of Central Tendency - Mean, median, mode, their relative advantages and disadvantages. Measures of dispersion – mean, standard

deviation, quartile deviation. Co-efficient of variation, percentile and percentile ranks. Association of attributes and contingency tables

UNIT- V

Tests of significance – large and small sample-'t' and 'F' test, tests for independence using chi-square test. Analysis of variance- one-way and two-way classifications, Correlation, coefficient of correlation and its interpretation, rank correlation, regression equations and predictions.

TEXT BOOKS:

1. *Pillai .R.S.N., Bagavathi .V.,* 2001., "**Statistics**", Sultana Chand and Sons, New Delhi, India.
2. *Gupta, S.P.,* 2002., "**Statistical Methods**", Sultana Chand and Sons, New Delhi, India

REFERENCE BOOKS:

1. *Devadas .R.P.,* 1989.,"A **Handbook on Methodology of Research**"., Sri Ramakrishna Vidhyalaya, Coimbatore
2. *Ramakrishnan, P.,* 2001., "**Biostatistics**", Sara Publication., India.

17PFN33D	COMPUTER APPLICATIONS IN NUTRITION	SEMESTER - III

PREAMBLE

- To introduce the concept of Computer and Operating system
- To make students well versed with Word, Excel, Access and PowerPoint
- To enable students to learn computer networks and multimedia

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO 1	Understand the concepts of computer, memory and operating system.	K_1
CO 2	Apply the knowledge for creating document and presentation.	K_3
CO 3	Build and analysis the table and database for nutrition using MS Excel and MS Access.	K_3, K_4
CO 4	Apply the knowledge for creating nutrition webpage. Expose the concepts of computer networks.	K_4, K_5
CO5	Develop the online application in nutrition education using multimedia tools.	K_4, K_5

Mapping with programme outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO 1	M	M	M	M	S
CO 2	M	M	M	M	S
CO 3	M	M	M	M	S
CO 4	M	M	M	M	S
CO5	M	M	M	M	S

S-Strong; M-Medium; L-Low

17PFN33D	COMPUTER APPLICATIONS IN NUTRITION	SEMESTER-III

Total Credits: 2
Hours/Week: 3

CONTENTS

UNIT- I

Computer definition, Types of Computer, Logical Organization of a Digital Computer-Memory: Main Memory, Secondary Memory, Input devices, Output devices, Operating system, Functions of an operating system, Types of Operating systems,Multiprogramming,Multitasking,Time sharing, Real time operating systems.

UNIT- II

Word Basics: Starting word, Creating a new document, Opening preexisting document, Formatting Text and Documents, Working with Headers and Footers, Creating a simple table using the table menu, Creating presentations: Using auto content wizard, Using blank presentation option, Adding slides, Deleting a slide,Creating food and nutrition presentation.

UNIT- III

MS Access: Creating a Simple Database and Tables, Forms: The Form Wizard, Saving Forms, Modifying Forms, Finding ,Sorting and Displaying Data. Excel Basics: Overview of Excel features, Creating a new worksheet, Selecting cells, moving cells, copying cells, sorting cell data, inserting rows, inserting columns, Deleting parts of a worksheet, entering and editing Formulas, Creating Nutrition database using MS Access

UNIT- IV

Introduction to LAN, MAN,WAN-TCP/IP-Common protocols in Intranet-WWW-Web browser-HTML, Creating Nutrition application using HTML tags.

UNIT- V

Introduction to Multimedia: Components of Multimedia, Multimedia software tools, Multimedia Applications, Multimedia and hypermedia, online applications in Nutrition education.

TEXT BOOKS:

1.Gurvinder Singh and Rachhpal Singh., 2014. P.C.Software and Programming in C, 4th Edition,2014.

2.D.S.Yadav,2008 ,Fundamentals of Information Technology, Third Edition.

3.Ze Niam Li and *Mark S.Drew,* 2009, Fundamentals of Multimedia.

REFERENCE BOOKS:

1. *Chetan Srivastava*, 2014, Fundamentals of Information Technology", 2014.

17PFN33P	LAB III : CLINICAL NUTRITION TECHNIQUES	SEMESTER -III

Total Credits: 3
Hours /Week: 6

EXPERIMENTS

I.QUALITATIVE ESTIMATION OF

a. Pentose sugar
b. Reagent preparation for amino acid identification
c. Identification of Tryptophan
d. Identification of Tyrosine
e. Identification of Arginine

II. ANALYSIS OF BLOOD FOR

A. Glucose
B. Haemoglobin and Iron
C. Cholesterol
D. Pyruvic Acid
E. Serum AG Ratio
F. Serum Phospholipid
G. Serum Protein
H. Serum Alkaline Phosphatase

