THIRUVALLUVAR UNIVERSITY, VELLORE - 632 115

(M.Sc., FOODS AND NUTRITION) – 2022-2023 onwards

Programme Objectives: (5 Points Compulsory)

1. Emerge with competency in the subject and to pursue higher education/prospective careers.

2. Imbibe logical/analytical/critical/innovative skill in the field of clinical nutrition, community nutrition and food processing industries.

3. Articulate academic understanding and develop the ability to attain empowerment in food industry, health and public sectors.

4. Enable students to apply the knowledge and cater to the needs of the society/employer/ institution/entrepreneurship.

5. Acquire the ability and behavioural skills to work in groups, plan/organize/conduct community programs.

Programme Educational Objectives: (5 Points Compulsory)

1. Deliver value-based holistic and innovative learning based education to meet the standards expected in their careers.

2. Provide conducive learning space to the students and encourage their hidden talents, critical thinking and reasoning skills for individual betterment and to the society at large.

3. Empower students with the state-of-art practical exposure in the field of foods and nutrition

4. Help to transpire the acquired knowledge to the community as nutrition educators/diet counsellors/health communicators and create awareness.

5. Transcend in becoming nutritionist/dieticians/industrialist/successful entrepreneurs.

Programme Specific Outcomes: (10 Points Compulsory)

1. Enable to pursue highereducation and researchin academic and research institutions.

- 2. Inculcate comprehensive and analytical skills in food industries and health sectors
- 3. Excel in community health nutrition for employment in State and Central Government.
- 4. Develop skills to be successful entrepreneurs in food industries.
- 5. Demonstrate the ability to plan, organize and conduct community nutrition programs.
- 6. Exhibit competence in hospital and health sectors with appropriate practical exposure.

7. Explore knowledge and interest in food product development.

8. Explore the current concept of personalized nutrition with reference to nutrigenetics & nutrigenomics.

9. Demonstrate an understanding on the scope and recent developments in food biotechnology.

10. Take up professions in sports nutrition, health & fitness centres and community development projects.

Programme Outcomes: (10 Points Compulsory)

1. A strong understanding on the interrelationship between health, food, nutrition and dietetics.

- 2. Gain insight into various diseases and the role of dietician in managing diseases.
- 3. Apply the knowledge in managing a dietary department in a hospital.

4. Determining the in-vitro nutrient content of foods through various analytical procedures.

5. Gain capacity to identify various nutritional deficiencies and recommend nutritional guidelines to manage/prevent them.

6. Apply appropriate knowledge on the nutritional requirements throughout the life span.

- 7. Demonstrate skill in food science and new food product development.
- 8. Interest in venturing as entrepreneurs.
- 9. Capacity to organize community oriented programs on health and nutritional status.

10. Develop enormous responsibility in determining health and nutritional status of the society.

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

M.Sc. Foods and Nutrition – 2022-2023 onwards

The Course of Study and the Scheme of Examination

SI.	Study Compo	onents	ins.	Cre	Title of the Depor	/	Maximum M	arks
No.	Course Ti	itle	week	dit			Uni.	_
	SEM	IESTER I	L			CIA	Exam	Total
1.	Core-Theory	Paper-1	6	5	Advanced Physiology	25	75	100
2.	Core-Theory	Paper-2	6	5	Advanced Food Science	25	75	100
3.	Core-Theory	Paper-3	5	5	Essentials of Macronutrients	25	75	100
	Core-Practical	Paper-1	3	0	Advanced Food Science	0	0	0
	Core-Practical	Paper-2	3	0	Essentials of Macronutrients	0	0	0
		Intern	al Electiv	e for sa	me major students (Choose any one)			
	Paper-1 (to choose 1 out of 3)							
4.	Core		4	3	A. Health and Fitness	25	75	100
	Elective				B. Food Hygiene and Sanitation		-	
	Ev:	tornal Elect	ive for et	hor ma	C. FOOD Processing	anore)	
5	Open Elective	Paper-1			(to choose 1 out of 3)	25	75	100
5.	open Lietuve		3	3	A. Culinary Skills	23	75	100
				-	B. Basic Food Science			
					C. Nutraceuticals			
			30	21		125	375	500
SEMESTER II						CIA	Uni. Exam	Total
6.	Core-Theory	Paper-4	5	4	Essentials of Micronutrients	25	75	100
7.	Core-Theory	Paper-5	4	4	Nutrition Through Life Cycle	25	75	100
8.	Core-Theory	Paper-6	4	4	Food Microbiology	25	75	100
9.	Core-Practical	Paper-1	4	4	Advanced Food Science & Essentials	25	75	100
		·			of Macronutrients			
10.	Core-Practical	Paper-2	4	4	Essentials of Micronutrients &	25	75	100
		Intern	al Floctiv	e for sa	me major students (Choose any one)			
					(to choose 1 out of 2)			
		Paper-2			A Food Standard and Quality			
	Core				Control			
11.	Elective		4	3	B. Hospital Food Service	25	75	100
					C. Textiles and Clothing in Human			
					Care			
	Ext	ternal Elect	ive for ot	her ma	ijor students (Inter/multi disciplinary p	papers)	
12.	Open Elective	Paper-2			(to choose 1 out of 3)			
			3	3	A. Bakery Science			
					B. Home Scale Preservation of fruits	25	75	100
					and Vegetables			
12	Field Study)	C. LITESTYle Practice	100		100
13.	riela stuay		-	2		100	-	100

14.	Compulsory Pap	er	2	2	Human Rights	25	75	100
			30	30		300	600	900
	SEMI	ESTER III				CIA	Uni. Exam	Total
15.	Core-Theory	Paper-7	5	4	Nutritional Biochemistry	25	75	100
16.	Core-Theory	Paper-8	5	3	Research Methodology and Applied Statistics	25	75	100
17.	Core-Theory	Paper-9	4	3	Community Nutrition	25	75	100
	Core-Practical	Paper-3	6	0	Nutritional Biochemistry & Community Nutrition (Practicals)	0	0	0
	·	Intern	al Electiv	e for sa	ame major students (Choose any one)			
18.	Core Elective	Paper-3	5	3	(to choose 1 out of 3) A.Nutrition in Emergencies B.Functional Foods and Nutraceuticals C.Principles of Food Analysis	25	75	100
	Ext	ternal Elect	ive for ot	her ma	jor students (Inter/multi disciplinary p	apers)	
19.	Open Elective	Paper-3	5	3	(to choose 1 out of 3) A.Princi.ples of Nutrition- I B.Assessment of Nutritional Status C.Nutrition Education and Counselling	25	75	100
20.	Viva Voce		-	2	Internship	25	75	100
21.	MOOC Courses		-	2		0	0	100
			30	20		150	450	700
	SEMI	ESTER IV				CIA	Uni. Exam	Total
22.	Core-Theory	Paper- 10	6	4	Diet Therapy	25	75	100
23.	Core-Practical	Paper-3	0	3	Nutritional Biochemistry & Community Nutrition	25	75	100
24.	Core-Practical	Paper-4	6	3	Diet Therapy	25	75	100
25.	Core	Project / Disserta tion	10	5	Core Project/ Dissertation with vivavoce	100 (75 Project +25 viva)		100
	1	Intern	al Electiv	e for sa	me major students (Choose any one)	-		
26.	Core Elective	Paper- 4	5	3	(to choose 1 out of 3) A.Foodbiotechnology B.Food Safety and Nutrition Security C.Computer Application in Food Science and Nutrition	25	75	100

	External Elective for other major students (Inter/multi disciplinary papers)									
27.	Open Elective	Paper- 4	3	3	(to choose 1 out of 3) A.Principles of Nutrition- II B.Nutrition in Special Condition C.Techniques of Food Evaluation	25	75	100		
			30	21		125	375	600		
			120	92				2700		

SEMESTER – I

Semester: I	Paper type: Core 1
Paper code:	Name of the Paper: Advanced Physiology
Credit: 5	Total Hours per Week:Lecture Hours: Tutorial Hours:

Course Objectives

- 1. Understand the basic tenets of human physiology
- 2. Comprehend the general structure and functions of organs in the body.
- 3. Gain knowledge on various systems of the body.
- 4. Comprehend the mechanism involved in secretion and functions of the body.
- 5. Understand the integrated function of all systems and disease conditions

Course Out Comes

1. After studied unit-1, the student gain knowledge on body fluids, muscle and nerve tissues.

2. After studied unit-2, the student will be able understand the significance of blood, and enumerate the functions of cardiovascular and excretory systems of the body.

3. After studied unit-3, the student will be able to comprehend the respiratory and digestive systems of the body.

4. After studied unit-4, the student will be able to describe endocrinal and reproductive functions in the body.

5. After studied unit-5, the student will understand the significance of nervous system, immune functions and auto immune disorders.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	No
4	Yes	Yes	Yes	Yes	Yes	No
5	Yes	Yes	Yes	Yes	Yes	No

Matching Table (Put Yes / No in the appropriate box)

UNIT-I (50 to 100 contents) Teaching Hours:....

Physiological aspects of body fluid- Body fluid compartment, composition of body fluid, importance of body fluid and lymph and lymphatic system - Homeostasis.

Physiological aspects of muscle tissue - structure, chemical composition, mechanism and energetics of muscle contraction, muscle fatigue.

Physiological aspects of nerve tissue - structure, composition & functions of nerve tissue and anatomy of nerve system.

UNIT-II (50 to 100 contents)

Teaching Hours:....

Blood Circulation and Renal system

Blood - composition, functions of basic elements of blood and plasma proteins, blood volume, origin and conduction of heart beat and heart rate, ECG-interpretation, Latest development in cardiac condition, cardio vascular system and mechanism and homeostasis.

Excretion - formation of urine, micturition, characteristics of urine, normal and abnormal constituents of urine, acid - base balance by kidney

UNIT-III (50 to 100 contents) Teaching Hours:....

Respiratory and Digestive system

Physiological anatomy of respiratory tract, mechanics of respiration, transport of respiratory gases in blood exchange of respiratory gases, pulmonary volumes, regulation of respiration.

Physiological anatomy and functions of Gastrointestinal Tract, movement of gastro intestinal tract, Mechanism of secretion of gastric juice, hormones involved in digestive system.

Hunger, Appetite, Satiety - physiological and psychological factors affecting food intake, circadian rhythm in GI tract secretions.

UNIT-IV (50 to 100 contents) Teaching Hours:....

Endocrine and Reproductive system

Physiological anatomy of endocrine glands and Reproductive organs. Hormones - Mode of action, functions of hormones of the endocrine glands - Pituitary, Adrenal, Thyroid, Gonadal hormones, Pancreas, Pineal body and Parathyroid, Hypo and Hyper functions of the glands.

UNIT-V (50 to 100 contents) Teaching Hours:....

Nervous system – Structure and functions of brain, spinal cord and neuron; conduction of neuro impulse, role of neuro transmitters; blood brain barriers, role of cerebrospinal fluid and hypothalamus in body functions.

Immunity - Properties, natural and acquired Immunity, features of immune responses, antigen - antibodies - types, properties and antigen - antibody interaction, Auto immune disorders.

REFERENCES:

- 1. Guyton, A.G. and Hall, J.B. (2005): Text Book of Medical Physiology, 9th Edition, W.B. Sanders Company, Prism Books (Pvt.) Ltd., Bangalore.
- 2. Wilson, K.J.W and Waugh, A. (2003): Ross and Wilson Anatomy and Physiology in Health and Illness 8th Edition, Churchill Livingstone.
- 3. Jain, A.K.: Textbook of Physiology. Vol. I and II. Avichal Publishing Co., New Delhi.
- 4. McArdle, W.D., Katch, F.I. and Katch V.L (2001): Exercise Physiology. Energy, Nutrition and Human Performance, 4th Edition, Williams and Wilkins, Baltimore.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	-	S	М	-	М	М	S
CO2	S	S	S	-	S	S	-	М	М	S
CO3	S	S	S	-	S	S	-	М	М	S
CO4	S	S	S	-	S	S	-	М	М	S
CO5	S	S	S	-	S	S	-	М	Μ	S

 $\begin{array}{l} PO-Programme \ Outcome, \ CO-Course \ outcome \\ S-Strong \ , \ M-Medium, \ L-Low \ (may \ be \ avoided) \end{array}$

Semester: I	Paper type: Core 2
Paper code:	Name of the Paper: Advanced Food Science
Credit: 5	Total Hours per Week:Lecture Hours:Tutorial Hours:

- 1. Acquire knowledge about the basic concepts of food science.
- 2. Understand the principles and physiological changes in foods with the effect of cooking.
- 3. Gain insight into the composition and nutritive value of various foods.
- 4. Describe the role of non-nutritive components of food in health
- 5. Study the effects of acid, alkaline and heat on the cooking of foods on the composition.

Course Out Comes

1. After studied unit-1, the student will gain knowledge on physio-chemical changes in cereal and cereal products and factors affecting the quality and quantity of nutrients

2. After studied unit-2, the student will be able learn the structure, cooking methods and factors affecting cooking quality of pulses, vegetables and fruits.

3. After studied unit-3, the student will be able enlightened with structure, nutritive value, cooking and preservation of egg, meat and fish.

4. After studied unit-4, the student will be able to understand and discuss the types, nutritive value and effect of cooking on milk & milk products and fats & oils.

5. After studied unit-5, the student will acquire skills on types, application and uses of sugar, beverages, spices and condiments in Indian cookery.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT-I (50 to 100 contents) Teaching Hours:....

Cereals and Cereal products

Cereals - Rice & wheat and other Millets - Composition and Nutritive Value.

Starch - Sources, Characteristics, Dextrinisation, Gelatinisation, Retrogradation and principles of Starch cookery.

Batter and Dough - Structure, Principle, Properties, Different types of flour, Gluten - properties, Gluten formation.

Flour - Types, properties. Bread - yeast leavened, Quick bread, pastries. - Role of ingredients & preparation of cake, bread and biscuits.

Teaching Hours:....

UNIT-II (50 to 100 contents) Pulses, Vegetables and Fruits

Pulses - Composition, types, nutritive value, toxic constituents and its removal, Germination, factors affecting Germination, Cooking methods and factors affecting cooking quality.

Vegetables - Structure, Classification, Composition, Nutritive value, Methods of Cooking, Changes in vegetables and pigments on Cooking.

Fruits - Structure, Classification, Composition, Ripening of fruits, changes on ripening, Pectic substances, Cooking changes, browning reactions in fruits and vegetables.

UNIT-III (50 to 100 contents) Teaching Hours:....

Egg - Structure, Composition, Nutritive value, Grading, Methods of preservation and Cooking and Role of egg in Indian cookery.

Meat - Structure, Composition, Nutritive value, Classes and Grades of meat cuts, tenderization, Rigor mortis. Poultry - Composition, Nutritive value, Grades, Methods of

cooking and Changes on cooking.

Fish - Composition, Nutritive value, Types, Cuts, Selection, Spoilage, Cooking and Factors effecting cooking quality.

UNIT-IV (50 to 100 contents) Teaching Hours:....

Milk and Milk Products - Composition, Nutritive value, Constituents, Properties of milk, Effects of acid, Salt, Heat on milk proteins and coagulation. Milk products - Ice cream, Types, Crystal formation and Dairy forms.

Fats & Oils – Types, properties of fat relating to cooking, Rancidity- types and tests for rancidity, Hydrogenation, Changes taking place in fat during heating, Factors affecting fat absorption, Shortening, Use of fats in Indian cookery.

UNIT-V (50 to 100 contents) Teaching Hours:....

Sugar cookery - Types of sugar, Properties, Crystallization, Stages in Sugar cookery, Application in Indian recipes.

Beverages - Classification, Nutritive value, Preparation of milk based and fermented beverages.

Spices and Condiments – Types and Use of spices and condiments in Indian cookery.

REFERENCES

- 1. Potter, N. and Hotchkiss, J.H. (1996): Food Science, Fifth edition, CBS Publishers and Distributors, New Delhi.
- 2. Belitz, H.D. and Grosch, W. (1999): Food Chemistry, (2nd edition), Springer, New York.
- 3. SriLakshmi, B. Food Science, New Age International [p] Limited, New Delhi, Third Edition, 2003
- 4. Shakuntalamanay, N&Shadaksharaswamy, M, Foods, facts and principles, Wiley Eastern Ltd. 2004.
- 5. Christian, E.W. Essentials of Food Science, XXIV edition, WWW.Springer.com/978-14614-9137-8. 2014.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	М	S	Μ	Μ	М	S	Μ	S	S
CO2	S	М	S	М	М	S	S	М	S	S
CO3	S	М	S	М	М	S	S	М	S	S
CO4	S	М	S	М	М	S	S	М	S	S
CO5	S	М	S	М	М	S	S	М	S	S

 $\begin{array}{l} PO-Programme \ Outcome, \ CO-Course \ outcome \\ S-Strong \ , \ M-Medium, \ L-Low \ (may \ be \ avoided) \end{array}$

Semester: I	Paper type: Core 3
Paper code:	Name of the Paper: Essentials of Macro Nutrients
Credit: 5	Total Hours per Week:Lecture Hours:Tutorial Hours:

- 1. Gain knowledge on classification, functions, metabolism, requirements and sources of macronutrients.
- 2. Develop skills to evaluate protein quality.
- 3. Know the Importance of macronutrients in growth and development.
- 4. Understand the physiological and metabolic role of macronutrients in health and diseases.
- 5. Comprehend on water balance in human nutrition and assessment of hydration status.

Course Out Comes

1. After studied unit-1, the student gain knowledge on the role of carbohydrates and dietary fiber in human nutrition and disease.

2. After studied unit-2, the student will be able understand the significance of lipids in human nutrition and diseases.

3. After studied unit-3, the student will be able to comprehend the respiratory and digestive systems of the body.

4. After studied unit-4, the student will know the role of proteins in human nutrition and acquire skills to evaluate protein quality

5. After studied, the student will understand the role of energy in various physiological conditions of the body.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	No
4	Yes	Yes	Yes	Yes	Yes	No
5	Yes	Yes	Yes	Yes	Yes	No

Matching Table (Put Yes / No in the appropriate box)

UNIT-I: (50 to 100 contents) Teaching Hours:....

