BACHELOR OF SCIENCE IN FOOD SCIENCE AND NUTRITION REGULATIONS

ELIGIBILITY

A candidate who has passed in Higher Secondary Examination with any Academic stream or Vocational stream as one of the subject under Higher Secondary Board of Examination and as per the norms set by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Academic Council, subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the **Bachelor of Science in Food Science And Nutrition Degree Examination** of this College after a course of study of three academic years.

PROGRAMME EDUCATIONAL OBJECTIVES

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

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

SCHEME OF EXAMINATIONS

Course Code	Course	Hrs of Instruction	Max Marks				Credit Points
			Exam Duration (Hrs)	CA	CE	Total	
First Semester							
Part – I							
17UTL11T 17UHL11H 17UML11M 17UFL11F	Language-I Hindi-I Malayalam-I French-I	5	3	25	75	100	3
Part – II							
17UEG12G	English-I	5	3	25	75	100	3
Part – III							
17UFN13A	**Core- I** : Basic Food Science	6	3	25	75	100	5
17UFN13B	**Core -II** : Chemistry of Foods	5	3	20	55	75	5
17UFN13P	**Core Practical - I:** Food Science	4	3	20	30	50	2
17UCY1AA	**Allied- I** : Chemistry- I	3	3	20	55	75	3
Part – IV							
17UFC1FA	Environmental Studies	2	2	-	50	50	2
		30				550	**23**
Second Semester							
Part – I							
17UTL21T 17UHL21H 17UML21M 17UFL21F	Language-II Hindi-II Malayalam-II French-II	5	3	25	75	100	3
Part – II							
17UEG22G	English-II	5	3	25	75	100	3
Part – III							
17UFN23A	**Core - III** :	5	3	20	55	75	4

10/1/2018
BoS Chairman/HOD
Department of Food Science & Nutrition
Dr. N. G. P. Arts and Science College
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	Human Physiology						
17UFN23B	**Core – IV:** Principles of Nutrition	6	3	25	75	100	6
17UCY2AA	**Allied-II :** Chemistry -II	3	3	20	55	75	3
17UCY2AP	**Allied Practical:** Chemistry	4	3	20	30	50	2
Part – IV							
17UFC2FA	**Value Education –** Human Rights	2	2	-	50	50	2
		30				**550**	**23**
Third Semester							
Part – I							
17UTL31U 17UHL31H 17UML31M 17UFL31F	Language-III Hindi-III Malayalam-III French-III	4	3	25	75	100	3
Part – II							
17UEG32G	English-III	4	3	25	75	100	3
Part – III							
17UFN33A	**Core -V :** Nutrition in Health	6	3	25	75	100	5
17UFN33P	**Core practical-II :** Nutrition in Health	4	3	40	60	100	2
17UBC3AA	**Allied Paper – III:** Biochemistry	4	3	20	55	75	3

17UFN3SA	**Skill Based Course –I :** Food Hygiene and Sanitation	4	3	20	55	75	4
Part – IV							
	NMEC: I	2	2	-	50	50	2
17UFC3FA 17UFC3FB/ 17UFC3FC/ 17UFC3FD 17UFC3FE	Tamil/ Advanced Tamil(OR) Non-major elective-I (Yoga for Human Excellence)/ Women's Rights/Constitution of India	2	2	-	50	50	2
		30				**650**	**24**
Fourth Semester							
Part – I							
17UTL41U 17UHL41H 17UML41M 17UFL41F	Language-IV Hindi-IV Malayalam-IV French-IV	4	3	25	75	100	3
Part -II							
17UEG42G	English-IV	4	3	25	75	100	3
Part - III							
17UFN43A	**Core -VI :** Dietetics	5	3	25	75	100	5
17UFN43P	**Core Practical-III:** Dietetics	4	3	40	60	100	2
17UBC4AA	**Allied –IV:** Biochemistry	3	3	20	55	75	3
17UBC4AP	**Allied Practical-II:** Biochemistry	4	3	20	30	50	2

17UFN4SA	**Skill Based Course-II :** Health and fitness	2	3	20	55	75	2
Part - IV							
	NMEC: II	2	3	-	50	50	2
17UFC4FA/ 17UFC4FB/ 17UFC4FC/	Tamil/Advanced Tamil(OR) Non-major elective -II (General Awareness)	2	3	-	50	50	2
17UFN43V	Hospital Internship Project Viva	**Grade A to C**					
		30				**700**	**24**
Fifth Semester							
Part - III							
17UFN53A	**Core –VII:** Food Preservation	6	3	20	55	75	5
17UFN53B	**Core- VIII:** Food Microbiology	5	3	20	55	75	3
17UFN53C	**Core- IX :** Food Processing	6	3	25	75	100	5
17UFN53P	**Core Practical – IV** : Food Preservation and Quality Control	4	3	20	30	50	2
	Elective – I	5	3	20	55	75	4
17UFN5SA	**Skill Based Course-III :** Basic Computer science in Nutrition	4	3	20	55	75	3
		30				**450**	**22**
Sixth Semester							

Part III							
17UFN63A	**Core -X :** Community Nutrition	5	3	25	75	100	4
17UFN63B	**Core –XI:** Food Service Management	4	3	20	55	75	3
17UFN63P	**Core Practical-V:** Nutrition	4	3	40	60	100	2
17UFN63Q	**Core Practical – VI:** Food Product Development	4	3	20	30	50	2
	Elective – II	5	3	20	55	75	4
	Elective – III	5	3	20	55	75	4
17UFN6SV	**Skill Based Course- IV :** Project & Viva	3	3	25	50	75	3
Part – V							
17UFN6EA	Extension Activity	-		50	-	50	2
		30				**600**	**24**
GRAND TOTAL						**3500**	**140**

ELECTIVE – I

(Student shall select any one of the following Course as Elective-I in fifth semester)

S. No	Course Code	Name of the Course
1	17UFN5EA	Food Safety and Quality Control
2	17UFN5EB	Baking Technology

ELECTIVE – II

(Student shall select any one of the following Course as Elective-II in Sixth semester)

S. No	Course Code	Name of the Course
1.	17UFN6EA	Food Product Development and Marketing
2.	17UFN6EB	Nutrition Care Process

ELECTIVE – III

(Student shall select any one of the following Course as Elective-III in Sixth semester)

S. No	Course Code	Name of the Course
1.	17UFN6EC	Clinical Nutrition and Counseling
2.	17UFN6ED	Food Packaging

NON MAJOR ELECTIVE COURSES (NMEC)

The Department offers the following two papers as Non Major Elective Course for other than the Nutrition and Dietetics students.