III. ANALYSIS OF URINE FOR

A. Creatinine
B. Urea
C. Total Nitrogen
D. Calcium
E. Phosphorus
F. Vitamin-C

17PFN33Q	LAB-IV: NUTRITION IN DISEASES	SEMESTER- III

Total Credits: 2
Hours /Week: 4

CONTENTS

Menu planning, food plan, meal distribution, Ideal body weight prescription preparation of

a. Normal diet, regular diet, light diet, soft diet, full liquid diet, clear liquid diet and bland diet
b. Pre operative diet and post operative diet
c. Diet for anemia, PEM, iron deficiency
d. Diet for diabetes and diabetes with CVD
e. Diet for obesity, under weight
f. Diet for diseases of the GI tract – peptic ulcer, diarrhea, and constipation
g. Diet for Cardio-vascular diseases- atherosclerosis, hypertension
h. Diet for diseases of the kidney –kidney stones, renal failure, nephritic and nephrotic syndrome. Diet before and after dialysis.
i. Diet for febrile conditions - dengue, chickengunya, swineflu, chronic obstructive pulmonary disorder.
j. Diet for liver diseases – Viral hepatitis, cirrhosis and coma
k. Diet for burns and trauma

17PFN33V	MINI PROJECT VIVA	SEMESTER -III

Total Credits: 2

OBJECTIVES

To initiate research work and gain knowledge in food industrial sector

CONTENT

Internship and Project can be done in any food industry related to

1. Food Processing
2. Food Analysis
3. Food Preservation
4. Food Quality Control
5. Food Packaging

RULES

- The students should submit the research work in soft and hard copy with minimum 75 pages, Times new roman, font size 12, 1.15 line spacing.
- The students will undergo internship training in food industry under the supervision of respective faculty member.
- Internship training / project report should be presented during External Viva Voce.

17PFN43A	COMMUNITY NUTRITION	SEMESTER -IV

PREAMBLE

- Gain insight into nutritional problems of the community
- Understand the various nutrition intervention program for vulnerable groups in the community

COURSE OUTCOMES

Upon successful completion of the course, students will able to

CO Number	CO Statement	Knowledge Level
CO 1	Explain the influence of social, commercial and environmental factors on individuals and their food supply during the condition Illustration using case studies from Indian subcontinent	K_3
CO 2	Identify the prevalence rate and interpret the signs, symptom and causes of nutritional deficiency among the community and elaborate the prevention methods. Apply lifestyle and nutritional assessment techniques to assist them in understanding how they perceive and relate to food as part of their lives	K_4
CO 3	Importance of organization that supports the community to protect from nutritional deficiencies and reduce the morbidity and mortality among the society through education and supplementation	K_4

CO 4	Analyze the beliefs, customs and food practices of various groups and apply this knowledge in planning nutrition education, intervention programs and educate the community Develop an educational session or program/educational strategy for a target population to free from nutritional deficiency	K_5
CO5	Identify the community nutrition problems and interpret the relationship between health and food choices in a community setting to cure communicable diseases	K_5

Mapping with programme outcomes

COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO 1	S	M	S	S	S
CO 2	M	S	S	S	S
CO 3	S	M	S	M	S
CO 4	S	S	M	S	S
CO5	S	S	M	M	S

S-Strong; M-Medium; L-Low

17PFN43A	COMMUNITY NUTRITION	SEMESTER -IV

Total Credits: 4

Hours /Week: 5

CONTENTS

UNIT- I

General nutritional, support International agencies, non-government organizations, and government programs involved with food aid and relief during emergencies (Famine, drought, flood, earthquake, cyclone, Tsunamis, coastal hazards, war, civil)

UNIT- II

Protein Energy Malnutrition (PEM) - Etiology, types, prevalence, metabolic changes, prophylaxis and control programme in India

Nutritional Anaemia - Definition, Etiology, types, prevalence, anemia prophylaxis and control programme in India

Iodine Deficiency: Causes, prevalence, clinical features, prophylaxis and control programme in India

Fluorosis: Causes, prevalence, Clinical features prophylaxis and control programme in India

Vitamin A deficiency: Causes, clinical signs and symptoms, prophylaxis and control programme in India

B complex deficiency: Causes, clinical signs and symptoms, prophylaxis and control programme in India

Lathyrism: Causes, clinical signs and symptoms, prophylaxis and control programme in India

Assessment of Nutritional Status:

Anthropometric assessment, Biochemical tests, functional assessment text, Dietary/food consumption survey, Body composition indices.

UNIT- III

Nutrition Intervention Programmes

Objectives and functions- Special nutrition programme (SNP), Modified Applied Nutrition Programmes (ANP), Integrated Child Development

Services (ICDS), Tamil Nadu Integrated Nutrition programme (TINP) and Noon Meal Scheme.

Role of International Organizations - Food and Agriculture Organization (FAO), World Health Organization (WHO), United Nations International Children's Emergency Fund (UNICEF), Co-operative American Relief Everywhere (CARE) and World Bank.