CARBOHYDRATES

Classification, functions, digestion, absorption, metabolism, utilization and storage, hormonal regulation of blood glucose, role of carbohydrate in dental caries, sources and requirements. Dietary fibre - Development and concept, types and role of fibre in lipid metabolism, colon function, blood glucose level and GI tract functions – Advantages and Disadvantages of Dietary fibre.

UNIT-II: (50 to 100 contents)

Teaching Hours:....

LIPIDS

Classification, sources, functions, digestion, absorption, utilization and storage, effects of deficiency and excess of fat, lipotropic factors, role of saturated fat, cholesterol, lipoprotein and triglycerides and EFA in health, sources and requirements.

UNIT-III: (50 to 100 contents) Teaching Hours:....

PROTEINS AND AMINOACIDS

Classification, functions, digestion, absorption, utilization and storage, protein quality evaluation, nutritional classification of amino acids, amino acid balance, imbalance and toxicity, amino acid pool, sources and requirements.

UNIT-IV: (50 to 100 contents) Teaching Hours:....

ENERGY

Energy value of foods, SDA, energy production, factors affecting thermogenesis, energy utilization by cells, energy output - BMR, physical activity, factors affecting energy input - hunger, appetite, energy balance, measurement of energy content of food, BMR and Total energy expenditure.

UNIT-V: (50 to 100 contents) Teaching Hours:....

INTER RELATIONSHIP

Inter relationship between carbohydrate, fat and protein, nutritional adaptation and in malnutrition.

Homeostasis- Definition, Concepts and mechanism.

Electrolytes - Electrolyte content of fluid compartments, Functions of electrolyte,

Sodium, Potassium and Chloride, Absorption, Transport and Electrolyte Imbalance,

Factors affecting electrolyte balance, maintaining electrolytes, hydrogen ion balance, distribution of water, functions of water and Water balance.

REFERENCES:

- Shills, M.E., Olson, J., Shike, M. and Roos, C (2003). Modern Nutrition in Health and Disease, 9" edition Williams and Williams. A Beverly Co. London.
- 2. Bodwell, C.E. and Erdman, J.W. (2008) Nutrient Interactions. Marcel Dekker Inc. New York
- 3. Sareen, S, James, J (2005). Advanced Nutrition in Human Metabolism, 4th Edition, Thomson Wordsworth Publication, USA.
- 4. Chandra, R.K. (eds) (2002): Nutrition and Immunology, ARTS Biomedical. St. John's Newfoundland.

Journals:

- 1) Indian Journal of Nutrition and Dietetics
- 2) American Journal of Clinical Nutrition
- 3) British Journal of Nutrition
- 4) European Journal of Clinical Nutrition
- 5) International Journal of Vitamin and Nutrition Research
- 6) International Journal of Food Science and Nutrition 8. Nutrition Research

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	-	-	М	S
CO2	S	S	S	S	S	S	-	-	М	S
CO3	S	S	S	S	S	S	-	-	М	S
CO4	S	S	S	S	S	S	-	-	М	S
CO5	S	S	S	S	S	S	-	-	М	S

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

Semester: I	Paper type: Core Elective Paper 1 (To choose 1 out of 3)				
Paper code:	Name of the Paper: A. Health and fitness				
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:				

- 1. Elementary knowledge on wellness and fitness
- 2. Knowledge on relationship between nutrition and wellness
- 3. Insight into the relationship between physical activity, wellness and fitness

Course Out Comes

1. After studied unit-1, the student will understand and know the relationship between wellness, fitness and health.

2. After studied unit-2, the student will be able understand the concept of food, nutrients and health.

3. After studied unit-3, the student will be able to understand the concept of fitness training and foster fitness skills and gain the technical ability to run fitness centres.

4. After studied unit-4, the student will be able to gain insight on health and know how to prevent and manage lifestyle related diseases/disorders.

5. After studied unit-5, the student will gain knowledge on the stress and health management, and learn stress relaxation techniques.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT-V: (50 to 100 contents)

Teaching Hours:....

Wellness, Fitness and Health

Definition and Indicators of Health - Parameters, Components and Relationship between Wellness, Fitness and Health - Challenges and Personalized Approach.

UNIT-II: (50 to 100 contents) Teaching Hours:....

Nutrition and Health

Introduction - Food Groups, Adequate Diet, My Pyramid, Gandhian Foods For Health, Millennium Development Goals, Role of Macro and Micro nutrients - Carbohydrates, Proteins, Fats, Vitamin D, Calcium, Iron, Optimum Nutrition and Hydration for Health.

UNIT III: (50 to 100 contents)

Teaching Hours:....

Physical Activity Training

Aerobic and anaerobic training -To enhance Cardio Vascular Endurance, Flexibility and Body Composition, Measurement of PAL, Benefits of Fitness training and Gadgets for measuring PA.

UNIT - IV: (50 to 100 contents) Teaching Hours:....

Diseases due to Faulty Food Habits

Non communicable Disease conditions- Underweight, Obesity, Diabetes Mellitus, Hypertension, Cancer, Cardiovascular Disease, Anaemia.

UNIT-V: (50 to 100 contents) Teaching Hours:....

Stress and Health Management

Stress Assessment and Management Techniques-Under Weight, Overweight and Obesity, Relaxation Techniques – Yoga and Meditation for Health

Text Books

- 1. Werner W. K Hoejer, "Life time Physical Fitness and Wellness", Morton Publishing Company Colorado, 1989
- 2. Swaminathan T, "Essential of Food and Nutrition", Bangalore Printing Publishing Company, 2008.

Reference Books

- 1. William D. Mc Ardle, Frank I. Katch, Victor L. Katch "Exercise Nutrition: Energy Nutrition and Human Performance" William & Wilkin Publishing, USA, 1996.
- 2. Kathleen Mahan, Sylvia Escott Stump, "Krause"s Food and Nutrition and Diet Therapy" W.B Saunders Company, USA, 2000.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	-	S	М	-	S	М	S
CO2	S	S	S	-	S	М	-	S	М	S
CO3	S	S	S	-	S	М	-	S	М	S
CO4	S	S	S	-	S	М	-	S	М	S
CO5	S	S	S	-	S	М	-	S	М	S

PO – Programme Outcome, CO – Course outcome S – Strong, M – Medium, L – Low (may be avoided)

Semester: I	Paper type: Core Elective paper 2 (To choose 1 out of 3)
Paper code:	Name of the Paper: B. Food Hygiene and Sanitation
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

- 1. Identify the sources of food contamination.
- 2. Apply this knowledge for maintaining a sanitary environment in food industries.

Course Out Comes

- 1. Understand the national and international programmes and laws on food safety and Standards
- 2. Recognize the role of food handlers, food safety officers and health personnel
- 3. Master the standards followed for food safety
 - Appreciate the importance of personnel and environmental hygiene For hygienic practices; sanitary handling of food.

1. After studied unit-1, the student gain knowledge on deteriorative effects of micro-organism in foods and inhibition/killing of microbial growth.

2. After studied unit-2, the student will be able explain about contaminants in food products, toxicity and protection against environment.

3. After studied unit-3, the student will know to classify and select effective cleaning compounds and sanitizers.

4. After studied unit-4, the student will be able to describe cleaning steps/procedures in food processing and service industries.

5. After studied unit-5, the student will understand the significance of waste disposal, personal hygiene and sanitary handling of food.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT-I (50 to 100 contents) Teaching Hours:....

Sanitation: Definition and meaning, deteriorative effects of micro organisms- physical and chemical Changes; methods of killing micro organism- heat, chemicals and radiation; methods of inhibiting Microbial growth- refrigeration, chemicals, dehydration and fermentation.

UNIT-II (50 to 100 contents) Teaching Hours:....

Contamination of food products: Contamination of red meat, poultry and sea food during processing, Contamination of dairy products and other food; contamination of ingredients; other sources of Contamination- equipment, employees, air and water, sewage, insects and rodents;

protection against Contamination- protection against environment, protection during storage, protection against Contamination from litter and garbage, protection against toxic substances.

UNIT-III (50 to 100 contents)

Cleaning compounds: Characteristics of good cleaning compound, classification- alkaline cleaning Compound and acid cleaning compound, synthetic detergents, soaps, solvent cleaners; detergent Auxiliaries- protection and cleaning auxiliaries; scouring compounds; selection of effective cleaning Compound.

Sanitizers: Meaning, Types: thermal sanitizing, radiation sanitizing and chemical sanitizing.

UNIT-IV (50 to 100 contents) **Teaching Hours:....**

Cleaning steps in dairy industry; sanitation practices and procedures in meat processing industry; Cleaning steps in sea food plants; cleaning procedure for vegetable and fruit processing industry; Cleaning steps of a food service facility.

UNIT-V (50 to 100 contents) **Teaching Hours:....**

Waste disposal: Solid waste disposal; waste water handling- pre-treatment, primary treatment, secondary Treatment, tertiary treatment and disinfection.

Personal hygiene: Definition, need, personal hygiene and contamination of food products; requirements for hygienic practices; sanitary handling of food.

REFERENCES

- 1. Norman G. Marriott, Principles of sanitation, Van Nostrand Reinhold Company, Newyork. 1985.
- 2. Mario Stanga, Sanitation: Cleaning and Disinfection in the Food Industry, Wiley, 2010.
- 3. Y. H. Hui, L. Bernard Bruinsma, J. Richard Gorham, Wai-Kit Nip, Phillip S. Tong, Phil Ventresca, Food plant sanitation, CRC Press, 2002.
- 4. Y. H. Hui, Plant sanitation for food processing and food service, CRC Press, 2014.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	-	-	-	S	S	М	S
CO2	S	S	S	-	-	-	S	S	М	S
CO3	S	S	S	-	-	-	S	S	М	S
CO4	S	S	S	-	-	-	S	S	М	S
CO5	S	S	S	-	-	-	S	S	М	S

Mapping with Programme Outcomes

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

Teaching Hours:....

Semester: I	Paper type: Core Elective paper 3 (To choose 1 out of 3)
Paper code:	Name of the Paper: C. Food processing
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

- 1. To impart systematic knowledge of basic and applied aspects in food Processing and technology.
- 2. To optimise process parameter for consistent quality processed

Course Out Comes

1. After studied unit-1, the student gain knowledge on the principle and procedure of food processing techniques.

2. After studied unit-2, the student will be learn about cereal technology and milling process.

3. After studied unit-3, the student will have an insight on the processing of pulse, nuts and oil seed technology.

4. After studied unit-4, the student will understand the dairy technology and processing in detail.

5. After studied unit-5, the student will acquire knowledge in fruit, vegetable and fleshy food technology

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT-I (50 to 100 contents) **Teaching Hours:....**

Basic principle of food processing, Need for food processing, Basic unit operations In food processing- cleaning separating, heat exchanging, evaporation, drying, Forming, packaging and controlling. Processing techniques: Using high Temperatures, low temperatures, ionizing radiation, microwave and ohmic Processing of foods. Effect of various processing techniques on nutritive value of Foods. Manufacturing of sugar and its types.

UNIT-II (50 to 100 contents) **Teaching Hours:....**

Cereal technology: Rice- Milling, parboiling: Methods, advantages and Disadvantages, byproducts of rice milling and their utilization. Wheat: Milling Process, byproducts of wheat milling. Millets: Milling of major and minor millets. Malting and fermentation. Manufacturing of break fast cereals: Extruded products, Puffing, flaking.

Teaching Hours:.... UNIT-III (50 to 100 contents)

Pulse technology: Milling of soya bean and Bengal gram and their byproducts, Germination, fermentation, parching, popping, processed soya products. Nuts and Oil seeds: Milling,

techniques in extraction of oil, byproducts- Meal concentrates, Isolate. Speciality fats, hydrogenation, production of MCT. Fat replacers and their Uses.

UNIT-IV (50 to 100 contents) Teaching Hours:....

Dairy technology: Milk processing: Seperation, standardization, pasteurization, Homogenization, sterilization, evaporation, drying, membrane fractionation. Manufacturing of cheese, butter, khoa, yoghurt,srikhand, ice cream, condensed Milk and dry milk. Milk substitutes- Lactone, infant formula. Byproducts: Skimmed milk, lassi, butter milk, whey, ghee residue.

UNIT-V (50 to 100 contents) Teaching Hours:....

Fruits and vegetable technology: Dehydration, juice concentrate, canning of fruits And vegetables. Potato processing and its products (wafers and French fries). Fleshy food technology: Processing of fish for smoking, canning and freezing. Curing of meat, Poultry processing, Pasteurization of egg, manufacture of egg Powder and frozen egg products.

References:

- 1. Srilakshmi. B; Food Science, 6th edition, New Age International (P) Limited Publishers, 2015.
- 2. ShakunthalaManay. N; ShadaksharaSwamy.M; Foods Facts and Principles, 3rd Edition, New Age International (P) Limited Publishers, 2014.
- 3. Lillian Hoagland Meyer, Food chemistry, CBS Publishers and Distributors, 2004.
- 4. Subbulakshmi. G and Shobha. A.U; Food processing and preservation, New Age International (P) Limited Publishers, 2014.
- 5. Norman. N Potter, Joseph H. Hotchkiss, Food Science, 5th edition, CBS Publishers and Distributors, 1996.
- 6. Sivasankar. B; Food Processing and Preservation, PHI Learning Private Limited, 2011

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	М	-	М	М	М	S	S	S	S
CO2	S	М	-	М	М	М	S	S	S	S
CO3	S	М	-	М	М	М	S	S	S	S
CO4	S	М	-	М	М	М	S	S	S	S
CO5	S	М	-	М	М	М	S	S	S	S

Mapping with Programme Outcomes

PO – Programme Outcome, CO – Course outcome

S - Strong, M - Medium, L - Low (may be avoided)

Semester: I	Paper type: Open Elective Paper 1 (To choose 1 out of 3)
Paper code:	Name of the Paper: A. Culinary Skills
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

- 1. Acquire a sound foundation for healthy cooking
- 2. Select and correctly use utensils and equipment
- 3. Learn basic cooking methods

Course Out Comes

1. After studied unit-1, the student know about culinary meaning, terms and effect of cooking on food.

2. After studied unit-2, the student will acquire skill to select the required equipment for food preparations.

3. After studied unit-3, the student will be able to describe various pre-preparation procedures in cooking.

4. After studied unit-4, the student will be able to explain methods of cooking in detail.

5. After studied unit-5, the student will understand the significance of modern cooking methods.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT-I Introduction(50 to 100 contents)Teaching Hours:....Meaning of culinary, effect of cooking on food, basic culinary terms.

UNIT-II Equipment (50 to 100 contents)

Selection and use of equipments, minor equipments and major, equipments in food Preparation.

Teaching Hours:....

Teaching Hours:....

UNIT-III (50 to 100 contents) Teaching Hours:....

Pre preparation procedures - Washing, soaking, grating, kneading, fermentation, marinating, blanching, Germinating, cutting, coating, Preparation.

UNIT-IV Methods of Cooking (50 to 100 contents)

Moist heat methods- boiling, stewing, steaming, poaching, Dry heat methods-Baking, frying, grilling, roasting, toasting, Combination method- braising.

UNIT-V Modern Cooking Methods (50 to 100 contents) Teaching Hours:....

Solar cooking, microwave cooking, electrical cooking.

Text Books:

- 1. Chandrasekhar, U (2002). Food Science and Applications in Indian Cookery. Phoenix Publishing House Private limited.
- 2. Srilakshmi, B (2002). Food Science. New Age International Limited, New Delhi.

Reference Books:

- 1. Cessarani, V. Kinton, R (2002). Practical Cookery. Seventh edition. Hodder and Stoughton Publishers.
- 2. Thangam Philip (2005). Modern Cookery. Orient Longmam Limited. Third edition.
- 3. Sethi, M and Malhan, S.M (2007). Catering Management An Integrated Approach. Wiley Eastern Limited, Mumbai.

Journals:

- 1. International Journal of Food Science Research.
- 2. International Journal of Food Science and Technology.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	М	S	-	S	S	S	S	S	S
CO2	S	М	S	-	S	S	S	S	S	S
CO3	S	S	S	-	S	S	S	S	S	S
CO4	S	S	S	-	S	S	S	S	S	S
CO5	S	S	S	-	S	S	S	S	S	S

Mapping with Programme Outcomes

PO – Programme Outcome, CO – Course outcome

S-Strong, M-Medium, L-Low (may be avoided)

Semester: I	Paper type: Open Elective Paper 2 (To choose 1 out of 3)
Paper code:	Name of the Paper: B. Basics Food Science
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

1. Obtain knowledge of different food groups and their nutrient content.

2. Understand the scientific principle of food and apply it in food preparation.

3. Develop new food products ensuring food quality.

Course Out Comes

1. After studied unit-1, the student will acquire knowledge on methods of cooking, food groups, cereal and pulse cooking.

2. After studied unit-2, the student will be able learn about vegetable and fruit selection, nutritive value and cookery.

3. After studied unit-3, the student will be able to learn about egg, milk & milk products.

4. After studied unit-4, the student will be able to learn about meat, poultry and fish.

5. After studied unit-5, the student will know the significance of spices, nuts, oil seeds, fats sugars and food adulterants.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT-I Functions of food, cooking and processing of cereal and pulses

Food groups, functions of food, principles and need for cooking, water and fat as Medium of heat, merits and demerits. Germination, malting and fermentation, Fortification and enrichment. Structure and nutritive value, cooking of cereals. Nutritive value, pulse cookery and uses, toxic factors, improvement of pulse Protein quality.

UNIT -II Vegetables and Fruits

Classification, pigments, composition and nutritive value of vegetables and fruits, their selection and storage, vegetable and fruit cookery.

UNIT-III Milk and milk products and eggs

Composition, nutritive value, different types of milk and milk products, Preservation and milk cookery. Composition, nutritive value, evaluation of egg Quality and egg cookery.

Unit IV Meat, poultry and fish

Classification, composition and nutritive value, post mortem changes, aging and Tenderizing. Cooking and preservation of meat, poultry and fish.