Student shall select the following subject as Non Major Elective Course during their third and fourth semester

S. No	NMEC	Course code	Name of the Course
1	I	17UNM34G	Fundamentals of Foods
2	II	17UNM44G	Food Preservation

Total Credit Distribution

Courses	Credits	Total		Credits	Cumulative Total	
Part I: Tamil	3	4x100=400		12	24	
Part II: English	3	4x100=400		12		
Part III:						
Core	6	1x100=100		06	62	102
Core	5	4x100=400 2X75=150	550	30		
Core	4	1x100=100 1X75=75	175	08		
Core	3	2x75=150		06		
Core Practical	2	3x50=150 3x100=300	450	12		
Allied Paper	3	4x75=300		12	16	
Allied Practical	2	2x50=100		04		
Elective	4	3x75=225		12	12	
Skill Based Course	4	1x75=75		04	12	
	3	1x75=75		03		
	2	1x75=75		02		
Skill Based Viva	3	1x75=75		03		
Part IV						
EVS	2	1x50=50		02	12	
Value education – Human rights	2	1x50=50		02		
Foundational course	2	2x50=100		04		
NMEC	2	2 x 50 =100		04		
Part V:						

Extension Activity	2	1 x 50 =50	2	02
Total		**3500**	**140**	**140**

FOR PROGRAMME COMPLETION

Students have to complete the following Courses:

1. Language papers (Tamil/Malayalam/French/Hindi, English) in I, II, III and IV semester.
2. Environmental Studies and Human Rights in I and II semester respectively.
3. Allied papers in I, II, III and IV semesters.
4. Two Non Major Elective Courses in III and IV semester.
5. Four Skill Based Courses in III, IV, V and VI semester.
6. Extension activity in VI semester
7. Elective papers in the Fifth and Sixth semesters.
8. Mini Project Viva: Subject code: 17UFN6SV

Students must undergo Hospital Internship for 30 days during IV Semester Summer Vacation. Evaluation of the Report done by the Internal Examiner in the V Semester. Based on their performance Grade will be awarded as A to C.

A- 75 marks and above
B- 60-74 marks
C- 40-59 marks
Below 40 marks – Reappear (RA)

Earning Extra credits is not mandatory for programme completion
Extra credits

S.no	Subject	Credit	Total credits
1	BEC/ Self study courses	1	**1**
2	Hindi / French/ Other foreign Language approved by certified Institutions	1	**1**
3	Type Writing / Short Hand Course	1	**1**
4	Diploma/certificate/CPT/ACS Inter/ NPTEL Course	1	**1**
5	Representation – Academic/Sports /Social Activities/ Extra Curricular / Co-Curricular activities at University/ District/ State/ National/ International	1	**1**
Total			**5**

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

1. Student can opt BEC course/ Self study course to earn one credit. They have to Enroll and complete any one of the course during their programme period before fifth semester (I sem to V sem).

   Self study paper offered by the Nutrition and Dietetics Department

S. No.	Semester	Course Code	Course Title
1.	III	17UFNSS1	Food Fortification
2.		17UFNSS2	Nutrition Education

2. Student can opt Hindi/ French/ Other foreign Language approved by certified Institutions to earn one credit. The certificate (Hindi) must be obtained from **Dakshina Bharat Hindi Prachar Sabha** and He/ she has to enroll and complete during their programme period (**first to fifth semester)**
3. Student can opt for Type writing /short hand course to earn one extra credit. He/she has to enroll and complete the course during their programme period to obtain certificate through **Tamil Nadu Board of Technical Education**
4. Student can opt for Diploma/certificate/CPT/ACS Foundation/ NPTEL Course to earn one extra credit. Student who opt for Diploma/ Certificate course have to enroll any diploma/certificate course offered by Bharathiar University through our Institution. Student who opt for CPT/ ACS/CMA have to enroll and complete the foundation level during the course period. Students who opt for NPTEL course should complete the course certificate through NPTEL.
5. Award Winners in Academic/ Representation in Sports /Social Activities/ Extra Curricular/ Co-Curricular Activities at University/ District/ State/ National/ International level can earn one extra credit.

B.SC FOOD SCIENCE AND NUTRITION

PROGRAMME OUTCOMES

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

PO Number	PO Statement
PO1	Acquire knowledge and develop aptitude in Food Science and Nutrition intended for potential career opportunities.
PO2	Build self-empowerment in food Science and Nutrition and develop effective communication skills sufficient for entry in pre professional practice.
PO3	Apply skills by planning, implementing and evaluating diets to the community in the current scenario.
PO4	Interpret and utilize nutrition techniques in developing novel products to improve the health status of society and promote entrepreneurism.
PO5	Develop professional attributes and portfolio in Food Science and Nutrition that are adopted to serve in diverse professional and community organizations.

17UFN13A	CORE I – BASIC FOOD SCIENCE	SEMESTER-I

PREAMBLE

- To enable students to obtain knowledge of different food groups, their composition, nutritive value and role in daily diet, gain knowledge on principles and various methods of cooking foods.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO 1	List the basic food groups Define various cooking methods	K_1
CO 2	Interpret the nutritive value of food groups Outline the sources, structure, composition, methods and effects of cooking cereals, pulses, fruits and vegetables	K_2
CO 3	Demonstrate the methods of beverage preparation Explain the types and functions of fats and oils Outline medicinal uses of Spices and Condiments	K_2
CO 4	Illustrate milk processing and demonstrate preparation of milk products Identify uses, methods and experiment with effects of cooking egg	K_2
CO 5	Choose the cooking methods appropriate for meat, poultry and fish Solve the effects of cooking on meat, poultry and fish by applying the principles of cooking	K_3

Mapping with Program Outcomes

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

CO_5	S	S	S	S	S

S- Strong; M-Medium; L-Low

17UFN13A	CORE I – BASIC FOOD SCIENCE	SEMESTER-I

Total Credits: 5
Hours/Week: 6

CONTENTS

UNIT –I

Introduction to Food Science: Food groups- 4 (ICMR), 5 and 7, functional food groups-energy yielding, body building and protective foods (only sources), food pyramid.
Methods of cooking: Objectives of cooking. Boiling, steaming, stewing, frying, baking, roasting, broiling, cooking under pressure and microwave cooking.
Cereals: Structure and composition of rice and wheat, effects of cooking on parboiled and raw rice, **Cereal cookery**- Gluten and gelatinization, factors effecting gluten formation and gelatinization. **Millets:** Nutritive value of Ragi, Jowar and Maize.

UNIT –II

Pulses and legumes: Varieties of pulses, legumes and grams, composition, nutritive value, anti
nutritional factors (Trypsin and Tannins), cooking quality of pulses, germination and its effects.
Fruits: Composition, nutritive value, changes during ripening, methods and effects of cooking, enzymatic browning.
Vegetables: Classification, composition, nutritive value, selection and preparation for cooking, methods and principles involved in cooking.

UNIT –III

Beverages - Classification, nutritive value, milk based beverages- methods of preparing tea and coffee, fruit based beverages and preparation of carbonated non – alcoholic beverages. **Sugar:** Stages of sugar cookery.
Fats and Oils: Types of oils, function of fats and oils, shortening effects of oil, smoking point of oil, effect of heat on oil absorption and factors affecting absorption of oil

Spices and Condiments: Functions of spices, medicinal values of Cardamom, Cinnamon, Cloves, Fenugreek, Pepper, Onion, Turmeric, Ginger and Garlic.

UNIT –IV

Milk - Composition, nutritive value, kinds of milk, pasteurization and homogenization of milk, changes in milk during heat processing, role of milk and milk products, preparation of fermented (cheese) and non-fermented (milk powder)

Egg - Structure, composition, selection, nutritive value, uses of egg in cookery, methods of cooking, foam formation and factors affecting foam formation

UNIT –V

Meat -Structure, composition, nutritive value, selection of meat, post mortem changes in meat, aging, tenderness and curing. Methods of cooking meat and their effects.