National Organizations

National Institute of Nutrition (NIN), National Nutrition Monitoring Bureau (NNMB), Indian Council of Agriculture Research (ICAR), Indian Council of Medical Research (ICMR), Central Food Technological Research Institute (CFTRI).

UNIT- IV

Nutrition Education - Objectives, definitions, importance of nutrition education for the community.

Methods of nutrition education, nutrition education programmes- Planning, implementation and evaluation, training workers in nutrition education programmes, integration of nutrition education and extension activities, nutrition and health education for adolescent girls, lactating and pregnant women. Nutrition education in schools and community

UNIT- V

Concepts of community Health, Primary Health Center (PHC)- Concept, organization, current status in India and delivery of service, Taluk level hospitals, Employees State Insurance (ESI)

Epidemiology of Communicable Diseases

Factors responsible for the spread of communicable diseases, mode of transmission - chicken pox, typhoid fever, tuberculosis, malaria, leprosy, filariasis and AIDS. Prophylaxis and Immunization schedule. Waste disposal system in India.

TEXT BOOKS:

1. *Reddy.V.,Rao.P, Sastry .G. J and Kashinath K.C.*, 1993., "**Nutrition Trends in India**", N1N, Hyderabad, India.

2. *Park and Park*, 1995., "**Text Book of Preventive and Social Medicine**", Banarsidas Published by Jahalpu.

REFERENCE BOOKS:

1. *Gibney.M.J*, 2004., "**Public Health Nutrition**" , 1st Edition, Black Well Scientific Publications, Oxford.
2. *Wadhwa.A*, 2003, "**Nutrition in the Community**", 1st Edition, Elite Publications, New Delhi.

17PFN43V	PROJECT WORK AND VIVA VOCE	SEMESTER-I

Total Credits: 8
Hours/Week: 21

OBJECTIVES

To initiate research work and gain knowledge in industrial and community sector

CONTENTS

Project can be done in any specialized area

1. Food Processing
2. Food Analysis
3. Clinical nutrition
4. Community nutrition
5. The students could work with NGOs / Government agencies / International agencies/ Hospitals / Food Industries etc.

RULES

- The students should submit the research work in soft and hard copy with minimum 100 pages, Times new roman, font size 12, 1.5 line spacing.
- The students will be guided and supervised by a member of the teaching faculty of the concerned department. The dissertation in which the research culminates should reflect the student's own work.
- Minimum one research publication in peer reviewed/reputed journals.
- Research work should be presented during External Viva voce.

17PFN1EA	ELECTIVE I: FUNCTIONAL FOODS AND NUTRACEUTICALS	SEMESTER-I

PREAMBLE

- To enable students to gain insight on the importance of nutraceuticals
- To understand on various functional foods and their beneficiaries in health

COURSE OUTCOMES

In the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO 1	Analyze the basics and importance of nutraceuticals Examine the basics and importance of functional foods	K_4 , K_5
CO 2	Determine the properties and structure of various nutraceuticals Explain the functions of various nutraceuticals	K_4 , K_5
CO 3	Inspect nutraceuticals of plant origin and nutraceuticals of animal origin Importance of nutraceuticals of plant and animal origin in the field of medicine and therapy.	K_4 , K_5
CO 4	Distinguish between functional foods and nutraceuticals Compare the importance of nutritive and non-nutritive components. Explain the role of fibers and synbiotics with respect to health.	K_4 , K_5
CO 5	Design the role of nutraceuticals as food remedies Test the role of nutraceuticals in alleviating disorders Originate the role of nanotechnology in the field of functional food industry.	K_4, K_5

Mapping with Program Outcomes

CO s	PO 1	PO 2	PO 3	PO 4	PO 5
CO_1	S	S	M	S	S
CO_2	S	S	M	S	S
CO_3	S	S	M	S	S
CO_4	S	S	M	S	S
CO_5	S	S	M	S	S

S- Strong; M-Medium; L-Low

17PFN1EA	ELECTIVE I: FUNCTIONAL FOODS AND NUTRACEUTICALS	SEMESTER-I

Total Credits: 4
Hours/Week: 4

CONTENT

UNIT –I

Introduction to Nutraceuticals as Science:
Nutraceutical- Definition, Classification - Dietary supplements, Functional foods, Historical perspective, scope and future prospects, applied aspects of the Nutraceutical Science, Sources of Nutraceuticals

UNIT –II

Properties, structure and functions of various Nutraceuticals:
Glycosides, Isoprenoidderivaties, Glucosamine, Octacosanol, flavonoids, carotenoids, polyunsaturated fatty acids, lecithin, choline and spingolipids, Lycopene, Carnitine, Melatonin and Ornithine alpha ketoglutarate, Phytoestrogens, curcumin, organosulphur compounds as neutraceuticals. Use of proanthocyanidins, grape products, flaxseed oil as Nutraceuticals

UNIT –III

Nutraceuticals of plant and animal origin*:* Plant secondary metabolites, classification and sub-classification - Alkaloids, phenols, Terpenoids, extraction and purification, applications, Concept of cosmoceuticals and aquaceuticals Animal metabolites - Sources and extraction of nutraceuticals of animal origin, Examples: chitin, chitosan, glucosamine, chondroitin sulphate and other polysaccharides of animal origin, uses and applications in preventive medicine and treatment.