UNIT -V Spices, nuts and oil seeds, Fats, Sugar and sugar products, food Additives and food adulterants

Classification and uses of spices and condiments, nuts and oil seeds, different Forms of sugar, stages of sugar cookery and its uses in cookery. Processing and Changes in storage and cooking, role of fat in cookery. Types and functions, different food adulterants, measures to control adulteration.

Text Books:

- 1. Chandrasekhar, U (2002). Food Science and Applications in Indian Cookery. Phoenix Publishing House Pvt ltd.
- 2. Srilakshmi, B (2002). Food Science. New Age International Limited, New Delhi.
- 3. Rajagopal, M.V., Rao, S.M., Mudambi, S.R. (2013). Food Science. Revised Second Edition. New Age International (P) Limited, New Delhi.

Reference Books:

- 1. Parker, R (2003). Introduction to Food Science. Delmer Publications, U.S.
- 2. Potter.N. and Hotchkiss.J.H (1998). Food Science. Fifth edition. CBS publication and Distributors Daryaganji, New Delhi.
- 3. Freeland-Graves, J.H and Peckham, G.C. (1996). Foundations of Food Preparation. Sixth Edition, Englewood Cliffs, N.J., Merill.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	М	S	S	S	S	М	S
CO2	S	S	S	М	S	S	S	S	М	S
CO3	S	S	S	М	S	S	S	S	М	S
CO4	S	S	S	М	S	S	S	S	М	S
CO5	S	S	S	М	S	S	S	S	М	S

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Semester: I	Paper type: Open Elective Paper 3 (To choose 1 out of 3)
Paper code:	Name of the Paper: C. Nutraceuticals
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

- 1. To learn the principle compounds available in various food groups in aiding good health.
- 2. To gain insights into the functional foods which are in nature.
 - 3. To prevent and treat diseases.
- 4. To vision the impact of globalization on health and food Products.

Course Out Comes

1. After studied unit-1, the student will gain knowledge in the history and development in the field of nutraceuticals.

2. After studied unit-2, the student will be able understand the components of functional foods and functions of nutraceuticals.

3. After studied unit-3, the student will be able to comprehend the functional components of nutraceuticals and health effects.

4. After studied unit-4, the student will be able learn the effects of nutrients in molecular level process in the body and the effect of pytochemcials in disease conditions.

5. After studied unit-5, the student will know the importance of probiotics and prebiotics, articulate and advocate the principle of nutrigenomics in controlling life style diseases.

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Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT-I (50 to 100 contents) Teaching Hours:....

Introduction to nutraceuticals

Definitions, Synonymous terms. Nutraceuticals-The link between nutrition and medicine. A brief review of historical and teleological aspects. Basis of claims for a compound as a nutraceutical and Classifying nutraceuticals.

UNIT-II Properties, structure and functions of various Nutraceuticals

Pigments,

Structural lipids

Flavor and odor compounds,

Alkaloids, Terpenoids, Glycosides, Polyphenols, Isoprenoid

Derivatives and Natural antioxidants

UNIT-III Functional components and health effects of

Soya, Olive oil, Tea, Common beans, Capsicum annum, Mustards, Ginseng, Garlic, Grape, Citrus fruits, Fish oils, Sea food.

UNIT-IV Concept and the role of nutraceuticals/functional foods

a) Nutraceuticals for

- Cardiovascular diseases, Cancer, Diabetes, Cholesterol management, Obesity, Immune enhancement and Endurance performance b) Mood disorders
- Compounds and their mechanisms of action Dosage levels and Contraindications if any etc.

UNIT -V

General idea about role of Probiotics and Prebiotics as nutraceuticals.

a) Dietary supplements-GMPS and shelf life of dietary supplements.

b) Role of changing food preferences and globalization on selection of nutraceutical products.

c) Nutrigenomics - An introduction and itsrelation to nutraceuticals

References

- 1. Mary, K. Schmidl and Theodre, P. Labuza, Essentials of Functional Foods, Culinary and Hospitality industry publication services, 2000.
- 2. Mazza, G, Functional Foods- Biochemical and processing aspects, Culinary and Hospitality industry publication services, 1998.
- 3. Robert easy Wildman, Handbook of Nutraceuticals and Functional Foods, Culinary and Hospitality industry publication services, 2001.
- 4. David, H.Watson, Performance, Functional Foods, Culinary and hospitality industry Publication services, 2003.
- 5. Chatwick, R et al., Functional Foods, Springer, 2003.
- 6. Jeffery Horst, Methods of Analysis for Functional Foods and Nutraceuticals, CRS Press, 2002.
- 7. Paresh, C. Dutta, Phytosterols as Functional Food Components and Nutraceuticals, Marcel DehkerInc, New York, 2004.
- 8. Guo M. 2009, Functional Foods Principles and technology, Wood head publishing Company, UK.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	_	S	S	М	М	М	S
CO2	S	S	S	-	S	S	М	М	М	S
CO3	S	S	S	-	S	S	М	М	М	S
CO4	S	S	S	-	S	S	М	М	М	S
CO5	S	S	S	-	S	S	М	М	М	S

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SEMESTER – II

Semester: II	Paper type: Core Paper 4
Paper code:	Name of the Paper: Essentials of Micro Nutrients
Credit: 4	Total Hours per Week:Lecture Hours:Tutorial Hours:

Course Objectives

- Gain a deeper understanding of principles of micro nutrition.
- Develop competence to carry out investigations in nutrition.
- Gain in depth knowledge of the physiological and metabolic role of Vitamins and Minerals.
- Understand the physiological actions of Vitamins and Minerals.
- Aware of the interrelationship of nutrients Macro and Micronutrients

Course Out Comes

1. After studied unit-1, the student will gain knowledge on role of fat soluble vitamins in the body and will be able to diagnose deficiency/toxicity and know the interaction with other nutrients.

2. After studied unit-2, the student will be able learn role of water soluble vitamins in the body and will be able to diagnose deficiency/toxicity and know the interaction with other nutrients.

3. After studied unit-3, the student will be able to comprehend about macro minerals and their significance in body.

4. After studied unit-4, the student will be able to learn the distribution, functions, deficiency and toxicity of micro minerals and trace minerals.

5. After studied unit-5, the student will know the importance of Homeostasis maintenance, electrolyte maintenance and water balance.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT-I: FAT SOLUBLE VITAMINS

Nomenclature, units and measurements of vitamins and factors influencing the utilization of vitamins. Vitamins A,D,E,K – Chemistry, Functions, Physiological action, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Source, RDA, Deficiency, Diagnosis of deficiency, Toxicity, Interaction of fat soluble vitamins with other nutrients. Hypo and hyper vitaminosis.

UNIT-II: WATER SOLUBLE VITAMINS

Thiamine, Riboflavin, B_{12} , Folic acid, Pyridoxine, Pantothenic acid, Niacin, Biotin, Ascorbic acid – Chemistry, Functions, Physiological action, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Source, RDA, Deficiency, Diagnosis of deficiency, Toxicity, Interaction of water soluble vitamins with other nutrients.

UNIT-III: MACROMINERALS

Calcium - Distribution in the body digestion, Absorption, Utilization, Transport, Excretion, Balance, Deficiency, Toxicity, Sources, RDA, Regulation of calcium concentration, Calcium interaction with other nutrients.

Phosphorus - Distribution, Concentration in the body, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Deficiency, Sources, Calcium: Phosphorus ratio.

Magnesium, Sulphur, Chlorine, Sodium and Potassium- Distribution, Concentration in the body, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Deficiency, Sources and RDA.

UNIT-IV: MICRO AND TRACE ELEMENTS

Microminerals: Iron, Copper, Iodine, Fluoride, Zinc and Selenium, Chromium Trace elements: Molybdenum, Manganese, Nickel, Chromium and Cadmium - Distribution in the human body, Physiological functions, deficiency, Toxicity and Sources and RDA.

UNIT- V: HOMEOSTASIS MAINTENANCE

Homeostasis- Definition, concept s and mechanism

Electrolytes- Electrolyte content of fluid compartments, Functions of electrolyte, Sodium, Potassium and chloride, Absorption, Transport and Electrolyte imbalance, Factors affecting electrolyte balance, Maintainingelectrolytes, Hydrogen ion balance, Distribution of water, Functions of water and Water balance.

REFERENCES:

- 1. Swaminathan, M. Advanced Textbook on Food Science and Nutrition, Vol:2, Second edition, Reprinted, Bangalore Printing and publishing Co Inc, Bangalore, 2012.
- 2. Gopalan, CRamasastry, B.V. and Balasubramanian, S. Nutritive Value of Indian Foods, National Institute of Nutrition, Hyderabad, 2012
- 3. Swaminathan, M. Essentials of Foods and Nutrition, Volume I and II Ganesh and Co., Madras, 2013.
- 4. Mahan, Kathleen L. Krause's Food, Nutrition and Diet Therapy, W.B.Saunder's, 11th Edition 2010
- 5. Srilakshmi. E. Nutrition Science, New Age International Publishers, 2018.
- 6. Recommended dietary intakes for Indian Indian Council of Medical Research, New Delhi, 2012.

Journals:

- Indian Journal of Nutrition and Dietetics
- American Journal of Clinical Nutrition, The American Society for Clinical Nutrition, Inc., USA.
- Annual Reports, National Institute of Nutrition, Hyderabad.
- British Journal of Nutrition, Cambridge University Press, London.
- Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	М	S	S	S	М	S	S	S
CO2	S	S	М	S	S	S	М	S	S	S
CO3	S	S	М	S	S	S	М	S	S	S
CO4	S	S	М	S	S	S	М	S	S	S
CO5	S	S	М	S	S	S	М	S	S	S

 $\begin{array}{l} PO-Programme \ Outcome, \ CO-Course \ outcome \\ S-Strong \ , \ M-Medium, \ L-Low \ (may \ be \ avoided) \end{array}$

Semester: II	Paper type: Core 5
Paper code:	Name of the Paper: Nutrition through Life Cycle
Credit: 4	Total Hours per Week:Lecture Hours:Tutorial Hours:

- 1. The computation of Recommended Dietary Allowances
- 2. Impart knowledge on the importance of nutrition during life span.
- 3. Gain knowledge about the nutritional problems and their implications
- 4. Understand the role of nutrition in different stages of life cycle.
- 5. Comprehend the nutritional requirements for special events

Course Out Comes

1. After studied unit-1, the student will acquire knowledge and compute Recommended Dietary Allowances for individuals, and know the general concepts of growth and development through life cycle.

2. After studied unit-2, the student will gain knowledge about the nutritional need and importance during pregnancy and lactation.

3. After studied unit-3, the student will acquire skill to formulate weaning foods, plan nutritious menu for infants and pre-school children, based on age/activity specific diets adequate in both quality and quantity

4. After studied unit-4, the student will be ableplan nutritious menu for school going children and adolescents and also understand and tackle age specific food related problems and eating behaviours

5. After studied unit-5, the student will understand the significance of nutrition during adulthood and elderly and also acquire skill to modify diet for the elderly based on their health problems.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT-I: RECOMMENED DIETARY ALLOWANCES

Recommended allowances - RDA for Indians, basis for requirement, computation of allowance based on energy expenditure, components of energy expenditure. General concepts about growth and development through different stages of life.

UNIT-II : NUTRITION DURING PREGNANCY AND LACTATION

Nutrition in Pregnancy

Stages of gestation, maternal weight gain, complications of pregnancy, maternal physiological changes and adjustments, nutritional problems and dietary management based on RDA for foods and nutrients, importance of nutrition during and prior to pregnancy, teenage pregnancy - nutritional problems and dietary management, planning a menu.

Nutrition during Lactation

Physiology of lactation, hormonal control and reflex action, efficiency of milk production, factors influencing volume and composition of breast milk, nutritional concerns during lactation, special foods during lactation, dietary modification, planning a menu.

UNIT-III : NUTRITION IN INFANCY AND PRESCHOOL CHILDHOOD

Nutrition in Infancy

Infant feeding, nutritional needs, premature infant and their feeding, weaning foods, Feeding problems, infant formulae lactose intolerance, planning menu. Nutrition in Pre-school - Physiological development related to nutrition, feeding problems, behavioural characteristics, nutritional requirement and planning diet.

UNIT-IV : NUTRITION IN SCHOOL GOING YEARS AND ADOLESCENCE

Nutrition in school children - feeding school children and factors to be considered. Planning a menu, feeding problems, packed lunch.

Nutrition during Adolescence - changes in growth and development, hormonal influences, Age at menarche - factors affecting age at menarche, psychological problems, body image, disordered eating behaviour, nutritional and menstrual problems, planning a menu.

UNIT-V : NUTRITION IN ADULTHOOD AND ELDERLY

Nutrition in Adult and Elderly

Nutrition and work efficiency, Nutritional care and support for Menopausal and Post-Menopausal women, hormonal changes, and planning a menu.

Physiological changes in aging - Psycho-social and economic factors affecting eating behaviour, knowledge and belief, institutionalization, common health problems, nutritional requirement, modification in diet, modification of diet for elderly.

REFERENCES:

- 1. Swaminathan, M. Advanced text book on Food and Nutrition, , Anmol Publication Pvt, Ltd, Second Edition. 2014.
- 2. Gopal,C.Kamalakrishnaswamy, Nutrition in Major Metabolic Disease, Oxford India Paper backs Publisher First Edition 2000.
- 3. Srilakshmi, B. Nutrition Science, New Age International [p] ltd, New Delhi, 2018.
- 4. MahtabS.Bamji, Prasad Rao, N.Vinodini Reddy. Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt .Ltd, Second Edition, 2013.
- 5. Sumati. R. Mudambi, M.V Rajagopal., Fundamentals of Foods & Nutrition, 4th Edition New age International publishers New Delhi, 2006.
- 6. Melvin H. Willams., Nutrition for health fitness & Sport. 5th edition Mcgraw –Hill, publishing Co., 1999.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	М	S	S	М	S	S	S
CO2	S	S	S	М	S	S	М	S	S	S
CO3	S	S	S	М	S	S	М	S	S	S
CO4	S	S	S	М	S	S	М	S	S	S
CO5	S	S	S	М	S	S	М	S	S	S

 $\begin{array}{l} PO-Programme \ Outcome, \ CO-Course \ outcome \\ S-Strong \ , \ M-Medium, \ L-Low \ (may \ be \ avoided) \end{array}$

Semester: II	Paper type: Core 6
Paper code:	Name of the Paper: Food Microbiology
Credit: 4	Total Hours per Week:Lecture Hours:Tutorial Hours:

- 1. Learn about the morphology of different microorganisms.
- 2. Study various types of food spoilage ,poisoning and infection caused by microorganism caused by microorganism
- 3. Acquire knowledge and understand the relevance of microbiology and its application in food industry.
- 4. Gain knowledge about food additives and contaminants
- 5. Understand the importance of food safety and quality management in food processing.

Course Out Comes

1. After studied unit-1, the student gain knowledge to classify and understand the general morphology of microorganisms.

2. After studied unit-2, the student will be able understand the significant role of micro-organisms in food, soil and human body.

3. After studied unit-3, the student will be able to enumerate about food poisoning, food born hazards and food intoxication of microbial origin to ensure food safety.

4. After studied unit-4, the student will be able to learn about the principles of preservation by high and low temperature, and new trends in preservation.

5. After studied unit-5, the student will gain knowledge in Sterilization byPhysical agents, types of sterilization, Microbiology of water, bacterial examination for water and water treatment

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	No
4	Yes	Yes	Yes	Yes	Yes	No
5	Yes	Yes	Yes	Yes	Yes	No

Matching Table (Put Yes / No in the appropriate box)

UNIT-I (50 to 100 contents) Teaching Hours:....

Types and Classification of microorganism, and important micro-organisms in foods, morphology of yeast, mould, bacteria, virus, algae and protozoa.

UNIT-II

Micro-organisms and food: Their primary sources in foods, cultural characteristics and biochemical activities. Airborne bacteria, fungi Microorganisms found in soil Normal flora of skin, nose, throat, GI tract

UNIT-III

Food in relation to disease - food borne diseases, food infection, intoxication, microbial toxins - types, bacterial poisoning and infection - causative agents and sources, symptoms and prevention of Staphylococcal food poisoning, botulism, salmonella, bacillus infection, E.coli, food poisoning of fungal origin - ergotism, aflatoxin.

UNIT-IV

Control of microorganism - Principles of preservation, General principles underlying spoilage of foods. Preservation by high and low temperature, chemical preservatives, salt, sugar as preservative, new trends in preservation.

UNIT-V

Sterilization by Physical agents - Heat, moist heat, fractional sterilization, pasteurization, other types of sterilization, chemical sterilization. Microbiology of water, typical organisms in water, types of bacterial examination for water, water treatment.

REFERENCES:

- Pelczar, M.I and Reid, R.D, Microbiology, MC Graw Hill Book Company, New York, 5th edition, 1993.
- 2. Atlas M.Ronalds , Principles of Microbiology, 1st edition, Mosby year book Inc, Missouri, U.S.A, 1995.
- 3. Frazier, W.C, Food Microbiology, MC Graw Hill Inc 4th edition, 1988.
- 4. Banwart, Basic Food Microbiology, 2nd edition CBS Publisher, 1989.
- 5. Bensaon, H.J, Microbiological applications, C. Brown publishers, U.S.A, 1990.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	-	М	М	М	S	S	S
CO2	S	S	S	-	М	М	М	S	S	S
CO3	S	S	S	-	М	М	М	S	S	S
CO4	S	S	S	-	М	М	М	S	S	S
CO5	S	S	S	-	М	М	М	S	S	S

PO – Programme Outcome, CO – Course outcome S – Strong, M – Medium, L – Low (may be avoided) Semester: II Paper type: Core Practical 1

Paper code: Name of the Paper: Advanced Food Science & Essentials of Macronutrients

Credit: 4 Total Hours per Week:

Course Objectives:

- Understand the physio-chemical changes in foods with the effect of cooking
- Develop skill to explore the microscopic structural changes in starch and sugar crystals
- Develop skills to prepare recipes based on the physio-chemical changes in foods
- Understand the effect of acid, alkali and heat on the cooking of pulses, vegetables and meat.