Poultry: Classification, composition, nutritive value, selection, methods of cooking.

Fish - Structure, composition, nutritive value, selection of fish, methods of cooking and effects.

TEXT BOOKS:

1. *Srilakshmi, B. (2015).* **Food Science.** 3rd Edition. New Delhi: New Age International.
2. *Shakunthala Manay and Shadakhraswamy M., 2008.* **Food Facts and Principles**, Third Edition, New Age International Publishers, New Delhi

REFERENCE BOOKS:

1. *Mudambi .R. Sumathi and Rajagopal M.V (2008),* **Food Science.** New Age International Publishers, New Delhi.
2. *Thangam E. Philip (1998).* **Modern Cookery Volume II, Orient Longman, II Edition**., Hyderabad

17UFN13B	CORE II – CHEMISTRY OF FOODS	SEMESTER-I

PREAMBLE

- To understand the physico-chemical properties of foods
- To analyze the properties with advanced techniques protocols and instrumentation to explore its applications in the field of food science and nutrition.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Illustrate the physico-chemical properties of foods- Moisture in Foods, Hydrogen Bonding, Bound Water, Water Activity Demonstrate Moisture Content in Foods, True Solutions, Dispersions, Sols, Gels, Foams, Colloids and Emulsions	K_1, K_2
CO2	List out the Components of Starch and treatment effects on starch Explain the Stages of Sugar Cookery, Crystal Formation Classify the types of Candies, Action of Acid, Alkali and Enzymes. Illustrate Chemistry of Milk Sugar, Non Enzymatic Browning.	K_1, K_2
CO3	Explain Structure of wheat proteins, pulse proteins, egg proteins, vegetable proteins. Interpret the effect of treatments on various proteins.	K_2
CO4	Identify the Physical and Chemical Properties of fats and oils Explain the techniques of processing fats and oils Summarize the factors affecting Fat Absorption in Foods	K_2,K_3
CO5	Identify the properties, importance of enzymes, enzymes involved in food reactions Choose the plant pigments and its abundant sources	K_3

Mapping with Program Outcomes

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

CO_3	S	S	S	S	S
CO_4	S	S	S	S	S
CO_5	S	S	S	S	S

S- Strong; M-Medium; L-Low

17UFN13B	CORE II – CHEMISTRY OF FOODS	SEMESTER-I

Total Credits: 5
Hours/Week: 5

CONTENTS

UNIT -I

Physico-chemical properties of foods

Moisture in Foods, Hydrogen Bonding, Bound Water, Water Activity in Foods, Determination of Moisture Content in Foods, True Solutions, Dispersions, Sols, Gels, Foams, Colloids and Emulsions

UNIT- II

Chemistry of Starch and Sugars

Components of Starch, Swelling of Starch Granules, Gel Formation, Retro gradation, Syneresis, Effect of Sugar, Acid, Alkali, Fat and Surface Active Agents on Starch. **Sugar**: Types of Candies, Action of Acid, Alkali and Enzymes. Chemistry of Milk Sugar, Non Enzymatic Browning, Crystallization and factors affecting Crystallization of sugar.

UNIT- III

Chemistry of Proteins

Components of Wheat Proteins, Structure, Gluten Formation Effect of Soaking, Fermentation and Germination on Pulse Proteins Properties of Egg Protein, Chemistry of Milk Protein Changes in Milk, Egg and Meat Proteins during heat, action of heat, Acid, Alkalis on Vegetables Proteins and Animal Proteins

UNIT- IV

Chemistry of Fats and Oils

Physical and Chemical Properties of Fats and Oils Rancidity, Hydrogenation, Winterization, Decomposition of Triglycerides, Shortening Power of Fats, Changes in Fats and Oils during Heating , Factors Affecting Fat Absorption in Foods

UNIT -V

Chemistry of Pectic Substances, Plant Pigments

Enzymes – definition, chemical classification, properties of enzymes, importance of enzymes, enzymes involved in food reactions – beneficial and deterioration and its prevention, Pigments – classification, properties and food sources

TEXT BOOKS:

1. *Srilakshmi, B. (2003).* **Food Science,** III Edition, New Delhi: New Age International.
2. *Shakunthalamanay and Shadakhraswamy*, *2008*, **Food Facts and Principles,** Third Edition, New Age International Publishers, New Delhi.
3. *Potter, N. N., & Hotchkiss, J. H.* (2012). *Food science*. Springer Science & Business Media.

REFERENCE BOOKS:

1. *Mudambi .R. Sumathi and Rajagopal M.V (2008)*, **"Food Science",** New Age International Publishers, New Delhi.
2. *Sunetra Roday (2000),* **Food Science and Nutrition,** Edition I, Mangal Deep Publications, New Delhi.
3. *Swaminathan*, M. (1974). Essentials of food and nutrition. Vol. II. Applied aspects. *Essentials of food and nutrition. Vol. II. Applied aspects.*

17UFN13P	CORE PRACTICAL I - FOOD SCIENCE	SEMESTER I

Total Credits: 2
Hours/week: 4

EXPERIMENTS

1. Food group- Grouping of foods, discussion on nutritive value
2. Measuring ingredients -
   Methods of measuring different types of foods – grains, flours and liquids
   Edible portion Determination of edible portion percentage
3. Moist heat methods- Boiling, Simmering, Steaming and Pressure cooking
4. Dry heat methods- baking, Fat as a medium for cooking- shallow and deep fat frying
5. Cereals - Methods of cooking fine and coarse cereals. Examination of starch
6. Pulses - Cooking of soaked, un soaked, germination and fermentation of pulses. Common preparation with pulses
7. Vegetables Experimental cookery using vegetables of different colors and textures
8. Preparation of soups and salads, Common preparation with vegetables
9. Fruits - Prevention of darkening in fruits and vegetables. Fruit salad
10. Experimental cookery – cream of tomato soup, cheese curry and cooking vegetables in milk, common preparation with milk, cheese and curd.
11. Fleshy foods Fish, meat and poultry- preparations
12. Experimental cookery of Egg - boiled egg, poached egg. Common preparations with egg
13. Beverages Preparation of hot beverages- coffee, tea, Preparation of cold beverages-fruit drinks and milk shake
14. Evaluation Development of score card

15. Developing value added foods (Cereals, Millets, Pulses and Vegetable based) any four

17UCY1AA	ALLIED CHEMISTRY-I	SEMESTER – I

PREAMBLE

- To gain knowledge in the basics of chemistry which helps bioscience students to understand chemical bonding in the biomolecules and the techniques involved in the biochemistry.