UNIT –IV

Functional Foods: Definition, Relation of functional foods and Nutraceutical (FFN) to foods and drugs, applications of herbs to functional

foods, Concept of free radicals and antioxidants; Nutritive and Non-nutritive food components with potential health effects, Soy proteins and soy isoflavones in human health; Role of nuts in cardiovascular disease prevention .Functional foods from wheat and rice and their health effects. Role of Dietary fibers in disease prevention, Vegetables, Cereals, milk and dairy products as Functional foods, Health effects of prebiotics, probiotic and synbiotic foods and effects

UNIT –V

Food as remedies: Nutraceuticals in treatment for cognitive decline, Arthritis, Bronchitis, circulatory problems, hypoglycemia, Nephrological disorders, Liver disorders, Osteoporosis, Psoriasis and Ulcers etc, Nutraceutical rich supplements e.g. Bee pollen, Caffeine, Green tea, Lecithin, Mushroom extract, Chlorophyll, Kelp and Spirulinaetc. Nutrigenomics-concept of personalized medicine. Use of Nanotechnology in functional food industry.

TEXT BOOKS:

1. *Wildman, R.E.C.* ed. (2000) **Handbook of Nutraceuticals and Functional Foods**, CRC Press, Boca Raton
2. *Jeffery H. W.* **Methods of Analysis for Functional Foods and Neutraceuticals**, 2002, Edition I, CRC Press, New York

REFERENCE BOOKS:

1. *Mahan.K and Escott.S.*, 2000., "**Food Nutrition and Diet Therapy**", 11thEdition.,W.S. Saunder's Company, Philadelphia, USA.
2. *Murray Robert*, 1990, Harper`s **Biochemistry**, 24th Ed, Prentice Hall International UK Ltd.
3. *Degbasis Bagchi,2010,***Biotechnology in functional foods and nutraceuticals**,,CRC press,Taylor& Francis group,London.

17PFN1EB	ELECTIVE –I FOOD PRODUCT DEVELOPMENT	SEMESTER –I

PREAMBLE

- To understand and know various aspects of food product develop food science and technology, packaging, nutrition values and marketing
- Recognize the potential for entrepreneurship through marketing

COURSE OUTCOMES

On the successful completion of the course, students will able to

CO Number	CO Statement	Knowledge Level
CO 1	Choose raw materials, portion control, standardizations for products. Identify the new products for the community Make use of the technology and marketing on health concerns	K_3
CO 2	Categorize the products for development to the community Analyze the new developed products	K_4
CO 3	Examine sensory and objective evaluation test, score card designing and Instruments used for texture evaluation. Test for texture evaluation	K_4
CO 4	Select the types of food packing materials Explain the patent laws and code for IPR Prioritize patent for new products	K_5
CO 5	Build the marketing structure and integration Improve the marketing efficiency	K_6

	Discuss the role of government in promoting agricultural marketing	

Mapping with Program Outcomes

CO s	PO 1	PO 2	PO 3	PO 4	PO 5
CO_1	S	S	S	S	S
CO_2	S	S	S	S	S
CO_3	S	S	S	S	S
CO_4	S	S	S	S	S
CO_5	S	S	S	S	S

S- Strong; M-Medium; L-Low

17PFN1EB	ELECTIVE –I FOOD PRODUCT DEVELOPMENT	SEMESTER –I

Total Credits: 4
Hours/Week: 4

CONTENTS

UNIT-I

New product development
Definition and classification, characterization and factors shaping new product development. Health concerns impact of technology and market place influence.

UNIT-II

Formulation of new product development
Formulation of new product development for infants, preschool, sports person, elderly- Selection of raw materials, portion size, standardization methods, calculation of nutritive values, cost production, shelf life.

UNIT-III

Sensory evaluation
Establishing sensory panels – Designing testing facilities – Analytical Test – Conduct a sensory Evaluation Test – Designing score card, objective evaluation, Instruments used for texture evaluation.

UNIT-IV

Packaging
Packaging – Introduction, Types of packing materials. New product development – patent, patent laws, international code for Intellectual property rights (IPR).

UNIT-V

Marketing

Concept of market and marketing – Approaches to study marketing and marketing functions, market structure, market efficiency and market integration. Role of government in promoting agricultural marketing. GST for newly developed product

TEXT BOOKS:

1. *Baker,R.C.*, **Fundamentals of New Food Product Development**,1988.
2. *Fuller G.W*, **New Food Product Development from Concept to Market place**.