Course Outcomes:

- Develop the culinary skills in the preparation of recipes and different stages of sugar cookery
- Demonstrate the effect of fermentation of batter
- Recognize the reactions of food components due to the effect of acid, alkali and heat on the cooking of pulses, vegetables, egg and meat
- Apply the knowledge and skill to identify the microscopic structures of starch and sugar crystals.
- 1. Cereal cookery Preparation of rice based products Idli, Dosai and Appam to study the effect of fermentation and soaking.
- 2. Preparation of wheat based products Chappathi, phulkas, poories with different proportion of wheat flour study the development of gluten.
- 3. Pulse cookery Effects of soaking, acid, alkali and sprouting and different methods of cooking on cooking time and quality of pulses.
- 4. Vegetable cookery Effect of acid, alkali and methods of cooking on pigments present in vegetables.
- 5. Fruits- determination of strength of pectin.
- 6. Egg, meat, fish, poultry Methods of cooking on acceptability of the various fleshy foods preparation, foam formation and factors affecting foam formation. Effect of cooking temperature and methods on colour, texture of tender and tough cuts of meat.
- 7. Fats and oils Smoking point of different fats and oils Determination of optimum temperature for frying of different oils, factors affecting fat absorption.
- 8. Sugar cookery Stages of sugar cookery, use of sugar in Indian recipes. Crystallization and factors affecting crystallization.

ESSENTIALS OF MACRO NUTRIENTS

(Processed and unprocessed sample)

- 1. Qualitative analysis Identification of pentoses, hexoses, Dextrin, starch, glycogen present in the given solution.
- 2. Quantitative analysis

- a. Estimation of fat by Soxhlet method
- b. Estimation of Total protein by Microkjeldhal method
- c. Extraction of lipids from egg yolk
Semester: II Paper type: Core Practical 1I

Paper code: Name of the Paper: Essentials of Micronutrients& Nutrition Through Life Cycle

Credit: 4 Total Hours per Week:

Course Objectives:

- To know analytical techniques in quantitative estimation of nutrients
- To plan, prepare and evaluate a day's diet for various age groups
- 1. Preparation of ash solution.
- 2. Estimation of calcium in foods.
- 3. Estimation of phosphorus in foods.
- 4. Estimation of iron in foods.
- 5. Estimation of ascorbic acid in foods by dye method.
- 6. Estimation of thiamine in food by fluorimetry.

NUTRITION THROUGH LIFE CYCLE

- A. Menu planning, Preparation and Presentation of a day's menu for
 - 1. Pregnant woman
 - 2. Lactating mothers
 - 3. Infants ages 9 months
 - 4. Pre-schools children
 - 5. School going children
 - 6. Adolescents
 - 7. Adult of different working category
 - 8. Elderly

Semester: II	Paper type: Core Elective Paper 2 (To choose 1 out of 3)
Paper code:	Name of the Paper: A. Food Standard and Quality Control
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

Course Objectives

- 1. Study about the control of quality and use of additives.
- 2. Gain Knowledge on standards for food quality and food laws.
- 3. Know about food safety measures and food labelling.

Course Out Comes

1. After studied unit-1, the student gain knowledge on he control of food quality and use of food additives.

2. After studied unit-2, the student will acquire knowledge on the standards for food quality and on food laws and food adulteration.

3. After studied unit-3, the student will acquire skill to determine the quality of foods through subjective and objective methods.

4. After studied unit-4, the student will be ableto discuss food safety measures, risks and hazards associated with adulterated foods.

5. After studied unit-5, the student will understand the significance of food labelling, food packagingmerits and demerits.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT-I (50 to 100 contents) Teaching Hours:....

Principles of Quality control of food –Raw material, processed and finished product Inspection. Leavening agents – classification, uses and optimum levels. Food additives – Preservatives, colouring, flavouring, sequestering agents, emulsifiers and antioxidants.

UNIT-II (50 to 100 contents) Teaching Hours:....

Standardisation systems for quality control of foods-National and International Standardization system, Food grades, Food laws-compulsory and voluntary standards. Food Adulteration – Common adulterants in foods and tests to detect common adulterants.

UNIT-III (50 to 100 contents) Teaching Hours:....

Methods for determining quality – Subjective and objective methods. Sensory assessment of Food quality-appearance, colour, flavour, texture and taste, different methods of sensory Analysis, preparation of score card, panel criteria, sensory evaluation room.

UNIT-IV (50 to 100 contents) Teaching Hours:....

Food safety, Risks and hazards: Food related hazards, Microbial consideration in food safety, HACCP-principles and structured approach. Chemical hazards associated with foods. FSSAI

UNIT-V (50 to 100 contents) Teaching Hours:....

Principles of labelling, nutrition labelling, Food packaging- principles, functions and types (metal, glass and flexible films), merits and demerits of packaging materials.

Text Books:

- 1. Roday, S. (2011) Food Hygiene and Sanitation, 2nd Edition, Mac Grawhill Publication New Delhi.
- 2. Joshi, S.A. (2010) Nutrition and Dietetics with Indian Case Studies. Tata McGraw Hill Education Pvt. Ltd., Mumbai.
- 3. Manay, S.N. and M. Shadaksharawamy, 2001. (Eds) Foods, Facts and Principles. 3rd Edition, New Age International. New Delhi.
- 4. Begum, R. (2006) A Textbook of Foods, Nutrition and Dietetics. Sterling Publishers Pvt. Ltd. New Delhi.

Reference Books:

- 1. Mudambi, S.R. and M.V. Rajgopal 2006. Fundamentals of Foods and Nutrition. Wiley Eastern Ltd.
- 2. Vijaya Ramesh, Food Microbiology, MJP Publications, 2007.
- 3. David, A. Shapton, and Naroh F. Shapton (2011) Principles and Practices for the Safe Processing of Foods, Heineman Ltd., Oxford.

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	М	S	S	S	S	М	S
CO2	S	S	S	М	S	S	S	S	М	S
CO3	S	S	S	М	S	S	S	S	М	S
CO4	S	S	S	М	S	S	S	S	М	S
CO5	S	S	S	М	S	S	S	S	М	S

Mapping with Programme Outcomes

PO – Programme Outcome, CO – Course outcome

S - Strong, M - Medium, L - Low (may be avoided)

Semester: I1	Paper type: Core Elective Paper 2
Paper code:	Name of the Paper: B. Hospital Food Service
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

Course Objectives

- 1. Understand the principles of planning, organizing and controlling hospital food service.
- 2. Develop skills in meal planning, production and service.
- 3. Understand the principles of sanitation and hygiene.

Course Out Comes

1. After studied unit-1, the student will understand about the principles and types of food service in hospitals.

2. After studied unit-2, the student will be able to plan a layout and design a perfect kitchen and storage area.

3. After studied unit-3, the student will know about purchasing foods, receiving and storage, and food production on a hospital.

4. After studied unit-4, the student will acquire knowledge on the principles and techniques of management, leadership and managerial abilities in a hospital and dietary.

5. After studied unit-5, the student will know about accounting and book keeping in a hospital/dietary.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT I (50 to 100 contents) Teaching Hours:....

Types of service in hospitals – Food service definition and its types, equipment used for serving the food in hospitals.

UNIT II (50 to 100 contents) Teaching Hours:....

Physical requirements: Kitchen area – Size and type of kitchen, design of kitchen, Ventilation, lighting, flooring, carpets, wall covering and sample layout of kitchen. Storage area –Equipment – Equipment required.

UNIT III (50 to 100 contents) Teaching Hours:....

Purchasing – Meaning of purchase and buying methods.

Receiving & Storing – Importance of receiving raw materials.

Production – Menu planning for patients and process of food production. Holding of foods – methods.

UNIT IV (50 to 100 contents) Teaching Hours:....

Management – Definition, principles and techniques of effective management, Leadership and managerial abilities (in a hospital & dietary).

Tools of management – organisational chart of the food service team of the hospital.

UNIT V (50 to 100 contents) Teaching Hours:....

Accounting – Definition and principles. Journal and ledger. Book of account – Cash Book, purchase book, sales book, purchase returns & sales returns book.

Reference Books:

- 1. Sethi M and Mahan S.-Catering Management an integrated approach, 2006, 2nd edition, John Wiley & Sons, New York.
- 2. Tersel MC and Harger Profession food preparation, John wiley& Sons, New York.
- 3. Joan C Boason , Lennox M.-Hotel, hostel & hospital housekeeping , 2004, 5th edition, Book Power publishers, New York.
- 4. Mcswane D, Linton R Essentials of food safety & sanitation, 1998, Prentice hall international, London.

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	-	-	М	М	S	S	S
CO2	S	S	S	-	-	М	М	S	S	S
CO3	S	S	S	-	-	М	М	S	S	S
CO4	S	S	S	-	-	М	М	S	S	S
CO5	S	S	S	-	-	М	М	S	S	S

Mapping with Programme Outcomes

PO – Programme Outcome, CO – Course outcome

S-Strong, M-Medium, L-Low (may be avoided)

Semester: II	Paper type: Core Elective Paper 3
Paper code:	Name of the Paper: C. Textiles and clothing in human care
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

Course Objectives

1.To enable students gain knowledge on fibre and yarn.

2. To familiarise with fabric construction.

3. To apprehend on care and maintenance of fabrics.

Course Out Comes

1. After studied unit-1, the student gain knowledge to classify fibres, identify and explain its properties.

2. After studied unit-2, the student will can assess the types and properties of yarns and state their uses.

3. After studied unit-3, the student will be able to compile the fabric construction techniques.

4. After studied unit-4, the student will be able to describe the process and agents in stain removal.

5. After studied unit-5, the student will know to determine the laundering procedures for various fabrics

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT I (50 to 100 contents)

Teaching Hours:....

Fibre Types

Natural -cotton, flax/Linen, Jute, Ramie, Hemp

Manmade – cellulosic, manmade synthesized fibre, mineral and

Elastomeric

Processing and manufacture of fibres

Properties – Physical and Chemical

Fiber identifications -visual inspection, burning test, microscope test, Soluble test

Applications of fibres.

UNIT II (50 to 100 contents)

Yarn-Definition

Teaching Hours:....

Classification –simple and complex Testing and Identification of yarn Yarn twist Uses of yarn in various fabrics.

UNIT III (50 to 100 contents)

Fabric construction-Definition

Types -woven, non-woven, knitted

Construction techniques

Merits and demerits

UNIT IV (50 to 100 contents)

Stain removal and its techniques

Solvents – Oxidizing solvents, Reducing solvents, Lacquer solvents, Inert solvents, Detergents, Acids, Alkalis

Application of solvents

Types of stains and removal- Dye stains, Protein stains, combination Stains, Dairy product stains, fruit stains, mud stains, coffee stains.

UNIT V (50 to 100 contents) Teaching Hours:....

Laundering and Laundering Agents

Laundering - Types, Principles, methods and process

Laundering agents -Stiffening agents, Bleaching agents, Fabric

Softeners Dry cleaning -Procedure, advantages and disadvantages

REFERENCES

- 1. Branson, Joan C & Lennox, Margaret-Hotel, hostel and hospital housekeeping, 1973 Edward Arnold, London.
- 2. DeepaliRastogi and Sheetal Chopra -Textile Science, 2017, Orient Blackswan Private Limited.
- 3. SeemaSekhri Textbook of Fabric science, second edition, 2016,Prentice hall India learning Private Ltd Reference Books:

Text Books:

- 1. Bev Ashford Fibers to fabrics, 2016, AuthorHouseUK.
- 2. Premony Ghosh- Fibre science and Technology, 2003, McGraw Hill Education

Teaching Hours:....

Teaching Hours:....

3. PremlataMullick-Text book of home science, 2000, Kalyani Publisher.

Web Resources:

- 1. <u>http://textilelearner.blogspot.com/2011/10/textile-ebooks-free-</u> <u>download-html</u>
- 2. https://www.textilemates.com

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	-	S	-	-	-	-	S	М	S
CO2	S	-	S	-	-	-	-	S	М	S
CO3	S	-	S	-	-	-	-	S	М	S
CO4	S	-	S	-	-	-	-	S	Μ	S
CO5	S	-	S	-	-	-	-	S	М	S

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

Semester: II	Paper type: Open Elective Paper 2 (To choose 1 out of 3)
Paper code:	Name of the Paper: A. Bakery science
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

Course Objectives

- 1. Understand the science and technology of baking
- 2. Understand the role of different ingredients in baking
- 3. Develop skills in planning and maintenance of a bakery institution

Course Out Comes

1. After studied unit-1, the student gain knowledge on baking and demonstrate the safe operation, cleaning, maintenance and storage of baking equipment and utensils.

2. After studied unit-2, the student will be learn about the ingredients and their role baking.

3. After studied unit-3, the student will gain knowledge on the appropriate preparation, mixing, makeup, baking, decorating and presenting of baked products.

4. After studied unit-4, the student will develop skill to decorate baked foods.

5. After studied unit-5, the student will acquire skill to plan and design a baking unit and know appropriate sanitation, health and safety practices and packaging of bakery products.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	X 7	X 7	\$7	\$7	37	37
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Ves	Ves	Ves	Vec	Ves	Ves
2	105	105	105	105	1 05	105
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT I (50 to 100 contents) Teaching Hours:....

Baking - Definition, Principles of baking, classification of baked foods. Types of equipment's in baking industry, cleaning and sanitizing methods of baking equipment's, baking. Temperature of different products, operation techniques of different baking equipment's.

UNIT II (50 to 100 contents) Teaching Hours:....

Ingredients and Their Role in Baking - Flour, Yeast, sugar, egg, butter, salt, baking powder, Colouring, flavouring agents. List of standard colouring and flavouring agents.

UNIT III (50 to 100 contents) Teaching Hours:....

Preparation of baked foods - Quick breads, cakes and its varieties, different types of biscuits, Cookies and pastries.

UNIT IV (50 to 100 contents) Teaching Hours:....

Decoration of baked foods – Icing- Types of Icing used in different bakery product. Role of Other ingredients used in icing.

UNIT V (50 to 100 contents) Teaching Hours:....

Baking unit/ plant layout and design of a baking unit sanitation and hygiene. Types of Packaging materials used for bakery products, method of packaging.

Text Books:

- 1. Potter M, N. and Hotchkiss, J.H. (1998) Food Science 5th edition, CBS Publications and Distributors, Daryaganji, New Delhi.
- 2. Dubey, SC, (1979) Basic Baking Science and Craft, Jwalmukhi Job Press, Bangalore.

Reference Books:

- 1. Baker"s Handbook on practical Baking .Wheat Associates, USA, New Delhi.
- 2. Modern Pastry Chab, Vol.I and II, A VI Publishing Co., Inc., West Port, Connecticut, 1977.

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	М	S	-	-	-	S	S	М	S
CO2	S	М	S	-	-	-	S	S	М	S
CO3	S	М	S	-	-	-	S	S	М	S
CO4	S	М	S	-	-		S	S	М	S
CO5	S	М	S	-	-	-	S	S	М	S

Mapping with Programme Outcomes

PO - Programme Outcome, CO - Course outcome S - Strong, M - Medium, L - Low (may be avoided)

Semester: II	Paper type: Open Elective Paper 2 (To choose 1 out of 3)
Paper code:	Name of the Paper: B. Home scale preservation of Fruits and Vegetables
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

Course Objectives

- 1. Understand the methods of food preservation and apply the knowledge in improving the quality of the preserved foods
 - 2. Gain knowledge related to sugar, salt and chemicals as a preservative and learn the importance of moisture removal and fermentation in home scale preservation
 - 3. Become as an entrepreneur in small scale food industries.

Course Out Comes

1. After studied unit-1, the student willgain knowledge on the principles of food preservation, importance and methods of food preservation and food spoilage.

2. After studied unit-2, the student will gain expertise to preserve fruits using sugars.

3. After studied unit-3, the student will gain expertise to prepare and preserve dehydratedfoods at home scale level

4. After studied unit-4, the student will gain expertise to preserve fruits and vegetables using chemicals and salts.

1. 5. After studied unit-5, the student will acquire skill to excel in the field of food preservation by applying fermentation techniques.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	No
4	Yes	Yes	Yes	Yes	Yes	No
5	Yes	Yes	Yes	Yes	Yes	No

Matching Table (Put Yes / No in the appropriate box)

UNIT - I Introduction to Food Preservation (50 to 100 contents) Teaching Hours:....

Basic Principles of Food Preservation, Types of Spoilage, Importance of Food Preservation Different Methods of Food Preservation

UNIT - II Preservation by using Sugar (50 to 100 contents) Teaching Hours:....

Sugar concentrates, Preparation of Jam, Jelly, Marmalades, Preserves, Candied, Glazed, Crystallized Fruits, FPO Specification, Problems Encountered, Spoilages

UNIT-III Preservation by Removal of Moisture (50 to 100 contents) Teaching Hours:....

Sun drying, Drying, Dehydration, Method of Drying, Preparation of Vegetable

Vathals - Ladies Finger, Brinjal, Beans, Cluster Beans, Preparation of

Vadams - Rice vadam, Sago Vadam, Rice Flakes Vadam, TomotoVadam

UNIT-IV Preservation by using Chemicals and Salts (50 to 100 contents) Teaching Hours:....

Chemical Preservatives - Definition, Types of Preservatives, Preparation and Preservation of

Fruit Juices, Picking - Principles Involved, Process, Types

Preparation of Various Types of Pickles – Lime, Mango, Ginger, Capsicum, Mixed Vegetables, Brinjal, Onion, Garlic

UNIT- V Fermentation (50 to 100 contents) Teaching Hours:....

Definition, Types of Fermentation, Common Fermented Foods - Cheese Making, Dokhla, Wine

Text books:

- 1. Adams, M.R. and Moss, M.O. (2005) Food Microbiology, New Age International (P) Ltd., New Delhi,.
- 2. Usha Chandrasekhar, (2002)Food Science and Applications in Indian Cookery, PhoenixPublishing House Pvt. Ltd., New Delhi.
- 3. Srilakshmi, B.(2013) Food Science, New Age International (P) Ltd., New Delhi.