COURSE OUTCOMES

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

Course Outcome Number	Course Outcome Statement	Knowledge Level
CO1	To gain knowledge in the basics of chemistry which helps the students to understand bonding in molecules, crystals structures and evaluate their bonding characteristics.	K1
CO2	Design a demonstration that enables the students to prepare laboratory solutions.	K2
CO3	To apply the concepts of bondings in organic molecules and relate their displacement reactions with mechanism.	K2, K3
CO4	To know the fundamentals of adsorption techniques. To study the adsorption process and to apply the concepts of chromatography in separation process.	K1 K2, K3
CO5	To know the preparation and uses of synthetic dyes and their application in day today life.	K1, K2, K3

Mapping with Programme Outcomes

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

CO4	M	M	S	S	S
CO5	M	M	S	S	S

S – Strong; M - Medium; L – Low

17UCY1AA	ALLIED CHEMISTRY-I	SEMESTER – I

Total Credits: 3
Hours/Week: 3

CONTENTS

UNIT – I
Chemical bonding

1. Molecular Orbital Theory - bonding, antibonding and nonbonding orbitals. MO configuration of H_2, N_2, O_2, F_2- bond order – diamagnetism and paramagnetism.
2. Ionic Bond: Nature of ionic bond, structure of NaCl and CsCl, factors influencing the formation of ionic bond.
3. Covalent Bond: Nature of covalent bond, structure of CH_4, NH_3, H_2O, shapes of $BeCl_2$, BF_3, based on VSEPR theory and hybridization.

UNIT – II
Solutions

1. Normality, molarity, molality, mole fraction, mole concept.
2. Preparation of standard solutions - primary and secondary standards.
3. Principle of Volumetric analysis.
4. Strong and weak acids and bases - Ionic product of water- pH, pKa, pKb, Buffer solution, pH and pOH simple calculations.

UNIT–III
Basic Organic Chemistry

1. Electron displacement effect in organic compounds - Inductive effect – Electromeric effect - Resonance effect, Hyperconjugation and Steric effect.

2. Isomerism, Symmetry of elements (Plane, Centre and Axis of symmetry), Molecules with one chiral carbon and two adjacent chiral carbons –Optical isomerism of lactic acid and tartaric acid, Enantiomers, Diastereomers, Separation of racemic mixture (chemical, mechanical, biochemical and kinetic), Geometrical isomerism (maleic and fumaric acid).

UNIT – IV

1. **Surface Chemistry**

   Adsorption – adsorbent and adsorbate, adsorption and absorption - chemisorption - physisorption - Difference between chemisorption and physisorption - applications of adsorption - Factors influencing adsorption, adsorption isobar, adsorption isostere.

2. Chromatography - Principles and applications of column, paper and thin layer Chromatography.

UNIT – V

Dyes

1. Terms used – chromophore, auxochrome, bathochromic shift, hypsochromic shift, hyperchromic shift and hypochromic shift. Classification of dyes based on chemical structure and application- Preparation of azo (Methyl orange) and triphenyl methane (Malachite green) dyes.

TEXT BOOKS

1. *R. D. Madan. 2001.* **Modern Inorganic Chemistry**. S. Chand & Company, New Delhi.
2. *Puri, Sharma, Pathania. 2004.* **Principles of Physical Chemistry**, Vishal Publishing Company, Jalandhar.
3. *B.S.Bhal , Arun Bhal,1997.* **Advanced Organic Chemistry,** S. Chand & Co Limited, New Delhi.
4. *M. K. Jain, S. C. Sharma. 2001*. **Organic Chemistry**, Shoban Lal Nayin Chand, Jalandhar.
5. *Gopalan R. 1991.***Elements of Analytical Chemistry**, Sultan Chand & Sons, New Delhi.

17UFN23A	CORE III – HUMAN PHYSIOLOGY	SEMESTER-II

PREAMBLE

- Understand the structure and functions of various organs of the body.
- Obtain a better understanding of the principles of nutrition through the study of physiology.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Define terms specific to the human body Demonstrate knowledge of cellular function Explain the role of body systems and mechanisms	K_1,K_2
CO2	Summarize the structure and functions of the blood & blood components and demonstrate laboratory experiments. Identify the major organs of the cardiovascular system and understand their functions	K_2
CO3	Explain the structure and functions of Sense organs. Illustrate the structure and mechanism of respiratory system functioning, exchange and transportation of gases	K_2
CO4	Illustrate about the reproductive organ and puberty cycle Identify basic components and functions of the endocrine systems	K_2 K_3
CO5	Identify the major structures and function of the gross anatomy of the central nervous system List the major skeletal muscles, their actions and origins Examine how the nervous system controls the body mechanism	K_3

Mapping with Program Outcomes

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

CO 5	M	M	M	M	M

S- Strong; M-Medium; L-Low

17UFN23A	CORE III - HUMAN PHYSIOLOGY	SEMESTER -II

Total Credits: 4
Hours/Week: 5

CONTENTS

UNIT-I

Cell: Structure and functions,

Tissues: Structure and functions of epithelial, connective, muscular and nervous tissue.

Digestive system: structure and functions, digestion, absorption of food. Accessory organs of digestion- salivary gland, liver, gall bladder, pancreas

UNIT-II

Blood: Composition of blood and plasma, blood volume, Red Blood cells: Formation and functions, hemoglobin, anemia, Thalessemia . White Blood cells: Types and functions, Importance of Haemogram, Leukaemia . Platelets-function.

Blood group, blood coagulation , haemorrhagic disorders (Haemophilia and thrombocytopenia) and Rh factor. Lymph -Structure and its functions.

Circulatory system: Heart structure and functions - cardiac cycle, blood pressure and ECG.

UNIT-III

Sense organs: Structure and functions of eye, ear and skin .

Common problems - Eye - conjunctivitis, trachoma, glaucoma, cataract, Ear - deafness, vertigo, motion sickness.

Respiratory system: Basic anatomy of the respiratory system, process of respiration, transport and exchange of oxygen and carbon dioxide in the body

UNIT-IV

Reproductive system - Anatomy of the male and female reproductive organs, menstrual cycle

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

UNIT-V

Excretory system - Excretory organs - structure of kidney and functions, formation of urine, composition of urine.
Muscles - physiology of muscular action.
Central nervous system - Physiology of the nerve cell, parts of the central nervous system and function.

ACTIVITY:

1. Identification of tissues
2. Bleeding time and Clotting time
3. Blood groups – identification
4. Measuring Pulse Rate
5. Demonstration of measurement of Hemoglobin
6. Demonstration of Measuring Blood Pressure
7. Demonstration of RBC, WBC

TEXT BOOKS:

1. *Chatterjee C.C. (1987)*: **Human Physiology,** Vol. I and II, Medical Allied Agency, Calcutta.
2. *Wilson, K.J.W and Waugh, A. (1996):***Ross and Wilson, Anatomy and Physiology in Health and Illness,** 8th Edition, Churchill Livingstone.

REFERENCE BOOKS:

1. *Guyton, A.G. and Hall, J.B. (1996):* **Text Book of Medical Physiology,** (9th Edition, W.B. Sanders Company, Prism Books (Pvt.) Ltd., Bangalore.
2. *Meyer B J, Meij H S and Meyer A C., (1997):***Human Physiology,** AITBS Publishers and Distributors.