REFERENCE BOOKS:

1. *Sivarama Prasad A*. **Agricultural marketing in India**, Mittal Publication, New Delhi, 1985.
2. *Aaron, L. Brody, Joha .B. Lord*.Developing **New Food Product for a changing Market place**, 2nd Edition, 2005,

17PFN2EA	ELECTIVE – II: HUMAN PHYSIOLOGY	SEMESTER –II

PREAMBLE

To understand the structure and functions of various organs of the body and to obtain a better understanding of the principles of nutrition through the study of physiology

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Explain the structure and functions of cell, stomach, liver, gall bladder, pancreas, small intestine and large intestine.	K_4
CO2	Categorize the blood constituent – RBC, WBC, Platelets and lymph. Explain blood coagulation and examine the blood groups and Rh factor Explain the structure and functions of circulatory system, and its defects.	K_4
CO3	Explain the basic anatomy of respiratory system. Elaborate pulmonary function test, pulmonary circulation, and mechanism of respiration. Elaborate the structure and functions of pituitary, thyroid, islets of langerhans and adrenal glands.	K_5,K_6
CO4	Explain the anatomy of male and female reproductive organs. Elaborate the structure and functions of sense organs.	K_5 , K_6
CO5	Perceive the structure and functions of excretory organs – kidney and nephron. Elaborate the renal circulation, formation and composition of urine, Elaborate the physiology of muscular action.	K_5 , K_6

	Explain the physiology& function of the central nervous system.	

Mapping with Program Outcomes

COs	PO 1	PO 2	PO 3	PO 4	PO 5
CO_1	S	S	M	M	S
CO_2	S	S	M	M	S
CO_3	S	S	M	M	S
CO_4	S	S	M	M	S
CO_5	S	S	M	M	S

S- Strong; M-Medium; L-Low

17PFN2EA	ELECTIVE – II: HUMAN PHYSIOLOGY	SEMESTER –II

Total Credits: 4
Hours/Week: 4

CONTENTS

UNIT- I

Cell – Structure and functions**.** Digestive system – Anatomical consideration – structure and functions of stomach, liver, gall bladder, pancreas, small intestine and large intestine.

UNIT- II

Blood, RBC, WBC, Platelets and Lymph, Blood coagulation, blood grouping and Rh factor, Circulatory system – Heart structure and functions – cardiac cycle, cardiac output, ECG, cardiac murmurs, arrhythemia, circulatory shock and heart failure.

UNIT- III

Respiratory system – Basic anatomy of the respiratory system, process of respiration, transport and exchange of oxygen and carbondioxide in the body, pulmonary function test, pulmonary circulation, regulation of respiration and ventilation.

Endocrine glands – Structure and function of pituitary, thyroid, islets of langerhans and adrenal gland.

UNIT- IV

Reproductive system – Anatomy of the male and female reproductive organs, menstrual cycle, ovulation, menopause. Sense organs - Structure and functions of eye, visual pathway, ear, auditory pathway, skin, regulation of body temperature, sensation of taste and smell

UNIT- V

Excretory system - Excretory organs - structure of kidney and nephron and functions, renal circulation, formation and composition of urine, and micturition.

Muscles - structure and classification of muscles, physiology of muscular action.

Central nervous system –Physiology of the neuron, parts of the central nervous system and function, reflex activity, receptors and neurotransmitters.

TEXT BOOKS:

1. Chatterjee C.C. (1987): "**Human physiology**"., Vol I and II, Medical allied agency, Calcutta.
2. Wilson, K.J.W and Waugh, A. (1996): **Ross and Wilson, Anatomy and physiology in health and illness,** 8th edition, Churchill Livingstone.

REFERENCE BOOKS:

1. Guyton, A.G. and Hall, J.B. (1996): **Text Book of Medical Physiology,** (9th Edition, W. B. Sanders Company, Prism Books (Pvt.) Ltd., Bangalore.
2. Sembulingam.K and Sembulingam. P, 2013, **Essentials of Medical Physiology,** 6th Edition, JAYPEE Brothers, Medical Publishers.

17PFN2EB	ELECTIVE –II : FOOD PACKAGING	SEMESTER-II

PREAMBLE

- Enable students to understand the purpose and the need for food packaging technology
- To appreciate the recent packaging techniques, labeling methods and their applications in food industries

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Identify the functions of packaging materials for different foods Organize the characteristics of packaging materials Make use of food packages -bags, pouches, wrappers, tetra packs.	K_3
CO2	Classify the types of packaging materials – characteristics, applications in food industry, Categorize the merits and demerits, plastic containers, paper and boards.	K_4
CO3	Examine the characteristics, applications and advantages of microwave ovenable containers Analyze the packaging techniques,implication and its application and advantages.	K_4
CO4	Compare the ecofriendly alternatives to plastics Classify&Explain the edible packaging materials– advantages,and materials used Recommend the importance of biodegradable packaging material Evaluate the packaging of finished goods	K_4,K_5
CO5	Choose the Standards for labeling concerned in food industries	K_5