Reference Books:

1. Fellows, P. (2000) Food Processing Technology, Principles and Practice, 2nd Edition,

CRC Press, Woodland Publishing Ltd., Cambridge, England,

- 2. Sommers, C.H. and Xveteng Fan, (2006) Food Irradiation Research and Technology, Blackwell Publishing, 2006.
- 3. Swaminathan, M. Food Science, Chemistry and Experimental Foods, Bappco Publishers2013.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	М	М	-	-	-	S	S	М	S
CO2	S	М	М	-	-	-	S	S	М	S
CO3	S	М	М	-	-	-	S	S	М	S
CO4	S	М	М	-	-	-	S	S	М	S
CO5	S	М	М	-	-	-	S	S	М	S

PO – Programme Outcome, CO – Course outcome

S - Strong, M - Medium, L - Low (may be avoided)

Semester: II	Paper type: Open Elective Paper 2 (To choose 1 out of 3)
Paper code:	Name of the Paper: C. Lifestyle practices
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

Course Objectives

- 1. Recollect the developmental stages of human beings and the importance of nutrition
- 2. Collate the influence of lifestyle on health status.
- 3. Learn healthy life style practice

Course Out Comes

Course Outcomes:

- 1 Plan a balanced diet.
- 2 Distinguish between healthy and unhealthy life style practices.
- 3 Correlate life style practices with health outcomes.
- 4 Practice and promote healthy life style practices.

1. After studied unit-1, the student willrelate to the nutritional requirement for various stages of life and plan a balanced diet.

2. After studied unit-2, the student will acquire knowledge on healthcare during pregnancy and lactation.

3. After studied unit-3, the student will learn about healthcare during infancy and early childhood

4. After studied unit-4, the student will know about healthcare during school going and adolescence.

5. After studied unit-5, the student will gain knowledge on health care during adulthood and old age.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	No
-						

UNIT-I (50 to 100 contents)

Teaching Hours:....

Introduction

Balanced diet, food groups, menu planning objectives of menu planning, steps in menu planning, association between health and lifestyle.

UNIT-II (50 to 100 contents)

Healthcare in pregnancy and lactation

Stages of pregnancy, nutrition during pregnancy, lactation process, nutritional needs during lactation. Dietary guidelines during pregnancy and lactation.

UNIT-III (50 to 100 contents) Teaching Hours:....

Healthcare during infancy and early childhood

Nutritional needs, importance of breast feeding, supplementary foods and nutritional requirements for infancy and childhood.

UNIT-IV (50 to 100 contents) Teaching Hours:....

Healthcare during School going and Adolescence

Growth pattern, nutritional needs, importance of healthy snacking, correct food choices, dietary guidelines.

UNIT V- (50 to 100 contents) Teaching Hours:....

Healthcare in adulthood and old age

Lifestyle and degenerative diseases. Nutritional requirements and healthy lifestyle practices for adult and elderly.

Text Books:

1. Garrow, J.S, James, W.P.T and Ralph, A (2000). Human Nutrition and Dietetics. Churchill Livingston.

2. Robinson, B.W. Williams, S.R (2000). Nutrition through lifecycle. McGraw hill higher education, New York.

3. Drummond, K.E and Brefere, L.M (2004). Nutrition for food service and culinary professionals. John wiley and sons, New York.

Reference Books:

1. Mahan, L.K and stump. S.E (2004). Krause"s, Food nutrition and Diet therapy.W.B.Saunders co.

2. Nutrition Dietician and Health Management, Air Cmde.L.K.Sharma, 1st edition,2012. Published by Surendrapublictions.

3. Nutrition of child, pregnant and lactating mother, Anupama Rani,1st edition, 2010 published by Sonali publications.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	-	S	М	М	S	S	S
CO2	S	S	S	-	S	S	М	S	S	S
CO3	S	S	S	-	S	S	М	S	S	S
CO4	S	S	S	-	S	S	М	S	S	S
CO5	S	S	S	-	S	S	М	S	S	S

PO – Programme Outcome, CO – Course outcome S – Strong, M – Medium, L – Low (may be avoided)

Teaching Hours:....

SEMESTER – III

Semester: III	Paper type: Core 7
Paper code:	Name of the Paper: Nutritional Biochemistry
Credit: 4	Total Hours per Week:Lecture Hours:Tutorial Hours:

Course Objectives

- 1. Understand the involvement of enzymes and co-enzymes involved in biological oxidation.
- 2. Learn the various metabolic cycles of nutrients.
- 3. Analyze the significance of biochemical findings.
- 4. Obtain in depth knowledge in biochemistry of major nutrients and their metabolic pathways.
- 5. Understand the role of nutritional biochemistry in health and diseases.

Course Out Comes

1. After studied unit-1, the student will know the biochemical activity of enzymes and co-enzymes, biological oxidation process and its related diseases.

2. After studied unit-2, the student will be able explain carbohydrate metabolism with bioenergetics and disorders of the metabolism.

3. After studied unit-3, the student will be able to gain knowledge on lipid biosynthesis, metabolism, energetics and disorders of lipoprotein metabolism.

4. After studied unit-4, the student will be able to describe protein metabolism and disorders of aminoacid metabolism.

5. After studied unit-5, the student will be able to understand nucleic acid metabolism and disorders, and learn about the functional test to determine health status.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	No
4	Yes	Yes	Yes	Yes	Yes	No
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT-I : BIOLOGICAL OXIDATION (50 to 100 contents)

Enzymes and co-enzymes involved in oxidation and reduction, respiratory chain, phosphates in biological oxidation and energy capture, components and role of respiratory chain and mechanism of oxidative phosphorylation ,inhibitors, uncouplers and mitochondrial disease.

UNIT-II:

METABOLISM OF CARBOHYDRATE (50 to 100 contents)

Glycolysis, Gluconeogenesis, TCA cycle, HMP shunt, glycogen metabolism, bioenergetics, disorders of carbohydrate metabolism –fructosuria, galactosemia, glycogen storage disease, pentosuria, abnormal level in blood glucose.

UNIT-III:

METABOLISM Of LIPID(50 to 100 contents)

Biosynthesis and oxidation of saturated and unsaturated fatty acids, glycerides, phospholipids and cholesterol, bioenergetics, lipoproteins and their significance, metabolism and disorders of lipoprotein metabolism.

UNIT-IV:

METABOLISM OF PROTEIN AND AMINOACID (50 to 100 contents) Teaching Hours: ...

Biosynthesis of protein, general catabolism of aminoacids, glucogenic and ketogenicaminoacids, deamination, transamination, urea cycle, disorders of aminoacid metabolism - phenyl ketonuria, cystinuria, albinism, alkaptonuria, maple syrup disease.

UNIT-V:

METABOLISM OF NUCLEIC ACIDS (50 to 100 contents)

Biosynthesis and degradation of purine and pyrimidine nucleotides, DNA replication and repair, biochemical importance of cyclic AMP. Disorders of purine and pyrimidine metabolism - gout, aciduria, xanthinuria, lesch-nyhann syndrome. Structure and properties of DNA, RNA - mRNA, tRNA, rRNA. Functional tests - Gastric, liver, renal and endocrine.

Text book:

- 1. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W.(2000): 25th Ed. Harpers Biochemistry.Macmillan worth publishers.
- 2. Deb, A.C. (2012), Fundamentals of Biochemistry, New Central Book Agency (P)Ltd.
- 3. Nelson, L. and Michael.M.Cox. (2015), Lehninger Principles of Biochemistry, 4th Edition, W.H. Freeman and Company, NewYork.
- 4. Palmer, T. (1995), Understanding enzymes, 4th Edition, Prentice Halls, Ellis Horwood, London.
- 5. Nelson, D.L. and Cox, M.M.(2000): 3rd Ed. Lehninger's principles of Biochemistry, Macmillan worth publishers.
- 6. U. Satyanarayan(2006). Biochemistry, New Central Book Agency (pvt) ltd, Edition 3.
- 7. J.L. Jain(2004).Fundamentals Of Biochemistry (Multi Colour Ed), S Chand publisher, 6th Edition.
- 8. Murray, R K., Granner, D K., Mayes, P A and Rodwell, V W (2012):29th Ed Harper's illustrated Bio-Chemistry. Lange Medical book.

Reference Book:

- 1. West, E.S., Todd, W.R., Mason, H.Sand and Van Brugge, T.J. (1966), Biochemistry, 4th edition, The Macmillan Company, London.
- 2. Delvin, T.M.(1997): 4th Ed. Text Book of Biochemistry with clinical correlations, Wiley Liss Inc.

Teaching Hours: ...

Teaching Hours: ...

Teaching Hours:....

Teaching Hours: ...

- 3. Stryer, L. (1998): 4th Ed. Biochemistry, WH Freeman and Co. 5. Conn, E.E., Stumpf, P.K., Bruening, G. NS Doi, R.H.(2001): 5th Ed. Outlines of Biochemistry, John Wiley and Sons.
- 4. Voet, D. Voet, J.G and pratt, C.W.(1999): Fundamentals of Biochemistry .
- 5. Oser, B.L., (1965) 14th ed. Hawk's Physiological Chemistry. Tata McGraw Hill Pub.Co. Ltd.

Journals:

- 1. Current Science
- 2. Indian Journal of Biochemistry and Biophysics
- 3. Metabolism-clinical and experimental

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	М	S	М	-	-	-	S
CO2	S	S	S	S	S	S	-	-	-	S
CO3	S	S	S	S	S	S	-	-	-	S
CO4	S	S	S	S	S	S	-	-	-	S
CO5	S	S	S	S	S	S	-	-	-	S

PO – Programme Outcome, CO – Course outcome

S - Strong, M - Medium, L - Low (may be avoided)

Semester: III	Paper type: Core 8
Paper code:	Name of the Paper: Research Methodology and Applied Statistics
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

Course Objectives

- 1. Understand the fundamental principles and techniques of methodology concerning research.
- 2. To use effective tools and techniques to collect research data, organize them appropriately for facilitating further analysis.
- 3. Learn the applications of statistics in research.
- 4. Apply statistical procedure to analyse numerical data and interpreting data meaningfully.
- 5. Develop skills in writing a research report and formatting of thesis writing.

Course Out Comes

1. After studied unit-1, the student will understand research, learn the types of data and tools for collecting research data.

2. After studied unit-2, the student will learn about sampling design, types, techniques and errors.

3. After studied unit-3, the student will be able to gain knowledge on classification and representation of data.

4. After studied unit-4, the student will be able to assess numerical data for providing statistical evidences to support the research results.

5. After studied unit-5, the student will be able to interpret data with statistical evidences and draft research/format thesis writing/dissertation.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT-I (50 to 100 contents)

Teaching Hours: ...

Meaning of research, Types of research, Objectives of research, Research process. Collection of Data -Methods of collecting data. Primary and Secondary data - Sources of Primary and Secondary data, Editing the data and precautions used in the use of data. Different types of research tools for collecting research data, defining and determining a problem.

UNIT-II (50 to 100 contents)

Teaching Hours: ...

Teaching Hours: ...

Teaching Hours: ...

Sampling Design - Census and sampling survey, Different types of sampling techniques - Probability and non-probability, size of the sample, Merits & Demerits of each sampling method, Sampling errors and methods of Reducing the error.

UNIT-III (50 to 100 contents)

Classification and Tabulation of Data - Meaning, Objective, Types of Classification, Formation of frequency distribution, Tabulation of data - Schemes general rules, Types of tables and preparation of tabular forms. Representation of data - Diagrammatic and Graphic significance, Types of diagrams, Types of graphs.

UNIT-IV (50 to 100 contents)

Measures of central tendency - Mean, Median, Mode, their relative advantages and disadvantages. Measures of dispersion - mean deviation, standard deviation, Quartile deviation, Co-efficient of variation, percentile, Association of attributes, Contingency table, correlation - coefficient of correlation and its interpretation, Rank correlation, Regression equation and predictions.

UNIT-V (50 to 100 contents)

Teaching Hours: ...

Probability - Theorems, Simple Problems, Distributions - Binomial Poisson distribution, normal distribution, their properties and simple problems. Testing of significance - Large and Small sample tests - 't' test, Chi square test, and 'F' test - simple problems. Writing a research report - format of thesis writing with eg.

Text book

- 1. Devadas, R.P , A Handbook on Methodology of Research, Sri Ramakrishna Vidhyalaya, Coimbatore, 1989.
- 2. Pillai, R.S.N and Bagavathi, V, Statistics, Chand and company limited, 2001.
- 3. Kothari, C.R , Research Methodology, 2002.
- 4. Shanthi, P., Sophia and Bharathi, Computer oriented statistical methods/ probability and Statistics, charulatha publications, second edition, 2000.
- 5. Gupta, S.P, Statistical Methods, Sultana Chand and Sons, 31st revised edition, 2002.

Reference book

- 1. Donald, H.M.C. Burney, Research Methods, fifth edition, Thomson and Wadsworth Publications, 2002.
- 2. Ramakrishnan, P, Biostatistics, Saras publication, 2001.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	Μ	-	S	Μ	Μ	S	Μ	S	S	S
CO2	М	-	М	S	S	S	S	S	S	S
CO3	S	-	S	S	S	S	S	S	S	S
CO4	S	-	S	S	S	S	S	S	S	S
CO5	М	-	S	S	S	S	S	S	S	S

 $\begin{array}{l} PO-Programme \ Outcome, \ CO-Course \ outcome \\ S-Strong \ , \ M-Medium, \ L-Low \ (may \ be \ avoided) \end{array}$

Semester: III	Paper type: Core 9
Paper code:	Name of the Paper: Community Nutrition
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

Course Objectives:

- 1. Learn the national nutritional problems and consequences of nutritional problems
- 2. Understand the prevalence malnutrition problems in India.
- 3. Gain knowledge related to national programmes and policies for combating malnutrition.
- 4. Able to formulate community nutrition education programme modules
- 5. Study of common nutritional problems prevailing at community

Course Out Comes

1. After studied unit-1, the student will learn the concepts of community nutrition, nutritional deficiencies – prevalence and control measures.

2. After studied unit-2, the student will gain knowledge in the assessment of nutritional status at community level.

3. After studied unit-3, the student will understand and learn national nutritional policy and strategies.

4. After studied unit-4, the student will be able to gain knowledge on intervention programmes available at International and National level to alleviate malnutrition.

5. After studied unit-5, the student will learn about health care delivery in preventing malnutrition and communicable diseases, and organize nutrition education program.

Unit i. Remembering ii. Understanding iii. Applying iv. Analyzing v. Evaluating vi. Creating 1 Yes Yes Yes Yes Yes Yes 2 Yes Yes Yes Yes Yes Yes 3 Yes Yes Yes Yes Yes No 4 Yes Yes No Yes Yes Yes 5 Yes Yes Yes Yes Yes Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT-I (50 to 100 contents)

Teaching Hours: ...

Nutrition and National Development- Definition and brief study of community, family, village and block.

Malnutrition - causes, ecological factors, effects of malnutrition, protein deficiency diseases - PEM, Kwashiorkor - incidence, prevalence, epidemiology. The package programmes of immunization, marasmus, nutrition education, feeding programmes, and measures to overcome malnutrition.

Vitamin deficiency - A, B₁, B₂, Niacin, C, D, B12, and Folic Acid - prevalence, programmes to combat.

Nutritional Anaemia - Prevalence, programmes to control.

IDD and fluorosis - Prevalence and programmes to control.

UNIT-II (50 to 100 contents)

Teaching Hours: ...

Study of common nutritional problems prevailing at community level – Assessment of Nutritional status – Direct methods– anthropometry, laboratory examination (Bio Chemical), clinical examination, Diet Surveys, socio economic diet survey, for common nutrition problems. Indirect methods – Food Balance sheet, Ecological parameters and vital statistics.

UNIT-III (50 to 100 contents) Teaching Hours: ...

National nutritional policy - Aim, objectives, guidelines and thrust areas. PDS - Public distribution system, Agricultural planning - New strategies.

Concepts and definition of food and nutritional security at National household and individual levels.

UNIT-IV (50 to 100 contents) Teaching Hours: ...

Nutrition intervention Programmes - Objectives, operation of feeding national programmes. ICDS, TINP, NNMS, IRDP, DWACRA.

National organizations - ICMR, NIN, NNMB, ICAR, CFTRI, NIPCCD.

International organizations - FAO, WHO, UNICEF, UNESCO, World Bank.

UNIT-V (50 to 100 contents) Teaching Hours: ...

Demographic changes due to malnutrition. IMR, MMR, Mortality, morbidity rate, birth rate, sex ratio, poverty level.

Health care delivery - PHC, School Health services and their role in preventing communicable diseases.

Nutrition education - Merits, planning, evaluation and conduct.

REFERENCES

- 1. Swaminathan M (2018), Essentials of Food and Nutrition. An Advanced Textbook Vol.I, The Bangalore Printing and Publishing Co. Ltd, Bangalore
- 2. Bhatt D.P (2018), Health Education, KhelSahitya Kendra, New Delhi
- 3. Bamji M.S, Prahlad Rao N, Reddy V (2014). Textbook of Human Nutrition II Edition, Oxford and PBH Publishing Co. Pvt. Ltd , New Delhi
- 4. Park A. (2017), Park's Textbook of Preventive and Social Medicine XIX Edition M/S Banarasidas, Bharat Publishers, 1167, Prem Nagar, Jabalpur, 428 001(India)
- 5. Gibney MJ, Margetts BM, Kearney JM, Arab L (2004) Public Health Nutrition Blackwell Publishing Co. UK

Journals:

- 1. Reports of the State of World's Children, WHO and UNICEF, Oxford University.
- 2. Reports of National Family Health Survey, International Institute for Population Science, Mumbai.

- 3. Indian Journal of Medical Research, ICMR, New Delhi,
- 4. Indian Journal of Pediatrics, Valley Micro, Missouri, U.P.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	-	S	S	М	S	S	S
CO2	S	S	М	-	S	S	М	М	S	S
CO3	S	S	М	-	S	S	М	S	S	S
CO4	S	S	М	-	S	S	М	S	S	S
CO5	S	S	S	-	S	S	S	S	S	S

 $\begin{array}{l} PO-Programme \ Outcome, \ CO-Course \ outcome \\ S-Strong \ , \ M-Medium, \ L-Low \ (may \ be \ avoided) \end{array}$

Semester: III	Paper type: Core Elective Paper 3 – A (to choose one out of 3)
Paper code:	Name of the Paper: Nutrition in emergencies
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

Course Objectives:

- 1. Gain knowledge in protecting people's right to nutrition during disaster
- 2. Prepare for emergencies ,to prevent hunger, malnutrition and deficiency disorders
- 3. Create an awareness on nutrition policies and programmes to combat nutritional problems
- 4. Gain knowledge in control of communicable diseases in emergencies and therole of immunisation and sanitation.
- 5. Understand the public nutrition approach to tackle nutritional problems in emergencies.