17UFN23B	CORE IV – PRINCIPLES OF NUTRITION	SEMESTER-II

PREAMBLE

- To enable students to understand the vital link between nutrition and health, gain knowledge on functions, metabolism and effects of deficiency of nutrients.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the general introduction and history of Nutrition, energy value of foods, Basal metabolic rate., Recommended Dietary Allowances, Classification, functions, digestion, absorption and utilization of carbohydrates and Dietary fiber Intricate the determination and factors influencing of physiological fuel values, SDA of foods.	K_1,K_2
CO2	Elucidate the Classification, functions, sources and requirements, digestion, absorption and utilization of protein, Fats and essential fatty acids Analyze the Protein quality and digestibility coefficient. Construct the calculation Reference protein, essential amino acids and mutual supplementation of dietary protein.	K_2,K_3
CO3	Explicate and evaluate the functions, source, requirements, deficiency disorders of Vitamins	K_2,K_3
CO4	Infer the general functions of minerals in the body and classification of macro and micro minerals. Execute the functions, absorption, utilization, requirements, deficiency and toxicity of Macro and Micro minerals	K_3

CO5	Evaluate the functions of water, water distribution, maintenance of water and regulation of acid-base balance in the body and electrolyte balance.	K_3

Mapping with Program Outcomes

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

S- Strong; M-Medium; L-Low

17UFN23B	CORE IV –PRINCIPLES OF NUTRITION	SEMESTER-II

Total Credits: 6
Hours/Week: 6

CONTENTS

UNIT-I

Introduction to Nutrition - History of Nutrition , Energy **-** Definition of Kilocalories, Joule, energy value of foods, determination, and physiological fuel values, SDA of foods, Basal Metabolic Rate- definition, factors influencing BMR. Recommended Dietary Allowances for energy.
Carbohydrates - Classification, functions, sources, digestion, absorption and utilization. Dietary fiber and health.

UNIT-II

Protein - Classification, functions, sources and requirements, digestion, absorption and utilization, definition and calculation of Protein quality – PER, BV, NPU, digestibility coefficient, reference protein, essential amino acids and mutual supplementation of dietary protein .
Fats and Lipids - Classification, functions, sources and requirement.Importance of essential fatty acids, their requirements and deficiency

UNIT-III

Vitamins – Fat soluble vitamins –A, D, E and K- functions, source, requirements, deficiency **Water soluble vitamins** –The B-complex vitamins (Thiamine, Riboflavin, Niacin, Folic acid, Biotin, pantothenic acid) and Vitamin C - functions, source, requirements and deficiency.

UNIT-IV

Minerals - General functions in the body, classification- macro and micro minerals.
Micro minerals – Iron, Fluorine, Zinc, copper, Iodine -functions, absorption, utilization, requirements, deficiency and toxicity .
Macro minerals – Calcium and phosphorus - functions, absorption, utilization, requirements, deficiency and toxicity

UNIT-V

Water Balance – Functions of water, water distribution, maintenance of water and regulation of acid-base balance in the body. Electrolyte balance

TEXT BOOKS:

1. *Srilakshmi B, 2014,* **Nutrition Science,** Fourth Edition, New Age International Publishers, New Delhi.
2. *Shubhangini A. Joshi, (2014)'*"**Nutrition and Dietetics",** Tata Mc Grow Hill publishing Company Ltd, New Delhi.

REFERENCE BOOKS:

1. *Swaminathan M, (1996),* **Hand Book of Food and Nutrition,** Bangalore Printing Publishing Company, Bangalore
2. *Vijay Kaushik, (2000),***Food Science and Nutrition,**Mangal Deep Publications, New Delhi.

17UCY2AA	ALLIED CHEMISTRY-II	SEMESTER – II

PREAMBLE

- To gain knowledge in the basics of chemistry which helps bioscience students to understand the periodic table, IUPAC nomenclature of organic compounds, enzyme kinetics and water technology.

COURSE OUTCOMES

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

Course Outcome Number	Course Outcome Statement	Knowledge Level
CO1	To know the position of the elements in the periodic table and their properties. To compare and correlate the periodic behavior of elements and their properties.	K1 K2, K3
CO2	To study the preparation, properties, structures and uses of Biomolecules.	K1,K2
CO3	To study and apply the concepts involved in naming organic compounds. To understand the substitution reactions of	K1, K2, K3

	aromatic heterocyclic compounds.	
CO4	To study the spontaneity of the reaction, the nature of catalyst and reaction pathway.	K1, K2
CO5	To know the techniques involved in the purification of water.	K2, K3

Mapping with Programme Outcomes

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

S – Strong; M - Medium; L – Low

17UCY2AA	ALLIED CHEMISTRY-II	SEMESTER - II

Total Credits: 3
Hours/Week: 3

CONTENTS

Preamble

To gain knowledge in the basics of chemistry which helps bioscience students to understand the periodic table, IUPAC nomenclature of organic compounds, enzyme kinetics and water technology.

Course Outcomes

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

Course Outcome Number	Course Outcome Statement	Knowledge Level
CO1	To know the position of the elements in the periodic table and their properties. To compare and correlate the periodic behavior of elements and their properties.	K1 K2, K3
CO2	To study the preparation, properties, structures and uses of Biomolecules.	K1,K2
CO3	To study and apply the concepts involved in naming organic compounds. To understand the substitution reactions of aromatic heterocyclic compounds.	K1, K2, K3
CO4	To study the spontaneity of the reaction, the nature of catalyst and reaction pathway.	K1, K2
CO5	To know the techniques involved in the purification of water.	K2, K3

Mapping with Programme Outcomes

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

S – Strong; M - Medium; L – Low

17UCY2AA	ALLIED PAPER – CHEMISTRY II	SEMESTER II

UNIT - I

Periodic Table

1. Long form of periodic table – Classification of elements on the basis of electronic configuration – Periodicity in properties – Causes of periodicity and factors affecting the magnitude of atomic and ionic radii, electron affinity, ionization energy, electronegativity.

UNIT - II

1. Carbohydrates - Classification, preparation, properties and structure of glucose, fructose, inter conversion of glucose to fructose and fructose to glucose, mutarotation.

2. Vitamins - Sources of vitamins, diseases caused by the deficiency of vitamins.

UNIT - III

1. IUPAC Nomenclature of organic compounds – alkanes, alkenes, alcohols, aldehydes, ketones, carboxylic acids (mono and dicarboxylic), benzene and naphthalene derivatives.

2. Heterocyclic Compounds – Preparation and properties (physical, chemical and electrophilic substitution reactions) of furan, pyrrole, pyridine and thiophene.

UNIT – IV

Chemical Kinetics

1. Rate of reaction, rate law, order, molecularity, first order rate law, half life period of first order equation, pseudo first order reaction, zero and second order reactions. Derivation of rate expression for I and II order kinetics.

2. Catalysis – homogenous, heterogeneous and enzyme catalysis (definition only), enzymes used in industry, characteristics of catalytic reactions.

UNIT - V

Water Technology:

1. Introduction- dissolved impurities in water – hard water – disadvantages of hard water, hardness, estimation of hardness by EDTA titration.

2. Softening methods – zeolite ,demineralization process, reverse osmosis – purification of drinking water, biological oxygen demand (BOD) and chemical oxygen demand (COD).

TEXT BOOKS:

1. *R. D. Madan. 2001.***Modern Inorganic Chemistry**. S. Chand & Company, New Delhi,.
2. *Puri , Sharma, Pathania. 2004.***Principles of Physical Chemistry**, Vishal Publishing Company, Jalandhar.
3. *M. K. Jain, S. C. Sharma. 2001*. **Organic Chemistry**, Shoban Lal Nayin Chand, Jalandhar.
4. *Gopalan R. 1991.***Elements of Analytical Chemistry**, Sultan Chand & Sons, New Delhi.
5. *N Krishnamurthy, K Jeyasubramanian, P Vallinayagam.*2000. **Applied chemistry**, Tata McGraw-Hill Publishing Company limited, New Delhi.