	Analyze the purpose of labels, description of labels for food packaging. Justify labelling regulations, bar code, nutrition labelling, health claims, mandatory labelling provisions. Criticize the critical elements of food label	

Mapping with Program Outcomes

CO s	PO 1	PO 2	PO 3	PO 4	PO 5
CO_1	S	S	S	S	S
CO_2	S	S	S	S	S
CO_3	S	S	S	S	S
CO_4	S	S	S	S	S
CO_5	S	S	S	S	S

S- Strong; M-Medium; L-Low

17PFN2EB	ELECTIVE –II : FOOD PACKAGING	SEMESTER-II

Total Credits: 4

Hours/Week: 4

CONTENTS

UNIT- I

Definition, functions of packaging materials for different foods, characteristics of packaging material, food packages -bags, pouches, wrappers, tetra packs.

UNIT- II

Types of packaging materials – characteristics, applications in food industry, merits and demerits, textiles and wood, metal, glass, flexible films, rigid and semirigid plastic containers, paper and boards.

UNIT- III

Microwave ovenable containers – characteristics, applications and advantages. Retortable packages – Retort pouches, retortable aluminium containers, composite flexible retortable packages – application and advantages. Shrink packaging, active/smart/Intelligent packaging.

UNIT- IV

Ecofriendly alternatives to plastics – Edible packaging – advantages, material used – lipid coating, proteins, composite films, current applications, biodegradable packaging material – biopolymer based edible film. Packaging of finished goods – weighing, filling, scaling, wrapping, cartooning, labeling, marking and trapping.

UNIT- V

Labelling- Standards for labelling, Purpose of labels, description of label for food packaging, critical elements of food label, types of labels, common terms for labels, materials used, surface treatment, labels for freight containers, labelling regulations, bar code, nutrition labelling, health claims, mandatory labelling provisions.

TEXT BOOKS:

1. **Food Packaging technology** Hand book-NIIR, Delhi, 2004
2. **Handbook on Modern Packaging Industry**, NIIR, Delhi, 2008.

REFERENCE BOOKS:

1. *Griffrin .R.C,* "**Principles of Food Packaging**", Stainley Sacharous, 2nd Ed. Avipub Co.Westport.
2. **Food Packaging technology**, NIIR, Delhi, 2005.

17PFN3EA	ELECTIVE – III: FOOD SAFETY AND QUALITY MANAGEMENT	SEMESTER- III

PREAMBLE

To enable students to gain knowledge on food safety and food laws and to study about quality control and common food standards

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Develop the knowledge about the quality control and quality assurance program in food industry	K_2 , K_3
CO2	Distinguish various Government regulations and its applications in quality control	K_3 K_4
CO3	Justify the importance of the role of Central and State Government in imparting quality control	K_4 K_5
CO4	Infer the food standards and explain the importance of patents for food products	K_4 K_5
CO5	Evaluate the importance of food safety and its quality Criticize about the GRAS additives and different methods of preservation	K_5

Mapping with Outcomes

CO s	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	S	S	S	S	S
CO 2	S	S	S	S	S
CO 3	S	S	S	S	S
CO 4	S	S	S	S	S
CO 5	S	S	S	S	S

S- Strong; M-Medium; L-Low

17PFN3EA	ELECTIVE – III: FOOD SAFETY AND QUALITY MANAGEMENT	SEMESTER- III

Total Credits: 3

Hours/Week: 3

CONTENTS

UNIT- I

Quality control – Objectives, Importance, functions of quality control, Stages of quality control in food industry.
Food quality assurance – Design of company quality assurance program, Microbiological concerns.
Managing quality in supply chain and marketing of food products.

UNIT- II

Government regulations in quality control – FAO/WHO codex Alimentarious commission, PFA, AGMARK, BIS, FPO, fair average quality (FAQ) specification for food grains, ISO 9000 series.
HACCP – background, current status, structured approach, principles, benefits and limitation. Consumer Protection Act (CPA)

UNIT- III

Role of Central and State Government in imparting quality control – Role of central food laboratory and state food laboratories. FSSAI.

UNIT- IV

Food standards – cereals and products – bread, biscuits, cakes, pasta products.
Fruit products – jam, juices, squashes, ketchup, sauce,
Oils and fats – coconut oil, groundnut oil, palm oil, sunflower oil, vanaspati.
Milk and products – Skimmed milk powder, partly skimmed milk powder, condensed sweetened milk. Other products-coffee, tea, sugar, honey, toffees.

Patent – definition, requirements, patent laws in India, administrator, need for patent system, advantages, and precautions to be taken by applicants, patent procedures, non-patentable.