Course Out Comes

1. After studied unit-1, the student will gain insight on Natural / manmade disasters resulting in emergency situations.

2. After studied unit-2, the student will gain knowledge to understand common nutritional problems prevalent among the vulnerable groups in emergencies

3. After studied unit-3, the student will learn about communicable diseases in emergencies and public nutrition approach to tackle them.

4. After studied unit-4, the student will gain knowledge to assess the nutritional status of emergency affected population and organize nutritional surveillance and individual screening.

• 5. After studied unit-5, the student will learn to apply the principles of massive supplementary feeding and food safety for the welfare of the community

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT-I (50 to 100 contents)

Teaching Hours: ...

Natural / manmade disasters resulting in emergency situations.Famine, drought, flood, earthquake, cyclone, war, civil and political emergencies.Factors giving rise to emergency situation in these disasters. Illustration using case studies from Indian Subcontinent.

UNIT-II (50 to 100 contents)

Teaching Hours: ...

Nutritional problems in emergencies in vulnerable groups.Causes of malnutrition in emergency situations.Major deficiency diseases in emergencies.Protein – energy malnutrition.Specific deficiencies.

UNIT-III (50 to 100 contents)

Communicable diseases: Surveillance and treatment.Control of communicable diseases in emergencies Role of immunisation and sanitation.Public nutrition approach to tackle nutritional problems in emergencies.

UNIT-IV (50 to 100 contents)

Assessment and surveillance of nutritional status in emergency affected populations. Scope of assessment of malnutrition in emergencies. Indicators of malnutrition clinical signs for screening acute malnutrition. Anthropometric assessment of nutritimal status – Indicators and cut – offs indicating seriously abnormal nutrition situation weight – for – height based indicators, MUAC, social indicators. Organization of nutritional surveillances and individual screening.

UNIT-V (50 to 100 contents)

Nutrition Relief and Rehabilitation. Assessment of food needs in emergency situations.Food distribution strategy – identifying and reaching the vulnerable group – Targeting Food Aid.Mass and supplementary feeding.Special foods / rations for nutritional relief.Local production of special foods.

Local food rehabilitation. Organization of mass feeding / general food distribution. Feeding centres.

Transportation and food storage.Sanitation and hygiene. Evaluation of feeding programmes.

REFERENCES

- 1. Shills, M.E., Olson, J.A, Shike, M and Ross, A.C. (2003): Modern Nutrition in Health and Disease, 9th Edition, A.Williams and Willdns.
- 2. Goyet, fish.. V.; Seaman, J. and Geijer, u-(2008): The Management of Nutritional Emergencies in Large Populations, World Health Organisation, Geneva
- 3. Mahan, L.K. and Escott-Stump, S. (2000): Krause's Food Nutrition and Diet-Therapy, 10th Edition, W-13 Saunders Ltd.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	-	S	S	М	М	S	S
CO2	S	S	S	-	S	S	М	S	S	S
CO3	S	S	S	-	S	S	М	М	S	S
CO4	S	S	S	-	S	S	М	М	S	S
CO5	S	S	М	-	S	S	S	S	S	S

Mapping with Programme Outcomes

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

Teaching Hours: ...

Teaching Hours: ...

Teaching Hours: ...

Semester: III	Paper type: Core Elective Paper 3 - B (to choose one out of 3)
Paper code:	Name of the Paper: Functional foods and Nutraceuticals
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

Course objectives

- 1. Enable students to understand relation between Functional Foods and Nutraceuticals
- 2. Gain knowledge on nutraceuticals and dietary supplements in health and diseases
- 3. Learn about nutraceutiacls in the areas of preventive diseases.
- 4. To be aware of the National and International regulatory aspects of Functional foods.
- 5. To develop diet plans incorporating functional foods/supplementation.

Course Out Comes

1. After studied unit-1, the student will learn about functional foods and development of functional foods

2. After studied unit-2, the student will acquire skills to categorize nutraceuticals.

3. After studied unit-3, the student will gain awareness on the functional foods and nutraceuticals of microbial origin.

4. After studied unit-4, the student will obtain knowledge of functional foods and nutraceuticals in health and diseases.

5. After studied unit-5, the student willunderstand the regulatory aspects of functional foods and nutraceuticals.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT - I (50 to 100 contents)

Teaching Hours: ...

Definition and History-Functional foods, traditional foods, nutraceuticals - teleologemey, designer foods and pharma foods, history of functional foods, components of functional foods, stages involved in development of functional foods.

UNIT- II (50 to 100 contents) Teaching Hours: ...

Classification - Based on food source, mechanism of action and chemical nature-isoprenoid, phenolic substances, fatty acids and structural lipids, terpenoids – saponins, tocotrienols and simple terpenes, carbohydrates and amino acid based derivatives, isoflavones.

UNIT- III (50 to 100 contents) Teaching Hours: ...

Functional foods of Microbial origin- Human gastrointestinal tract and its microbiota, functions, probiotic microflora and functions- Lactobacillus and Bifidobacterium, concept of probiotics and prebiotics with examples, role of probiotics in health and disease, spirulina as bioactive component.

UNIT – IV (50 to 100 contents)

Teaching Hours: ...

Sources and role of Functional foods and Nutraceuticals - Role of functional foods and Nutraceuticals in diseases, concept of dietary supplements, phytochemicals, phytosterols, omega 3 and 6 fatty acids, dietary fiber, role of nutraceuticals in health and disease management – diabetes mellitus, hypertension, CVD, cancer; non essential nutrients as dietary supplements, FOSHU foods.

UNIT – V (50 to 100 contents) Teaching Hours: ...

Regulatory aspects- International and national regulatory aspects of functional foods in India, ICMR guidelines for Probiotics, development of biomarkers to indicate the efficacy of functional ingredients, Research frontiers in functional foods.

REFERENCES:

- 1. Bamji (2013), Textbook of Human Nutrition, 3rd edition, Oxford & IBH Publishing Co Pvt Ltd, New Delhi.
- 2. Srilakshmi.B (2018), Nutrition Science, 4th edition, New Age InternationlPvt Ltd.
- 3. Webb G.P (2016), Dietary Supplements and Functional Foods, Blackwell Publishing Ltd, New York.
- 4. Tamine. A (2015), Probiotic Dairy Products, Blackwell Publishing Ltd, United Kingdom.
- 5. USFDA regulations on functional foods.

Journals

- 1. Journal of functional foods
- 2. Journal of free radical research

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	М	S	S	S	М	-	S
CO2	S	S	S	S	S	S	S	М	-	S
CO3	S	S	S	S	S	S	S	М	-	S
CO4	S	S	S	S	S	S	S	М	-	S
CO5	S	М	S	М	S	S	S	S	-	S

Semester: III	Paper type: Core Elective Paper 3 - C (to choose one out of 3)
Paper code:	Name of the Paper: Principles of food analysis
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

Course objectives

- 1. Understand the principles underlying various analytical methods.
- 2. Explore the concepts of food analysis
- 3. Describe the criteria to select appropriate food analysis method.
- 4. Determine food constituents using analytical procedures
- 5. Extract food pigments from foods.

Course Out Comes

- 1. After studied unit-1, the student will learn different methods of foods analysis, trends and demands
- 2. After studied unit-2, the student will acquire skills to analyse the composition of foods.
- 3. After studied unit-3, the student will learn on chemical properties in foods and immuneassays.
- 4. After studied unit-4, the student will understand the chromatographic techniques in food analysis.
- 5. After studied unit-5, the student willaquire skill to extract food pigments and collourants.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT I (50 to 100 contents)

Teaching Hours: ...

Teaching Hours: ...

Introduction to Food Analysis- Trends and demand, consumer and food industry, steps in analysis, Choice and validity of method, criteria for choice of food analysis Methods, role of AOAC International. Sampling and sample preparation. Brief overview of physical, chemical, Instrumental and Gravimetric Methods of analysis.

UNIT II (50 to 100 contents) Teaching Hours: ...

Compositional Analysis of foods-Moisture and total solid analysis, ash analysis, Total fiber analysis, Proteinanalysis, Carbohydrate analysis (mono, oligo and polysaccharides, starch and Starch derivatives), Vitamin and mineral analysis

UNIT III (50 to 100 contents)

Chemical properties and characteristics of foods-pH and titrable acidity, Fat characterization – Analysis of fatty acids, oil fat indices.Protein separation, characterization procedures, amino acid composition, Application of enzymes in food analysis, Immunoassays,

Spectroscopy – Basic principles of spectroscopy, ultra violet, visible and Fluroscence spectroscopy. Atomic absorption and emission spectroscopy

UNIT IV (50 to 100 contents)

Chromatographic techniques, Principles of chromatography Types of chromatographic techniques – HPLC, Gas chromatography Rheological principles used for food analysis Viscocity of liquids, Solutions and fine suspensions.

UNIT V (50 to 100 contents)

Pigments and colourants- Extraction, isolation, purificationMeasurements of natural pigments and colouranalysis.ThermalAnalysis- Principles and procedures of calorimetry, Differential scanning of calorimeters.

REFERENCE

1. Nielson S.S. (2006). Food Analysis (3ndEd), Springer Private Limited.

2.Wrolstad R.E. et al (2005). Handbook of Food Analytical Chemistry: Water, Protein, Enzymes, Lipids and Carbohydrates. Published by John Wiley and Sons

3.Wrolstad R.E. et al (2005). Handbook of Food Analytical Chemistry: Colourants, Flavours, Textural and Bioactive food components. Published by John Wiley and Sons
4.Egan H., Kirk R., Sawyer R., (1981). Pearson's Analysis of Foods. (8th Edition) Longman Group Limited

5.Dr. Latimer G. W., Jr.(2012) (19th Ed). Official Methods of Analysis of AOAC International: Volume I and II.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	М	S	М	S	S	S	-	М
CO2	S	S	М	S	М	S	S	S	-	М
CO3	S	S	М	S	М	S	S	S	-	М
CO4	S	S	М	S	М	S	S	S	-	М
CO5	S	S	М	S	М	S	S	S	-	М

Teaching Hours: ...

Teaching Hours: ...

Semester: III	Paper type: Open Elective Paper 4 - A (to choose one out of 3)
Paper code:	Name of the Paper: Principles of Nutrition I
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

Course objectives:

- 1. Understand the physiological and metabolic role of nutrients in human body.
- 2. Gain knowledge on the interrelationship of macro nutrients to human health.
- 3. Understandthe role of macro nutrients in our body
- 4. Learn about the functions, metabolism and functions of macro nurients.
- 5. Acquire knowledge on the role of water.

Course Out Comes

- 1. After studied unit-1, the student will gain knowledge on energy, requirements and estimation.
- 2. After studied unit-2, the student willknow the importance of carbohydrates in human nutrition

3. After studied unit-3, the student will learn nutritional importance of proteins and estimate quality.

4. After studied unit-4, the student will learn nutritional importance of lipids and essential fatty acids.

5. After studied unit-5, the student willknow the importance of water and hydration status.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	No
4	Yes	Yes	Yes	Yes	Yes	No
5	Yes	Yes	Yes	Yes	Yes	No

UNIT I (50 to 100 contents) **Teaching Hours: ...**

Energy: Definition and Components of Total Energy Requirements, Factorsaffecting total energy requirement, Methods of Estimation of energy requirements, Energy Expenditure and Requirement for various age groups.

UNIT II (50 to 100 contents)

Carbohydrates - Nutritional importance of Carbohydrates ,Digestion and Absorption, Metabolic Utilization. Blood Glucose, Resistant Starch, Fructose. Oligosaccharides (FOS), role of dietary fiber in human nutrition, concept of Glycemic Index, and Glycemic load,

UNIT III (50 to 100 contents)

Proteins- Nutritional importance of proteins, nutritional classification of proteins, Improvement of Quality of Protein in the Diet, Methods of Estimating protein quality and RDA for Proteins and Amino Acids, Protein Deficiency.

Teaching Hours: ...

Teaching Hours: ...

UNIT IV (50 to 100 contents)

Teaching Hours: ...

Lipids - Nutritional Importance of Lipids, Digestion, Absorption and Metabolism ,Sources and Requirements, Consequence of High and Low Fat Intake, Effect of excess intake of fats, Role of Essential Fatty Acids.

UNIT V (50 to 100 contents)

Teaching Hours: ...

Water-distribution of water, functions, requirements, sources, water balance, importance of hydration, Assessment of Hydration Status, Hazards of Hypo and Hyper Hydration with Suitable Examples

REFERENCE:

1. Nutrient requirements and Recommended Dietary Allowances for Indians, ICMR, National Institute of Nutrition, Hyderabad, 2016.

2. Dietary guidelines for Indians, ICMR, National Institute of Nutrition, Hyderabad, 2016.

3.Swaminathan, M. Advanced Textbook on Food Science and Nutrition, Vol:2, Second edition,

Reprinted, Bangalore Printed and publishing Co Inc, Bangalore, 2012.

4.Krause, M.V and Hunsher, M.A, Food, Nutrition and Diet Therapy, 11thEdition, W.B.Saunders company, Philadelphia, London, 2014.

5. Bamji M.S, Prahlad Rao N, Reddy V, Textbook of Human Nutrition, II

Edition, Oxford and PBH Publishing Co. Pvt. Ltd , NewDelhi, 2014.

rre	,	- 8				
Cos	PO1	PO2	PO3	PO4	PO5	PO6

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	-	S	S	-	-	М	S
CO2	S	S	S	-	S	S	-	-	М	S
CO3	S	S	S	-	S	S	-	-	М	S
CO4	S	S	S	-	S	S	-	-	М	S
CO5	S	S	S	-	S	S	-	-	Μ	S

Manning with Programme Outcomes

Semester: III	Paper type: Open Elective Paper 4 - B (to choose one out of 3)
Paper code:	Name of the Paper: Nutrition education and counselling
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

Course objectives:

1. Gain knowledge on the meaning and methods of nutrition education

2. Develop skills in preparation of education materials

3. Learn the different methods of promoting nutrition education and awareness in the community

4. Enable competency as nutrition educators and counsellors.

5. Able organizers of nutrition education and intervention programmes.

Course Out Comes

1. After studied unit-1, the student willgain knowledge to organize nutrition education and intervention programmes.

2. After studied unit-2, the student willbe enabled with competency as nutrition educators and counsellors.

3. After studied unit-3, the student will be able to understand the role of mass communication in nutrition education.

4. After studied unit-4, the student will know to conceptualize and develop audio-visual aids for nutrition education.

5. After studied unit-5, the student willbe enabled organizers of nutrition education and intervention programmes.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT I (50 to 100 contents)

Teaching Hours: ...

Nutrition Education and Counselling - Meaning, objectives and methods of Nutrition education, -direct and indirect methods, individual and group contacts, types merits and demerits. Use of folk media in nutrition education, counselling for life style changes and nutrition care and support.

UNIT II (50 to 100 contents)

Teaching Hours: ...

Nutrition Education for the Community - Importance of Nutrition education to the community and lessons to be taught. Training workers in nutrition education programmes Methods of education when to teach, whom to teach. Use of computers to impart nutrition education, Organization of Nutrition education programmes.

UNIT III (50 to 100 contents)

Mass communication in Nutrition Education - Definition, merits and demerits, Types-Print media, Newspapers, magazines, leaflets, pamphlets, radio, television, films ,filmstrips,internet and computers.

UNIT IV (50 to 100 contents)

Audio visual aids in Nutrition Education-Definition, purpose of using AV Aids, Cone of Experience, classification of AV aids advantages and limitations

UNIT V (50 to 100 contents)

Organising Programmes in Nutrition Education-Introduction-selection of theme, planning the programme, developing teaching materials and methods, execution and evaluation of the programme

REFERENCE:

1. Mahtab, S. Bamji, 2016, Textbook of Human Nutrition, Oxford and IBM Publishing Co. Pvt. Ltd., NewDelhi.

2. Park, K. 2015, Parks Textbook of Preventive and Social Medicine, BanarsideBhanot Publishers, Jabalpur.

3. Srilakshmi, B. 2016, Nutrition Science, New Age International Pvt. Publishers, New Delhi.

4. Willett ,W 2013, Nutritional Epidemiology, 3rd Edition, Oxford University Press.

5. Rothman KJ(2016), Modern Epidemiology, Little Brown and Co, Bosten.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	М	-	-	S	S	-	S	S	S
CO2	S	S	-	-	М	S	-	S	S	S
CO3	S	S	-	-	М	S	-	S	S	S
CO4	М	S	-	-	М	S	-	S	S	S
CO5	S	S	-	-	М	S	-	S	S	S

Teaching Hours: ...

Teaching Hours: ...

Teaching Hours: ...

Semester: III	Paper type: Open Elective Paper 4 - C (to choose one out of 3)
Paper code:	Name of the Paper: Assessment of Nutritional status
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

Course objectives:

1. Develop skills in using epidemiologic concepts and methods to examine nutritional aspects of health and disease in population.

2. Understand the definition and uses of epidemiology and appreciate its role in public health.

3. Learn the techniques and tools to assess the nutritional status of a community.

4. Orient students with all the important state-of-the –art methodologies applied in nutritional assessment and surveillance of human group

5. Develop specific skills to assess nutritional status of the community.

Course Out Comes

1. After studied unit-1, the student willgainknowledge to critically evaluate methodologies for nutritional assessment

2. After studied unit-2, the student willbe enabled with competency to conduct clinical examination and dietary survey.

3. After studied unit-3, the student will gain knowledge on biochemical and biophysical tests in assessing nutritional status.

4. After studied unit-4, the student will describe the current state of epidemiological evidence for relationships of diet to the development of selected diseases, interpret and evaluate epidemiological data.5. After studied unit-5, the student willbe enabled assess nutritional status of a community.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT I (50 to 100 contents)

Teaching Hours: ...