17UCY2AP	ALLIED PRACTICAL I	SEMESTER II

Total Credits: 2
Hours/Week: 4

I Volumetric analysis

1. Estimation of Sodium Hydroxide using standard Sodium Carbonate.
2. Estimation of Hydrochloric acid using standard Oxalic acid.
3. Estimation of Oxalic acid using standard Sulphuric acid.
4. Estimation of Ferrous sulphate using standard Mohr salt solution.
5. Estimation of Oxalic acid using standard Ferrous sulphate solution.
6. Estimation of Ferrous ions using Mohr salt solution.

II Organic Analysis

1. To distinguish between aliphatic & aromatic.
2. To distinguish between saturated & unsaturated.
3. Detection of Elements (N, S, Halogens).
4. Functional group tests for phenols, acids (mono & di), aromatic primary amine, monoamide, diamide, carbohydrate.
   Functional group characterized by Confirmatory test.

TEXT BOOK:

1. *V. Venkateswaran, R. Veeraswamy& A. R. Kulandaivelu. 2004*. **Basic Principles of practical chemistry**, Sultan Chand & Co.

17UFN33A	CORE V - NUTRITION IN HEALTH	SEMESTER - III

PREAMBLE

- To enable the students to understand the nutritional demands in various stages of life cycle and acquire skills in planning adequate meals in different stages of life cycle.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO 1	Understand the basic principles and factors to be considered while planning menu for different age groups, Illustrate the recommended Dietary Allowance - RDA for Indians, basic requirement for various activities.	K_1,K_2
CO 2	Explain the stages of pregnancy, Normal growth and weight change, complications, Nutritional requirements and meal planning. Analyze the physiology of lactation, hormonal control and relaxation. Examine the nutritional components of colostrum and mature milk, Nutritional requirements of lactating women, Meal planning	K_2,K_3
CO 3	Assess the growth and development, factors influencing growth, difference between breast feeding and bottle feeding, factors to be considered in bottle feeding. Distinguish the different types of milk formulae. Design the preparation of Weaning foods and compare commercially and other organization foods. Compare the uses of growth chart to monitor growth and development, Nutritional requirements of infants' up to one year, Problems of feeding in normal and premature infants.	K_2,K_3

CO 4	Elaborate the nutritional requirements of toddlers and school going children, Originate the factors to be considered while planning meals for pre-school children. Rate the eating problems of children and their management, Develop packed lunches for toddlers and school going children.	K_2,K_3
CO 5	Evaluate the physical growth - changes, nutritional requirement, and nutritional problems in adolescence- iron deficiency anemia, obesity, anorexia nervosa and bulimia nervosa. Explain the nutritional needs in relation to occupation, Discuss the nutrition in menopausal women, hormonal changes. Design low cost balanced food Infer the physiological changes in ageing- psycho-social and economic factors affecting eating behavior, Originate the nutritional problems of aged and their management	K_3

Mapping with Program Outcomes

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

S- Strong; M-Medium; L-Low

17UFN33A	CORE-V : NUTRITION IN HEALTH	SEMESTER- III

Total Credits: 5
Hours/Week: 6

CONTENTS

UNIT I

Basic Principles of Meal Planning – Basic Principles and factors to be considered while planning menu for different age groups, Recommended Dietary Allowance - RDA for Indians, basis for requirement, energy allowance for different growth pattern of children, energy allowance for various activities. Low cost balanced diet and its dietary guidelines.

UNIT II

Nutritional needs during Pregnancy – Stages of pregnancy, Physiological changes during pregnancy, Normal growth and weight change, complications, Dietary problems, Nutritional requirements and meal planning **Nutrition during Lactation** - physiology of lactation, hormonal control and relaxation, nutritional components of colostrums and mature milk, Nutritional requirements of lactating women, Meal planning

UNIT III

Nutrition during Infancy - Growth and development, factors influencing growth, difference between breast feeding and bottle feeding, factors to be considered in bottle feeding. Different types of milk formulae.
Supplementary and Weaning Foods – Guidelines for formulation of weaning foods- Commercially and other institutions. Uses of growth chart to monitor growth and development, Nutritional requirements of infants' up to one year, Problems of feeding in normal and premature infants.

UNIT IV

Nutritional needs of toddlers and School children – Nutritional requirements of toddlers and school going children, Factors to be considered while planning meals for pre-school children. Eating problems of children and their management, packed lunch

UNIT V

Nutrition during Adolescence - Physical Growth - changes, Nutritional requirement, Nutritional problems in adolescence- Iron deficiency anemia, obesity, anorexia nervosa and bulimia nervosa.
Nutritional needs of adults – In relation to occupation, Nutrition in Menopausal women, nutritional needs during hormonal changes.
Geriatric Nutrition - Physiological changes during aging- psycho-social and economic factors affecting eating behavior, Geriatric Nutritional problems and their management

TEXT BOOKS:

1. *B. Srilakshmi,* **Dietetics**, 2014, Edition VII, New Age International Pvt. Ltd, New Delhi
2. ICMR- **Nutritive value of Indian Foods**, 2014.
3. Ravinder Chadha& Pulkit Mathur, **Nutrition A lifecycle approach**, 2015. Edition-I, Orient Blackswan Pvt ltd, New Delhi

REFERENCE BOOKS:

1. Shills, E.M. Olson, A.J. and Shike, Lea and Febiger ***Modern Nutrition in Health and Diseases****, 1994*
2. *Bonnie S. Worthinton, Roberts, Sue Rod well Williams,* **Nutrition throughout the life cycle,** 1996. The McGraw- Hill company

17UFN33P	CORE PRACTICAL II - NUTRITION IN HEALTH	SEMESTER - III

Total Credits: 2
Hours/Week: 4

PREAMBLE

- To enable the students to prepare and serve the planned menu and determine the nutrient content of the menu per meal and per portion.

CONTENTS

1. Food groups
2. Planning a menu for a pregnant mother and display a prepared items
3. Planning a menu for a lactating mother and display prepared items and calculate nutritive value for the prepared menu.
4. Preparation of low cost supplementary and weaning foods
5. Planning and preparing diet for infants
6. Planning and preparing diet for preschool children
7. Planning and preparing diet for school going children and
8. Planning and preparing diet for adolescent girls and boys
9. Planning and preparing diet for low, medium, high income groups and based on sedentary, moderate and heavy workers – Adult (Men and Women).
10. Planning and preparing diet for Geriatrics.

17UBC3AA	ALLIED - III: BIOCHEMISTRY	SEMESTER – III

Preamble:

1. This course provides an overview of nature of biological macromolecules namely carbohydrate, lipids, proteins and nucleic acids.
2. Students can gain basic knowledge and key understanding of the role of Vitamins, Minerals and Hormones in the functioning of cell.