UNIT- V

Food safety – meaning
Food hazards – Physical, Chemical, Biological hazards associated with foods – types. Effect of processing and storage on microbial safety
Types of food toxicants – Endogenous, natural, synthetic toxicants
Food additives - Food colours and flavours, thickeners, leavening agents, emulsifiers and food improvers. GRAS additives

TEXT BOOKS:

1. *A. Y. Sathe*, 1999, "**A First Course in Food Analysis**" ,New Age Publications,.
2. *Potter.N.N and Hotchkiss.J.H*.,1996., "**Food Science**" CBS Publishers.,

REFERENCE BOOKS:

1. *Swaminathan.M* , "**Food Science, Chemistry and Experimental Foods**" , Bappco Publishers.
2. *Desrosier and Desrosier*., 1999, "**Technology of Food Preservation**" ,4th Edition, CBS Publishers.

17PFN3EB	ELECTIVE III – CONVENIENCE FOODS	SEMESTER –III

PREAMBLE

- To gain knowledge on convenience foods
- To acquire knowledge on food processing techniques

COURSE OUTCOMES

By the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Develop new products and plan a strategy for marketing the developed products	K_3,K_4
CO2	Categorise the processing techniques and inspect the quality of the processed foods Recommend innovative food products	K_4, K_5
CO3	Prioritise the convenience food in IMF and hurdle technology Infer the types of DRDO designed foods	K_4, K_5
CO4	Criticize the RTE Products and rate the feasibility and reliability of RTE in India	K_4, K_5
CO5	Perceive the extrusion techniques in trend Appraise the applications of extruded products	K_5

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M
CO2	S	S	S	M	M
CO3	S	S	S	M	M
CO4	S	S	S	M	M
CO5	S	S	S	M	M

S - Strong; M - Medium; L- Low

17PFN3EB	ELECTIVE III: CONVENIENCE FOODS	SEMESTER- III

Total Credits: 3
Hours/week: 3

CONTENTS

UNIT- I

Food product development –Development of new product, need for developing new products, Developing marketing strategy for new product, Strategies in product development, success and failure factors for new products.

UNIT- II

Snack foods Popped snacks–Popcorn –popping procedures, loss during popping, measurement of expansion, factors affecting quality of popcorn, storage. Puffed snacks – Puffable materials, extrusion methods, drying, addition of flavours and colours, Simulated popcorn. Baked snacks – Proportion and role of ingredients; Sweet based –plain cookies, wire-cut cookies; Salt based soda crackers and cheese crackers.

UNIT- III

Convenience foods for defense services –IMF and Hurdle Technology-Principles, Processing of dehydrated vegetables, vegetable powder, IMF fruit slices, IMF fruit bars, fruit- milk, soup powders. Foods designed by DRDO for defense services –list and principle of processing applied.

UNIT- IV

Ready-to-eat foods:–principle of retort processing, technique, production, merits and demerits. Commercial availability, marketing and future prospects in India.

UNIT- V

Extruded foods–Principle of extruders, Production of pasta-noodle and macaroni products, Common extruders used in food industry, Merits and demerits of extruder technology, Uses of extruded foods, physico-chemical changes in extruded products

TEXT BOOKS:

1. *Subbulakshmi and Udipi.S*., 2001., "**Food processing and Preservation Technology**"., New Age Publications., New Delhi, India.
2. *Khader.V,* 2001., "**A Textbook of Food Processing Technology**", ICAR, New Delhi, India

REFERENCE BOOKS:

1. *Sivashankar. B*., 2002.,"**Food Processing and Preservation**", PHI, New Delhi, India.
2. **Modern Technology of Food Processing and Agro Based Industry**, 2nd Edition, NIIR Board, Asia Pacific Business Press, 2002.

17PFN4EP	ELECTIVE – IV: LAB - V-A: FOOD QUALITY CONTROL	SEMESTER –IV

Total Credits: 2
Hours/week: 4

EXPERIMENTS

1. Estimation of titrable acidity in fruits
2. Estimation of total solids in milk
3. Estimation of specific gravity in foods
4. Qualitative test of pectin in fruit
5. Estimation of lactose in milk
6. Estimation of tannins in tea
7. Test for rancidity in oils – Kries test
8. Food adulteration – Test to detect adulteration
9. Product formulation – Cereal based, Pulse based, Milk based, Vegetable, Fruit based or Combinations
10. Standardization of formulated food, threshold sensitivity tests, Evaluation of sensory characteristics using score card
11. Preparation and inoculation of growth media – Inoculation and incubation, counting of microbes
12. Consumer acceptability and popularization of formulated product

17PFN4EQ	ELECTIVE – IV: LAB -V-B: NUTRITION IN HEALTH AND WELLNESS	SEMESTER-IV

Total Credits: 2
Hours/week: 4

CONTENTS

Plan and prepare menu; determine the food portions, cost and nutritive value calculation for the following conditions,

1. Menu planning for pregnant mother carrying twins
2. Menu planning for preterm delivery
3. Menu planning for miscarriage
4. Menu planning for lactating mother carrying twins
5. Menu planning for toddlers and school going children
6. Menu planning for adolescents
7. Menu planning for geriatrics
8. Menu planning for physically challenged
9. Menu planning for IT professionals
10. Menu planning for soldiers
11. Menu planning for swimmers
12. Menu planning for weight lifters
13. Menu planning for athelets
14. Menu planning for racer
15. Menu planning for astronauts