Assessment of Nutritional status by Anthropometry- Introduction, Definition of Nutritional Status, Objective and Classification of Methods- Nutritional Anthropometry – Definition, Instruments, Standard of Reference, Age Assessment, Measurement Techniques, Weight, Linear Measurement, Circumferences, Soft Tissue Subcutaneous Fat, Anthropometric indicators.

UNIT II (50 to 100 contents)

Clinical Examination and Dietary Survey -Clinical Examination - Specific Deficiency, Signs that Need Further Investigation, Need not Related to Nutrition, Grouping of Signs, Different Types of Dietary Survey, General Survey, Special Survey, Comparison with Nutritional Requirement.

UNIT III (50 to 100 contents)

Biochemical Tests and Biophysical Methods -Definition of Biochemical tests, Collection of Samples. Test for Specific Nutrients - Protein, Vitamin A, D, Ascorbic Acid, Thiamine, Riboflavin, Niacin, Iron, Folic Acid, and Vitamin B12.Definition of Biophysical Method - Test for Physical Functions, Radiographic Examination, functional tests, Cytological Tests.

Teaching Hours: ... UNIT IV (50 to 100 contents)

Nutritional Epidemiology in Public Health - Introduction to Nutritional Epidemiology, Nutritional monitoring and surveillance, Community based epidemiological studies. Basic concepts and applications of Epidemiology in public health, Measurement of disease frequency, Person - Time exposure, Measures of Association and Impact of Health and Non Health related outcomes.

Indirect Nutritional Assessment-Vital Statistics, Age Specific Mortality Rate, Morbidity and Cause of Specific Mortality, Ecological Factors, Methods of Obtaining Information, Background Data. General Survey Data, Special Survey, Conditioning Infection, Nutritionally Relevant infection, food production, food consumption, cultural factors, socio economic profile and medical and educational service.

UNIT V (50 to 100 contents)

Assessment of Nutritional Status of a Community -Sensitize stakeholders and policy makers towards community upliftment.Planning, sampling, selection of methods, community nutrition assessment tools and scales, executing nutritional assessment and interpretation of data.

REFERENCE:

1. Mahtab, S. Bamji, 2016, Textbook of Human Nutrition, Oxford and IBM Publishing Co. Pvt. Ltd., New Delhi.

2. Park, K. 2015, Parks Textbook of Preventive and Social Medicine, BanarsideBhanot Publishers, Jabalpur.

3. Srilakshmi, B. 2016, Nutrition Science, New Age International Pvt. Publishers, New Delhi.

4. Willett, W 2013, Nutritional Epidemiology, 3rd Edition, Oxford University Press.

5. Rothman KJ(2016), Modern Epidemiology, Little Brown and Co, Bosten.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	М	-	S	S	-	-	S	S
CO2	S	S	S	-	S	S	-	-	S	S
CO3	S	S	S	-	S	S	-	-	S	S
CO4	S	S	S	-	S	S	-	-	S	S
CO5	S	S	S	-	S	S	-	-	S	S

Teaching Hours: ...

Teaching Hours: ...

Teaching Hours: ...

INTERNSHIP

Internship:

A phase of training where in a graduate is expected to undergo training practice in a hospital industry/food industry according to his or her choice for a period of 30 Days so as to acquire job oriented skills

Assessment:

Interns shall maintain a record book which shall be verified and certified by the training authority under whom he or she works during his/her internship period.

An objective evaluation of his/her knowledge, skills and attitude during training will be recorded by the center in-charge and monitored by faculty in-charge and marks shall be allotted accordingly.

Hospital authority		-	75
Internal Assessment	& Viva Voce	-	25
SEMESTER IV

Semester: IV	Paper type: Core Paper 10
Paper code:	Name of the Paper: Diet Therapy
Credit: 4	Total Hours per Week:Lecture Hours:Tutorial Hours:

Course objectives:

- 1. Understand the principles of diet care for the disease conditions.
- 2. Skills for the modifications in nutrients in therapeutic conditions.
- 3. Learn recent concepts in dietary management of different diseases conditions.
- 4. Obtain knowledge of different therapeutic diet and their preparation
- 5. Develop capacity and attitude for taking up the profession as a dietician

Course Out Comes

1. After studied unit-1, the student willgain knowledge and understand the concept of therapeutic nutrition as nutritional care and support, learn the formulation of therapeutic diets and feeding techniques and take up as dieticians in the hospitals.

2. After studied unit-2, the student willbe able to categorize diseases, disorders and deficiencies and plan suitable therapeutic diets.

3. After studied unit-3, the student will update knowledge on cardio vascular system and advanced techniques involved in the treatment and concept of diet planning for cardio vascular diseases.

4. After studied unit-4, the student will learn about the diseases and dietary management of GI system, Liver diseases and diseases.

5. After studied unit-5, the student willgain knowledge on kidney diseases, treatment and dietary modifications and be enabled with nutritional support for specific diseases.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT-I (50 to 100 contents)

Teaching Hours: ...

Principle of Nutritional care, Modification of normal diet into therapeutic diet, Types of hospital diets.Nutrition Support Techniques, Eneteral feeding - indications, Types - Nasogastric,

Gastrostomy, Jejunostomy and Rectal feeding - requirements and advantages.Parenteral feeding - Nutritional Support, Formula feeds and Complications in TPN.

UNIT-II (50 to 100 contents)

Teaching Hours: ...

Diet in Febrile condition Short duration - Typhoid, Influenza, Malaria, Long duration Tuberculosis.Diet in deficiency diseases - PEM, Vitamin A, Anaemia, IDD, Zinc deficiency.

Surgery - Physiological response, Metabolic Consequences, Stage of Convalescence, pre and post operative diets. Burns- Metabolic changes in protein and electrolytes and Nutritional support.Diet in Energy Imbalance - Underweight and obesity, Etiology and dietary management.

Diet in allergy - Common food allergens, test for allergy - Skin test and Elimination diet and Treatment for allergy.

UNIT-III (50 to 100 contents) Teaching Hours: ...

Diseases of cardio vascular system - Risk factors of CVD, Etiology, Symptoms, and dietary management of atherosclerosis, Cerebral Infarction, Myocardial Infarction, prevention through life style modifications. Classification, prevalence, Diet related factors influencing and dietary management of hypertension, dyslipidemia (Genetic Hyperlipidemia).

UNIT-IV (50 to 100 contents) Teaching Hours: ...

Diseases of the Gastro intestinal system- Disorders, Etiology, Symptoms and dietary management of acute gastritis, chronic gastritis, Peptic ulcer - duodenal & gastric

Intestinal disease - Flatulence, Diarrhoea and Dysentry, Constipation, Celiac disease, Tropical sprue, Irritable bowel syndrome, diverticular disease, colon cancer, Ulcerative colitis.

Liver disease - Hepatitis, cirrhosis, Jaundice, fatty liver, cholecystitis and cholelithiasis, Hepatic coma.Pancreas - Pancreatitis, Acute and chronic

Diabetes Mellitus - Etiology, Types, Symptoms, Diagnosis, metabolic alterations, complications and dietary management.

UNIT-V (50 to 100 contents) Teaching Hours: ...

Diseases of the Kidney - Etiology, Symptoms and Dietary modification, Nephritis, Nephrosis, Acute and chronic renal failure, Nephrolilthiasis, Transplantation and dialysis, Dietary Modification.Dietary modification and Nutritional Support for cancer, HIV, Alzheimer's and Parkinson's Disease.

REFERENCES

- 1. Srilakshmi. B (2012), Dietetics, New Age International Pvt Ltd, New Delhi.
- 2. Dietary Guidelines of Indians- A Manual, National Institute of Nutrition, Hyderabad, 2006.
- 3. Robinson C.H. (2007) Normal and Therapeutic nutrition, 12th edition, Mac Millan Publishing Co. Inc, New York.
- 4. Krause M.V and Mahan L.K (2010) Food, Nutrition and Diet therapy, 9th edition, W.B. Saunder Co, Philadelphia

Journals:

1. Clinical Nutrition, Bell and Bain Ltd., Scotland. Food and Nutrition Bulletin, United Nations University Press, Japan

- 2. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Home Science College for Women, Coimbatore.
- 3. The American Journal of Clinical Nutrition Published by the American society for Clinical Nutrition, Inc., USA.
- **4.** Journal of American Dietetic Association. The American Dietetic Association Mount Arris, Illinois-61054, USA.

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	М	S	S	М	_	S	S
CO2	S	S	S	М	S	S	М	-	S	S
CO3	S	S	S	М	S	S	М	-	S	S
CO4	S	S	S	М	S	S	М	-	S	S
CO5	S	S	S	М	S	S	М	-	S	S

Semester: IV	Paper type: Core Practical - III
Paper code:	Name of the Paper: Nutritional Biochemistry & Community Nutrition Practical
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

- 1. Know the analytical procedures in estimation of nutrients in foods, blood and serum.
- 2. Acquire skills in the analysis of macro and micronutrient contents of foods blood and serum
- 3. Enable to demonstrate the analysis of nutritional quality of foods ,blood and serum
- 4. Develop skill in handling analytic equipment's.
- 5. Interpret the health condition of the individual based on biochemical markers.

EXPERIMENTS

- 1. Determination of Saponification Number.
- 2. Determination of Acid Number
- 3. Determination of Reichert Meissl Number
- 4. Estimation of Creatinine in urine Jaff's method.
- 5. Estimation of Serum cholesterol Zak's method.
- 6. Estimation of Blood glucose O -Toluedene method.
- 7. Estimation of Serum proteins by Biuret method.
- 8. Estimation of Albumin / Globulin ratio by biuret method.

COMMUNITY NUTRITION

Course objectives

- 1. Gain knowledge on the analytical techniques in the nutritional estimation of foods.
- 2. Understanding of the principles and nutritional requirements of foods for various cage groups
- 3. Acquire analytical skills in the analysis of macro and micronutrient content of foods.
- 4. Enable to demonstrate the analysis of nutritional quality of foods.

PRACTICALS

- 1. Development of a plan for nutrition education programmes in community.
- 2. Preparation of communication aids for different groups.
- 3. Development of low cost recipes for infants, preschoolers, elementary school children, adolescents, pregnant, lactating mothers, adult women and elderly.
- 4. Planning and preparation of diet/ dishes for PEM, VAD and IDA
- 5. Field visits to ongoing national nutrition programmes

Semester: IV	Paper type: Core Practical - IV
Paper code:	Name of the Paper: Diet Therapy
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

- 1. Understand the principles of diet care for the disease conditions.
- 2. Skills for the modifications in nutrients in therapeutic conditions.
- 3. Learn recent concepts in dietary management of different diseases conditions.
- 4. Obtain knowledge of different therapeutic diet and their preparation
- 5. Develop capacity and attitude for taking up the profession as a dietician

Course Outcomes:

- 1. Understand the concept of therapeutic nutrition as nutritional care and support
- 2. Learn the formulation of therapeutic diets and feeding techniques
- 3. Categorize the diseases, disorders and deficiencies for planning suitable of therapeutic diets
- 4. Update knowledge on advanced techniques and concept of diet planning and of therapeutic diet counselling.
- 5. Take up as a Dietician in the hospitals.

PRACTICALS

- 1. Types of diet Full liquid, clear liquid, soft, light, bland and regular diet.
- 2. Diet for obesity, underweight, febrile conditions.
- 3. Diet in gastro intestinal disorders peptic ulcer, diarrhoea, constipation.
- 4. Diet in liver disorders jaundice, hepatitis, cirrhosis, hepatic coma, fatty liver and gall stones.
- 5. Diet in kidney disorders Glomerulo nephritis, nephritic syndrome, renal failure, and urolithiasis.
- 6. Diet in Diabetes mellitus Type1, Type2Diabetes mellitus, diabetes with complications.
- 7. Diet in Cardio vascular disease Hypertension, atherosclerosis, congestive heart failure.
- 8. Visit to a hospital to observe Enteral Feeding and formula diet for tube feeding.
- 9. Diet in deficiency diseases IDA, VAD, IDD

CORE PROJECT/DISSERTATION WITH VIVA VOCE

Semester: IV

Course Objectives

Hours of Instruction: 12 No of Credits:5

- An independent research work has to be undertaken by the students.
- The students will be guided and supervised by a member of a Teaching faculty of the concerned department.
- The Research can either be a survey or Laboratory oriented one.
- In which the research culminates should reflect the students own work.
- The Dissertation should be submitted at the end of the Semester.

ASSESSMENT DISSERTATION: EVALUATION PATTERN

Internal : 25 marks and External (including Viva Voce) : 75 marks = Total-100

Semester: IV	Paper type: Core Elective paper – 4 – A (to choose one out of 3)
Paper code:	Name of the Paper: Food Biotechnology
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

- 1. Gain knowledge on the techniques and tools of genetic engineering
- 2. Understand the classical strain improvement in Natural selections and mutation, recombination
- 3. Explore biotechnological techniques in the production of food based products and learn the safety of biotechnological implications in foods

Course Out Comes

1. After studied unit-1, the student will gain knowledge on the techniques and application of genetic engineering in food science and technology

2. After studied unit-2, the student will be able to understand the applications of enzyme technology in food 3industries.

3. After studied unit-3, the student will learn about the application of biotechnology to food products especially Yeast based processes and products.

4. After studied unit-4, the student will know about the application of enzymes in food and beverage industries.

5. After studied unit-5, the student willlearn about the application of nano biotechnology in food industry and also in food packaging.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT I (50 to 100 contents)

Teaching Hours: ...

Biotechnology – Introduction – biotechnological applications of animals, plants and microbes; concepts of genetic engineering and molecular cloning and their application in food production, transgenic plants, application of genetic engineering in food science and technology. Genomics, proteomics and bio informatics.

UNIT II (50 to 100 contents)

Teaching Hours: ...

Classical strain improvement: Natural selections and mutation, recombination. Concepts and tools for recombinant DNA technology; genetically modified foods: concept, types and applications;

safety assessment of genetically modified foods: International and National guidelines of regulations and safety, issues related to production, consumption, export / import and labelling of GM foods. Ethical issues concerning GM foods, Testing for GMOs, IPR, GMO Act 2004.

UNIT III (50 to 100 contents)

Teaching Hours: ...

Application of biotechnology to food products: Yeast based processes and products – alcoholic beverages, industrial alcohols, bread and related products; Bacteria based processes and products – dairy products, fermented meat and fish products, fermented vegetable products, vinegar and other organic products, bacterial bio mass.

UNIT IV (50 to 100 contents) Teaching Hours: ...

Application of enzymes in food and beverages industries. Enzyme immobilization and its application in food industry: History, carrier materials, enzyme immobilization techniques, use of immobilized enzyme in food industries. Micro organism based products – sweeteners, flavours and amino acids, vitamin pigments, mushrooms, SCP.

UNIT V (50 to 100 contents)

Teaching Hours: ...

Application of Nano biotechnology in food industry: Nano biotechnology in food packaging, nano biotechnology for delivery of bioactive and nutraceuticals, nano biosensors – safety and regulatory aspects of Nano biotechnology applications. Micro encapsulation in food biotechnology: concepts, agents and techniques; application of micro encapsulation – probiotics, flavours, lipids, antioxidants, vitamins and enzymes.

REFERENCES:

- 1. Byong H. Lee, fundamentals of food biotechnology, II editions, wiley Blackwell, 2014.
- 2. RavishankarRai, V. Advances in food biotechnology, Wiley Blackwell, 2015.

3. Bains W. biotechnology from A to Z, Oxford, University Press, 2009.

- 4. Lopez, G.F.G., Canovas, G.V.B., Food science and Food Biotechnology , CRC Press, 2003.
- 5. Crueger, W. Crueber A, Biotechnology; A text book of Industrial microbiology, science tech. Madison, USA, 1984.

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	М	М	S	М	М	S	S	S	S
CO2	S	М	М	S	S	S	S	S	S	S
CO3	S	М	М	S	М	М	S	S	S	S
CO4	S	М	М	S	М	М	S	S	S	S
CO5	S	М	М	S	М	М	S	S	S	S

Semester: IV	Paper type: Core Elective paper – 4 – B (to choose one out of 3)				
Paper code:	Name of the Paper: Food Safety and Nutrition Security				
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:				

- 1. Understand the Food Safety Management System in Household, Food Industries and Establishments
- 2. Gain knowledge on National and International Food Safety Laws and Regulations
- 3. Learn about the Food and Nutrition Security Management Concepts and Practices

Course Out Comes

1. After studied unit-1, the student will understand and learn to address the food safety issues knowing National and International Food Safety Laws and Regulations.

2. After studied unit-2, the student will be able to gain knowledge on food hygiene, microbiology of food spoilage and prevention.

3. After studied unit-3, the student acquire skills on safety assessment of food and its practices.

4. After studied unit-4, the student will learn about various food laws, regulations and its applications.

5. After studied unit-5, the student willgain knowledge on food and nutrition security, and strategies to combat insecurity.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT I (50 to 100 contents)

Teaching Hours: ...

Introduction to Food Safety - Definition, Food safety issues in India, food hazards (physical, chemical and biological) natural toxins, Need and importance of food safety in household, food industries and establishments; Factors affecting food safety in household, food industries and establishments; Regulatory authorities at local, national and global level for ensuring food safety in food industries and establishments.

UNIT II (50 to 100 contents)

Food Hygiene and Microbiology -Inspection of premises and Legal provisions, Quality Control and Quality Assurance, Personal Hygiene of Food Handlers, Routes of Contamination, Danger Zone –In food storage, Food Spoilage, Microbes responsible for Food spoilage-Effect on Health, Incubation period, Symptoms and Treatment .Steps to overcome microbial spoilage.

UNIT III (50 to 100 contents)

Teaching Hours: ...

Teaching Hours: ...

Safety Assessment -Food additives, adulterants, pesticide residues, safety aspects of water and beverages, Good Manufacturing Practices (GMP), Good Agricultural Practices (GAP), Good Hygienic

Practices and Good Laboratory Practices, Management and disposal food wastes in food industries and establishments.