Course Outcome:

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

CO number	CO Statement	Knowledge Level
CO1.	Outline the chemical characteristics, types and importance of carbohydrates.	K1 & K2
CO2.	Define and classify lipids. List and compare saturated and unsaturated fatty acids. Summarize the physiochemical properties of lipids.	K1 & K2
CO3.	Compare the different structural levels & Organization of proteins with suitable examples. Classify the standard amino acids and list the non protein aminoacids Experiment with aminoacids.	K1, K2 & K3
CO4.	Define Nucleic acids. Identify the structures of purines, pyrimidines, nucleoside and nucleotides. Classification and identification different forms of DNA and RNA.	K1, K2 & K3
CO5.	Define and classify vitamins. Explain the functions of minerals in biological system. Illutrate the role of hormones in metabolic regulation.	K1 & K2

Mapping with Programme Outcomes:

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

L-Low; M-Medium and S-Strong.

17UBC3AA	ALLIED - III: BIOCHEMISTRY	SEMESTER – III

Total Credits: 3
Hours Per Week: 4

CONTENTS

UNIT - I

Carbohydrate – classification, structure, properties & chemical reactions of monosaccharide – Glucose, Fructose, Galactose, Mannose, Arabinose. Disaccharides – Maltose, Lactose and Sucrose. Polysaccharides – Homo polysaccharides – Starch, Glycogen and Cellulose & Hetero polysaccharides – Hyaluronic acid, Heparin, Chondroitin sulphate. Biological importance of sugar derivates – glycosaminoglycan, proteoglycan & glycoprotein – Blood group & Bacterial cell wall polysaccharides.

UNIT - II

Lipids: Definition classification of lipids, physiochemical properties. Storage lipids – fatty acids – types. Structural lipids – phospholipids, glycolipids & sphingolipids. Structure & Biological role of cholesterol.

UNIT - III

Classification of amino acids, general properties, Non protein amino acids. Peptide bond – structure & conformation, Protein classification, Physiochemical properties of proteins. Organization of protein Structure – Primary, Secondary (Keratin, Collagen) Tertiary (Myoglobin), Quaternary structure (Hemoglobin).

UNIT - IV

Structures of Purines, Pyrimidines, Nucleoside & Nucleotides. Properties of nucleic acids. DNA Double helical structure – Isoform. RNA – Types – mRNA, tRNA, rRNA - structure & function.

UNIT - V

Minerals in biological system & their importance – Iron, Calcium, Phosphorous, Iodine, Copper, Zinc. Vitamins – Definition, classification: Fat soluble (Vitamin A,D,E,K) and Water Soluble vitamins (Vitamin B)- Sources, functions and deficiencies. Role of vitamins as antioxidants & cofactors. Hormones involved in regulatory metabolism: Insulin, Glucagon and thyroid.

TEXT BOOKS:

1. *J.L.Jain.* 2016. **Fundamentals of Biochemistry,** 7th edition. S. Chand and company Ltd.
2. *Sathyanarayana U.* 2013. **Biochemistry,** 4th Edition. Books and Allied (P) Ltd.
3. *Stryer L.* 2011**. Biochemistry,** 7th Edition. W. H. Freeman and Company, New york.

REFERENCE BOOKS:

1. *Zubay***,** 1999**. Biochemistry,** 4th edition. William.C.Brain publishers.

17UFN3SA	SKILL BASED COURSE I- FOOD HYGIENE AND SANITATION	SEMESTER - III

PREAMBLE

- To understand design food hygiene and sanitation measure to control the spread of micro organisms and the links between water, sanitation and health.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Plan the layout and design the physical kitchen layout to maintain the food sanitation and hygienic techniques for developing industrial sectors to current scenario	K_1 , K_2
CO2	Choose and demonstrate the Safe and effective insect and pest control methods to maintain the quality standards in sanitation and hygiene at House hold level	K_1 , K_2
CO3	Experiment the Standardization on Purification and disinfection of water to improve the food safety and health of the community and recycle the waste water to free from communicable diseases	K_3
CO4	Apply and find the effective cleaning technology to maintain the sanitation standards of the environmental household level	K_3
CO5	Identify and plan the sanitary evaluation of food processing unit to maintain the sanitation and hygienic practices to prevent health issues among the personnel	K_3

Mapping with programme outcomes

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

S-Strong;M-Medium;L-Low

17UFN3SA	SKILL BASED COURSE I- FOOD HYGIENE AND SANITATION	SEMESTER - III

Total Credits: 4
Hours/week: 4

CONTENTS

UNIT-I
Food hygiene
General principle of food hygiene, Hygiene in rural and urban areas in relation to food preparation, personal hygiene and food handling habits, Place of sanitation in food plants, Sanitary aspects of building and equipment: Plant layout and design, Comparative studies on sanitary fabrication of different types of processing equipments.

UNIT-II
Safe and effective insect and pest control
Extraneous materials in foods, Principles of Insects and pests control, Physical and chemical methods of control, Effective control of micro-organisms: micro-organisms as indicator of sanitary quality

UNIT-III
Sanitary aspects of water supply
Source of water, quality of water, water supply and its uses in food processing unit, Purification and disinfection of water, preventing contamination of potable water supply

UNIT-IV
Cleaning practices
Effective detergency and cleaning practices: Importance of cleaning practices, physical and chemical factors in cleaning, classification and uses of detergents and sanitizers.

UNIT-V
Sanitation practices
Sanitary aspects of solid and liquid waste disposal system, Establishing and maintaining sanitary practices in food processing unit, sanitation principle and the requirements for a food sanitation program, role of sanitation, general sanitary consideration and sanitary evaluation of food plants

TEXT BOOKS:

1. *David ME. S.* **Essential of Food Safety and Sanitation, 1998,** Edition I, Prentice Hall, New Jercy
2. *S. Roday.*, **Food Hygiene and Sanitation in Food Industry, 1999,** edition I, TMH, New Delhi

REFERENCES:

1. *Asmita T.,* **Catering Science and Food Safety, 2011**, Edition I, Anthor
2. *Roger Y. S.* **Basic Food Microbiology, 1989,** Edition I, CBS, New Delhi (Swaminathan book) added

17UFN43A	CORE VI - DIETETICS	SEMESTER- IV

PREAMBLE

To understand significance of diet therapy for various diseases and to appreciate the science of dietetics

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the principles of diet therapy and explain the role of dietitian, Demonstrate Nutrition Care Process Identify different diets for various disease stages	K1, K_2
CO2	Infer the signs, symptom and causes and explain the nutritional management of underweight, obesity, gastrointestinal diseases and nutrient deficiency and diet plan	$K_{2,}$ K3
CO3	Infer the signs, symptom and causes of diseases and explain the nutritional management for liver, gall bladder and cardio vascular system and diet plan	K2, K_3
CO4	Infer the signs, symptom and causes and explain the nutritional management for Diabetes mellitus and the diseases of the kidney and urinary tract and diet plan	K2, K_3
CO5	Infer the signs, symptom and causes and explain the nutritional management for Cancer, Food Allergy, Infections and Fever and diet plan	K2, K_3

Mapping with Program Outcomes

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

S - Strong; M - Medium; L- Low

17UFN43A	CORE VI - DIETETICS	SEMESTER -IV

Total Credits: 5
Hours/Week: 5

CONTENTS

UNIT I

Objectives of diet therapy - Role of a dietitian, Principles of diet preparation and counseling Normal diet in the hospitals – liquid, semi liquid, light, soft diet, bland diet and regular diet. Nutrition Care process. Different types of feeding - Basic concepts of oral feeding, tube feeding, IV feeding, gastrostomy feeding. Diet in infection and fever .