17PFNSS1	SELF STUDY-I COMPOSITE HOME SCIENCE	SEMESTER-III

Total Credits: 1

PREAMBLE

To enable students to understand and study for UGC-JRF/NET/SLET examinations

CONTENTS

Unit -I: Food and Nutrition

- Food Science and Quality Control
- Macro and Micro – Nutrients
- Human Nutritional Requirements
- Assessment of Nutritional Status
- Food Biotechnology

Unit – II: Institutional Management and Dietetics

- Advanced Management and Organisation
- Management of Human Resources
- Experimental Quantity Cookery
- Financial and Profit Management
- Quantity Food Preparation Techniques
- Food Service and, Delivery Systems
- Marketing
- Therapeutic Dietetics

Unit – III: Child and Human Development

- Human Development – Rights perspective.
- Principles and Theories of Human Development.
- Early Childhood Care and Development – Strategies, Monitoring and Supervision.

- Children with special needs and Children at Risk (Child Labour, Street Children, Child Abuse, Chronically Sick); Intervention Programs.
- Socialization in various family contexts across different cultures.
- Advances in Assessment of Children.

Unit – IV: Clothing and Textiles

- Textile Chemistry – Fibers and dyes.
- Dyeing, printing and finishing of fibers yarns and fabrics.
- Textile and Apparel Industry – Fundamental of business, specifications, quality control agencies and marketing.
- Historic and Traditional Textiles of world with emphasis on India.
- Curriculum and Teaching in clothing and textiles, analysis and development of curriculum; teaching methods and aids.
- Consumer and Textiles and Clothing.
- Recent developments in Textile and Clothing.

Unit – V: Home and Community Resource Management

- Concept of Home management, System approach to family, Input, Output and feedback.
- Family Resources – Management of Resources like time energy and money; Basic characteristics of Resources; Efficient methods of utilization of Resources.
- Family Life Cycle – Demands upon resources like time, energy and money.
- Concept of Ergonomics – its importance and application in home.
- Concept of Communication process and its importance in family; Barriers in Communication process; Measures for Effective Communication.
- Concept of Work Simplification – its importance in home; Simple pen and pencil technique.
- Consumer Education – Laws protecting consumer; Role of consumer society in protecting consumer; Kinds of adulteration; Identification of adulteration.

Unit – VI: Home Science Extension Education

- Curriculum Development for Formal Education in Home Sciences.
- General and Special Methods of Teaching Home Science.
- Media and Materials for promoting Home Science in Formal / Non – formal / Adult / Extension Education.
- Non – formal and Adult Education in Home Science.
- Extension Education in Home Science.
- Women in Changing India and Plans for their development.
- Self – Employment and Entrepreneurship through Home Science.
- Programs of extension in Home Science.
- Measurement and Evaluation including monitoring and supervision for Formal / Non – formal / Adult Education / Extension Education.

TEXT BOOKS

1.*Premlata Mullick*, 2012.Textbook of Home science, Kalyani publications

2.Serena Shekar,2013,Text book of Home science: Extension education

3.Suchi rastogi,2016,UGC NET/SET, JRF& LS, Home science

17PFNSS2	SELF STUDY-II DIET COUNSELLING	SEMESTER-III

Total Credits: 1

CONTENTS

UNIT I

Practical consideration in giving dietary advice and counselling – a) Factors affecting and individual food choice b) Communication of dietary advice c) Consideration of behaviour modification d) Motivation.

UNIT II

Counselling and educating patient: a) Introduction to nutrition counselling b) Determining the role of nutrition counseller c) Responsibilities of the nutrition counseller d) Practitioner v/s client managed care, e) Conceptualizing entrepreneur skills and behavior, f) Communication and negotiation skills.

UNIT III

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 IV

Use of Computers in Counseling: a) Use of computers by dietitian b) Dietary computations, c) Dietetic management d) Education/ training e) Information storage, f) Administrations g) Research

UNIT V

Computer applications for counseling

a) Execution of software packages b) Straight line, frequency table, bar diagram, pie chart, Preparation of dietary charts for patients c) Statistical computation- mean, median, standard deviation, conclusion and regression test.

TEXT BOOKS:

1. *Joshi .Y .K* , 2003, "**Basic Clinical Nutrition**", JAYPEE Brothers, New Delhi.
2. *Mahan.K and Escott.S.*, 2000., "Food **Nutrition and Diet Therapy**", 11th Edition.,W.S. Saunder's Company, Philadelphia, USA.
3. *Gibney.M.J*, 2004., "**Public Health Nutrition**" , 1st Edition, Black Well Scientific Publications, Oxford.
4. *Wadhwa.A*, 2003, "**Nutrition in the Community**", 1st Edition, Elite Publications, New Delhi.

10/1/2018
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