UNIT IV (50 to 100 contents)

Teaching Hours: ...

Food Laws and Regulations -National Food Safety Legislation –International food safety legislation - Codex Alimentarius, APEDA and WTO,ISO 22000 series, Food Safety Act 2006, Food Safety Rules and Regulations 2011, 2016, 2018, FSSAI, Essential Commodities Act, ISI / BIS, AGMARK, HACCP-Principles and Applications.

UNIT V (50 to 100 contents) Teaching Hours: ...

Food and Nutrition Security -Definition, Importance, Hunger and malnutrition.. Factors contributing to food insecurity, Food security model, Food availability, Household and individual food security survey, Public Distribution System, Strategies to combat food and nutrition insecurity, Food Security Bill and Act.

REFERENCE:

1. Frazier.W., Food Microbiology, McGraw-Hill Co Ltd, New Delhi.2005

2. Adams M,R and Moss M,O., Food Microbiology, New Age International(P) Ltd., New Delhi, 2005.

3. VijayaRamesh, Food Microbiology, MJP Publications, 2007.

4. David, A.Shapton and NarohF.Shapton (1991) Principles and Practices for the Safe Processing of Foods

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	М	S	-	-	М	S	S	-	S
CO2	S	S	S	-	-	М	S	S	-	S
CO3	S	S	S	-	-	М	S	S	-	S
CO4	S	S	S	-	-	М	S	S	-	S
CO5	S	S	S	-	-	М	S	S	-	S

Semester: IV	Paper type: Core Elective paper – 4 – C (to choose one out of 3)
Paper code:	Name of the Paper: Computer Applications in Food Science and Nutrition
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

- 1. Understand the basics of computer and its applications
- 2. Gain knowledge to use computers
- 3. Develop skills to apply computer based technology in Food science and Nutrition

Course Out Comes

- 1. After studied unit-1, the student will gain knowledge on computer applications.
- 2. After studied unit-2, the student will apply knowledge on Operating system and MS Office.
- 3. After studied unit-3, the student acquire knowledge on computer networks.
- 4. After studied unit-4, the student will learn about multimedia.

5. After studied unit-5, the student will gain knowledge on computer networking system and apply in the field of food science, nutrition and research.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT I (50 to 100 contents)

Teaching Hours: ...

Introduction to Computers History of Development of Computers, Main Frame, Minis, Micros and Super Computer Systems, Binary numbers, Bits, Bytes, CPU, Input and Output Devices, Main and Auxiliary Stage Devices, Software and Hardware

UNIT II (50 to 100 contents)

Operating Systems and MS Office Introduction to Operating Systems, Windows Applications MS Word, MS Excel. MS Access and MS PowerPoint

UNIT III (50 to 100 contents)

Computer Networks -LAN, WAN, Intranet, Extranet, Service Providers, Modem, Fibre Optics Basic of HTML, WWW, URL, TCP/IP

Teaching Hours: ...

UNIT IV (50 to 100 contents)

Teaching Hours: ...

Multimedia -Basic Elements, Hardware, Application of Multimedia, Introduction Multimedia, Authorizing Tools

UNIT V (50 to 100 contents)

Teaching Hours: ...

Application of Computers in Food Science and Nutrition -Power point presentation, nutrient and diet calculations, nutrition education and counselling, nutrition software and websites, e-journals in Food Science and Nutrition, Use of SPSS.

TEXT BOOKS

- 2. Balagurusamy. E (2008) Computing Fundamentals and C Programming, Tata McGraw Hill Education Private Limited, New Delhi.
- 3. Bansal.S.K (2004) Text Book of Information Technology , APH, Publishing Corporation.

REFERENCE

- 1. Andrew S. Tanenbaum (2009) IV Edition, Computer Networks, Pearson Education And Dorling Kindersley Publishers, Delhi.
- 2. James F. Kurose and Keith W Ross (2008) III Edition, Computer Networking. A Top-Down Approach Featuring the Internet, Pearson Education and Dorling Kindersley Publishers, Delhi.
- 3. Ralf Steinmetz and KlaraNahrstedt (2011) Multimedia- Computing, Communications and Applications, Pearson Education and Dorling Kindersley Publishers, Delhi

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	S	S	S	S	S	М	М	S	-
CO2	-	S	S	S	S	S	М	М	S	-
CO3	-	S	S	S	S	S	М	М	S	-
CO4	-	S	S	S	S	S	М	М	S	-
CO5	-	S	S	S	S	S	М	М	S	-

Semester: IV	Paper type: Open Elective paper – 4 – A (to choose one out of 3)
Paper code:	Name of the Paper: Principles of Nutrition II
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

1. Familiarize students with micro nutrients and studytheir physiological and metabolic role in body.

2. Understand the classification of vitamins and itsfunctions.

3.Differentiate Macro and Micro minerals, functions and deficiencies

Course Out Comes

- 1. After studied unit-1, the student will know the role and importance of fat soluble vitamins.
- 2. After studied unit-2, the student will understand the role and importance of water soluble vitamins.
- 3. After studied unit-3, the student acquire knowledge on micro minerals, deficiency and excess.

4. After studied unit-4, the student will acquire knowledge on micro minerals, deficiency and excess.

5. After studied unit-5, the student will gain knowledge on trace elements, deficiency and excess.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes
	100	100	100	100	100	100

UNIT I (50 to 100 contents)

Fat soluble vitamins-A,D,E and K-, functions, absorption, transport, utilization, storage, excretion, RDA, sources and deficiency.

UNIT II (50 to 100 contents)

Water soluble vitamins - Thiamine, riboflavin, niacin, vitamin B12, folic acid, pyridoxine, panthothenic acid, biotin, and ascorbic acid. functions, absorption, transport, requirement, sources and deficiency .

Unit III (50 to 100 contents)

Macro minerals: Calcium, Phosphorus, Magnesium- Distribution, function, absorption, utilization, source, requirement, effect of deficiency and excess.

Teaching Hours: ...

Teaching Hours: ...

UNIT IV (50 to 100 contents)

Microminerals:-Iron, Iodine, Fluorine, copper and Zinc-Distribution, absorption, function, utilization, sources, requirement, effect of deficiency and excess.

UNIT V (50 to 100 contents)

Trace elements:-Molybdenum, Manganese, Selenium, Chromium - Function, absorption, utilization, sources, requirement, deficiency and excess.

REFERENCE:

- 1. Nutrient requirements and Recommended Dietary Allowances for Indians, ICMR, National Institute of Nutrition, Hyderabad, 2016.
- 2. Dietary guidelines for Indians, ICMR, National Institute of Nutrition, Hyderabad, 2016
- 3. Swaminathan, M. Advanced Textbook on Food Science and Nutrition, Vol:2, Second edition, Reprinted, Bangalore Printed and publishing Co Inc, Bangalore, 2012.
- 4. Krause, M.V and Hunsher, M.A, Food, Nutrition and Diet Therapy, 11th Edition, W.B.Saunders company, Philadelphia, London, 2014.
- 5. Bamji M.S, Prahlad Rao N, Reddy V, Textbook of Human Nutrition II Edition, Oxford and PBH Publishing Co. Pvt. LtdNewDelhi,2014

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	М	S	S	М	-	М	S
CO2	S	S	S	М	S	S	М	-	М	S
CO3	S	S	S	М	S	S	М	-	М	S
CO4	S	S	S	М	S	S	М	-	М	S
CO5	S	S	S	М	S	S	М	-	М	S

Teaching Hours: ...

Semester: IV	Paper type: Open Elective paper – 4 – B (to choose one out of 3)
Paper code:	Name of the Paper: Nutrition in Special conditions
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

1. To learn about the emergency conditions in which the nutritional status of human beings are affected

- 2. Tofamiliarize and prepare students forfeeding and nutrition management during emergencies.
- 3. To know the importance of nutrition management in exercise and sport performance.

Course Out Comes

- 1. After studied unit-1, the student will know about sports nutrition and exercise.
- 2. After studied unit-2, the student will understand the role of nutrition in preparation for competitions.
- 3. After studied unit-3, the student acquire knowledge on high altitude and space travel nutrition.

4. After studied unit-4, the student will acquire knowledge on sea voyage and nutrition.

5. After studied unit-5, the student will gain knowledge on nutritional needs and feeding during emergencies.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Vaa	Vac	Vac	Vac	Vac	Vac
1	ies	res	res	1 85	ies	ies
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT I (50 to 100 contents)

Teaching Hours: ...

Sports - Effect of exercise/ games on muscular, cardiovascular and respiratory activitiesEnergy system - aerobic and aneorobic, fuel modulation on exercise

UNIT II (50 to 100 contents) Teaching Hours: ...

Sports nutrition – Preparation for competition – pre games meal, Carbohydrate loading,

Pre exercise hydration, post game meal. Nutrition during exercise/games – fluid and carbohydrate intake, nutritional factors causing fatigue. Fluid replacement, dietary supplements & ergogenic aids in sports

UNIT III (50 to 100 contents)

Teaching Hours: ...

High altitude nutrition – a. Acclimatization, hydration, nutritional problems and altitude sickness, dietary management of mountaineers, Space travel and nutrition. Space physiology, space food system, dietary intake for space flight

UNIT IV (50 to 100 contents)

Teaching Hours: ...

Sea voyage and Nutrition – Sea sickness. Deep sea diving. Hyperbaric conditions. Effect of high partial pressures of gases in the body. Hyperbaric oxygen therapy, health problems and dietary management

UNIT V (50 to 100 contents) Teaching Hours: ...

Emergency feeding – emergency situations arising from famine, earthquake, flood and Tsunami. Institutional problems in emergencies, Nutritional relief and rehabilitation – Organization involved, Food Distribution Strategies.

REFERENCE BOOKS:

1. Bourland, Charles T., (1998) 'Advances in Food systems for space flight'. Life support and Biosphere Science 5:71-77

2.Guyton, A.C. and Hall J.E,(2001). Pocket companion to text book of Medical Physiology, 10thedition W.B. Saunders company, Philadelphia

3.Lane, Helen W., and Smith, Scott M., (1998). 'Nutrition in space'. In modern nutrition in Health and Disease, 9th edition eds, M.E. Shills, J.H. Olson, M. Shike and AC Ross, Baltimore, William and Wilkins.

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	М	М	-	S	S	М	-	S	S
CO2	S	S	М	-	S	S	М	-	S	S
CO3	S	S	М	-	S	S	М	-	S	S
CO4	S	S	М	-	S	S	М	-	S	S
CO5	S	S	М	-	S	S	М	-	S	S

Semester: IV	Paper type: Open Elective paper – 4 – C (to choose one out of 3)
Paper code:	Name of the Paper: Techniques of Food Evaluation
Credit: 3	Total Hours per Week:Lecture Hours:Tutorial Hours:

- 1. Gain knowledge about different techniques for food evaluation
- 2. Methods of evaluating the quality of foods.
- 3. Understand the microbial quality of foods

Course Out Comes

1. After studied unit-1, the student will describe evaluation of food quality.

2. After studied unit-2, the student will know about evaluation food quality and conduct sensory analysis.

- 3. After studied unit-3, the student acquire knowledge on sensory tests for evaluation of food quality.
- 4. After studied unit-4, the student will gain knowledge methods of evaluation of food quality.

5. After studied unit-5, the student willunderstand the microbial quality of foods and assays uses to check food quality.

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Matching Table (Put Yes / No in the appropriate box)

UNIT I (50 to 100 contents)

Teaching Hours: ...

Teaching Hours: ...

Introduction to Food Evaluation Quality -Definition, Objectives and Need for Evaluation of Food Quality. Factors Affecting the Evaluation of Food Quality – Psychological and Physiological

UNIT II (50 to 100 contents)

Methods of Evaluation of Food Quality – Sensory Method Sensory Characteristics of Food – Appearance, Color, Flavour, Taste, Texture and Consistency, Conducting Sensory Tests – Training Panel Members, Testing Laboratory –Preparation of Samples, Techniques of Smelling and Tasting, Testing time, Design of Experiment, Reasons for Testing Food Quality.

UNIT III (50 to 100 contents)

Sensory Tests used for Food Evaluation -Types of Tests, Difference Tests, Rating Tests, Sensitivity Tests, Descriptive Tests, Interpretation of scores.

UNIT IV (50 to 100 contents)

Teaching Hours: ...

Methods of Evaluation of Food Quality – Objective Methods, Basic Guidelines, Advantages and Disadvantages, Tests Used, Chemical, Physico-chemical, Microscopic, Physical Method, Instruments used for Texture Evaluation.

UNIT V (50 to 100 contents) Teaching Hours: ...

Evaluation of Microbial Quality of Foods Methods, Assays used to assess the Microbial Loads of different Foods, Permitted Levels of Microbial Load in Different Foods, Microbes Responsible for Food Quality.

TEXT BOOKS

- 1. Srilakshmi, B. Second Edition, Food Science, New Age International (P) Limited Publishers, New Delhi.
- 2. Harry T. Lawless, Hildegarde, Sensory Evaluation of Food Principles and Practices, Second Edition, Springer Science, 2010.
- 3. Joshi, V.K Sensory Science : Principles and Applications in Food Evaluation,., 2006.

REFERENCE

- 1. Hutenwigs, B.J. Food Color and Appearance, Published by Blackie Academic and Professional, London, 2000.
- 2. Howard R. Beckley, Jacquiline, H. Sensory and Consumer Research in Food Product Design and Development, 2006
- 3. Bi, Jian, Sensory Discrimination Tests and Measurements: Statistical Principles, Procedures and Tables, 2006

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	-	S	М	-	М	S	S	S	S
CO2	S	-	S	М	-	М	S	S	S	S
CO3	S	-	S	М	-	М	S	S	S	S
CO4	S	-	S	М	-	М	S	S	S	S
CO5	S	-	S	М	-	М	S	S	S	S

Mapping with Programme Outcomes

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self discussion, self learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.

- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- 1. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

ANNEXURE - III BLOOM TAXONOMY OUESTION PAPER SETTING CHECK LIST

O. No.	COs	i.	ii.	iii.	iv.	V.	vi.
2.1.00	005	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
PART -	- A (Two que	stions from each c	ategory except vi.	Creating)	9	8	
1.	CO1			g/			Nil
2.	CO1						Nil
3.	CO2						Nil
4.	CO2						Nil
5.	CO3						Nil
6.	CO3						Nil
7.	CO4						Nil
8.	CO4						Nil
9.	CO5						Nil
10.	CO5						Nil
PART -	B (At the le	ast one question fr	om each category	not more tha	n two question	s from one cat	egory)
11. A.	CO1						
11. B.	CO1						
12. A.	CO2						
12. B.	CO2						
13. A.	CO3						
13. B.	CO3						
14. A.	CO4						
14. B.	CO4						
15. A.	CO5						
15. B.	CO5						
PART -	- C (One que	stion from each ca	tegory except i. Re	membering)			
16.	CO1	Nil					
17.	CO2	Nil					
18.	CO3	Nil					
19.	CO4	Nil					
20.	CO5	Nil					
Total	Marks *						

* Not exceeding 24 total marks in each category of (ii), (iii), (iv) and (v). Not exceeding 14 marks in category (i) and 20 marks in category (vi).

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Revised Bloom - Anderson 2000 Taxonomy: Code and Verbal Content

Definitions	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
Bloom's Definition	Exhibit memory of learned material by recalling facts, terms, basic, concepts, and answers.	Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving, descriptions, and stating main ideas	Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way	Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations	Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions
Verbs	1.1: Choose 1.2:Define 1.3 Find 1.4 How 1.5 Label 1.6 List 1.7 Match 1.8 Name 1.9 Omit 1.10 Recall 1.11 Relate 1.12 Select 1.13 Show 1.14 Spell 1.15 Tell 1.16 What 1.17 When 1.18 Where 1.19 Which 1.20 Who 1.21 Why	2.1 Classify 2.2 Compare 2.3 Contrast 2.4 Demonstrate 2.5 Explain 2.6 Extend 2.7 Illustrate 2.8 Infer 2.9 Interpret 2.10 Outline 2.11 Relate 2.12 Rephrase 2.13 Show 2.14 Summarize 2.15 Translate	3.1 Apply 3.2 Build 3.4 Choose 3.5 Construct 3.6 Develop 3.7 Experiment with 3.8 Identify 3.9 Interview 3.10 Make use of 3.11 Model 3.12 Organize 3.13 Plan 3.14 Select 3.15 Solve 3.16 Utilize	 4.1. Analyse 4.2 Assume 4.3 Categorize 4.4 Classify 4.5 Compare 4.6 Conclusion 4.7 Contrast 4.8 Discover 4.9 Dissect 4.10 Distinguish 4.11 Divide 4.12 Examine 4.13 Function 4.14 Inference 4.15 Inspect 4.16 List 4.17 Motive 4.18 Relationships 4.19 Simplify 4.20 Survey 4.21 Take part in 4.22 Test for 4.23 Theme 	5.1 Agree5.2 Appraise5.3 Assess5.4 Award5.5 Choose5.6 Compare5.7 Conclude5.8 Criteria5.9 Criticize5.10 Decide5.11 Deduct5.12 Defend5.13 Determine5.14 Disprove5.15 Estimate5.16 Evaluate5.17 Explain5.18Importance5.19 Influence5.20 Interpret5.21 Judge5.22 Justify5.23 Mark5.24 Measure5.25 Opinion5.26 Perceive5.27 Prioritize5.28 Prove5.29 Rate5.30Recommend5.31 Rule on5.32 Select	 6.1 Adapt 6.2 Build 6.3 Change 6.4 Choose 6.5 Combine 6.6 Compile 6.7 Compose 6.8 Construct 6.9 Create 6.10 Delete 6.11 Design 6.12 Develop 6.13 Discuss 6.14 Elaborate 6.15 Estimate 6.16 Formulate 6.17 Happen 6.18 Imagine 6.19 Improve 6.20 Invent 6.21 Make up 6.22 Maximize 6.23 Minimize 6.24 Modify 6.25 Original 6.26 Originate 6.27 Plan 6.28 Predict 6.29 Propose 6.30 Solution 6.31 Solve 6.32 Suppose 6.33 Test

		5.33 Support	6.34 Theory
		5.34 Value	