UNIT- II

Therapeutic diets for the disorders: Under weight and Obesity - definition, etiology, treatment. Diseases of the gastro intestinal tract- ulcer, constipation, diarrhea and malabsorption syndrome. Diet in relation to nutrient deficiencies -Protein energy malnutrition, vitamin A deficiency and anemia

UNIT- III

Diseases of the liver and gall bladder (risk factors and diet therapy) - Jaundice , Hepatitis,
Cirrhosis, Fatty liver, Cholecystisis and Cholelithiasis
Diseases of the cardio vascular system (risk factors and diet therapy)
Atherosclerosis, Arteriosclerosis, Hypertension and Heart Failure

UNIT- IV

Diabetes mellitus – Types, causes, symptoms, diagnosis, bio-chemical changes, insulin and
hypo- glycemic drugs (types only), food exchange list, dietary management
Diseases of the kidney and urinary tract - Acute and chronic nephritis, Nephrotic syndrome
Renal failure, Urinary calculi
Causes and dietary treatment of kidney diseases and dialysis

UNIT- V

Nutrition and cancer - Dietary guidelines for management
Diet in Allergy - Definition, classification, common food allergy, test of allergy, diet therapy.

Text Books

1. Srilakshmi B. , **Dietetics**, 2014, VII Edition. New Age International (P) Limited Publishers, New Delhi
2. Shubhangini. A. Joshi (2002) **Nutrition and dietetics**, Tata Mc Graw-Hill publishing Company limited, New Delhi

REFERENCE BOOKS:

1. Carolynn E.Town send and Ruth A. Roth (2002) **Nutrition and Diet Therapy**, Delmar Publisher
2. Sue Rod Williams, **Nutrition and diet Therapy**, Times Mirror Mosby College publishing, Boston, 1989.

17UFN43P	CORE PRACTICAL III- DIETETICS	SEMESTER - IV

Total Credits: 2
Hours/Week: 4

PREAMBLE

- To enable students to plan, prepare and serve different therapeutic diets and assess the nutritive value of the diets

CONTENTS

1. Weights and measures of foods.
2. Menu planning, prescription and preparation of
    a. Normal diet, regular diet, light diet, soft diet, full liquid diet, clear liquid diet and bland diet.
    b. Diet for obesity
    c. Diet for under weight
    d. Diet for anemia
    e. Diet for diseases of the GI tract – peptic ulcer, diarrhoea, constipation
    f. Diet for Cardio-vascular diseases- atherosclerosis, hypertension
    g. Diet for diseases of the kidney – nephritic and nephrotic syndrome, Diet before and after dialysis
    h. Diet for diabetes – Type I and II, Diabetes with CVD disease Diet in febrile conditions- Short duration – typhoid; long duration – tuberculosis
    i. Diet in liver diseases – Viral hepatitis and cirrhosis
3. Observation of a dietary department in a hospital.
4. Preparation of power point presentations on diet and disease conditions.

17UBC4AA	ALLIED - IV: BIOCHEMISTRY	SEMESTER – IV

Preamble:

1. This course provides an overview of information related to carbohydrate, fat and protein metabolism that takes place in our body and know the interrelationship between carbohydrate, fat and protein metabolism.
2. Students can gain basic knowledge and key understanding on principles underlying chromatography and electrophoresis methods.

Course Outcome:

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

CO number	CO Statement	Knowledge Level
CO1.	Tell the basic concepts of pH and Buffers and explain the role of buffers system in our body fluids. Demonstrate the importance of the various chromatographic techniques.	K1 & K2
CO2.	Outline the various electrophoretic techniques. Compare colorimetry and spectrophotometry. Define radioactivity and summarize the applications of isotopes.	K1 & K2
CO3.	Understand and apply concepts involved in thermodynamics. Recall respiratory chain and oxidative phosphorylation.	K1, K2 & K3
CO4.	Describe what happens during glycolysis, glycogenesis, and glycogenolysis. Explain the events that make up the process of TCA cycle and HMP shunt. Understand the chemical logic of lipid metabolic pathways.	K1, K2 & K3
CO5.	Explain how amino acids are synthesized and degraded. Outline their interrelations of carbohydrate, lipid and protein metabolism.	K1 & K2

Mapping with Programme Outcomes:

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

L-Low; M-Medium and S-Strong.

17UBC4AA	ALLIED - IV: BIOCHEMISTRY	SEMESTER – IV

Total Credits: 3
Hours Per Week: 3

CONTENTS

UNIT I

Buffers: Concept of acid base indicators, buffer systems of blood and body fluids, Components of the pH meter and the concept of pH
Chromatography: Paper, TLC, molecular sieve and affinity chromatography - their applications.

UNIT II

Electrophoresis: Paper and Gel electrophoresis.
Principles and applications of colorimetry and spectrophotometry.
Isotopes: Definition and units of radioactivity: examples of natural and heavy isotopes in biological investigations.

UNIT III

Bioenergetics: Basic principles of thermodynamics – entropy, enthalpy and free energy; highenergy phosphates, oxidation-reduction reactions.
Mitochondria: - Respiratory chain and oxidative phosphorylation.

UNIT IV

Metabolic pathways:
Carbohydrate metabolism: Glycolysis, TCA cycle, HMP shunt, Glycogenesis and glycogenolysis.
Lipid metabolism: Beta-oxidation, biosynthesis of saturated fatty acids - Palmitic acid

UNIT V

Protein metabolism: General pathway of amino acid metabolism – deamination, transamination and decarboxylation. Urea cycle. Glycine and

phenylalamine metabolism (structures not required).
Inter-relationship of carbohydrate, fat and protein metabolism (Flow chart only).

TEXT BOOKS:

1. *Deb A.C.* (2001). **Fundamentals of Biochemistry,** 9th edition, New Central Book Agency, Kolkatta.
2. *Chatterjea M. N.* (2012)**, Textbook of Medical Biochemistry,** 8th edition, *Jaypee Brothers,* New Delhi.

REFERENCE BOOKS:

1. *Nelson, D.L., Cox, M.M.* 2008. Lehninger **Principles of Biochemistry**, 5th edition, W.H. Freeman and Company, New York.

2. *Murray R.K., Granner D.K, Mayes P.A and Rodwell U. W.,* (2015)**, Harper's Biochemistry,** 30th edition, Lange Medical Publications.

3. *D.T. Plummer*, (2006), **An Introduction to Practical Biochemistry,** 3rd edition, TMH, New Delhi.

17UBC4AP	ALLIED PRACTICAL - II: BIOCHEMISTRY	SEMESTER – IV

Total Credits: 2
Hours Per Week: 4

CONTENTS

1. **Analysis of Carbohydrates:**
   a. Monosaccharide - Pentose- Arabinose. Hexoses- Glucose, Fructose,
   b. Disaccharides - Sucrose, Maltose and Lactose
   c. Polysaccharide - Starch.

2. **Analysis of Amino acids:**
   a. Histidine
   b. Tyrosine.
   c. Tryptophan
   d. Arginine

3. **Characterization of lipids**
   1. Determination of acid number.
   2. Determination of iodine number.

4. **Quantification technique**

a. Quantification of Protein by Lowry *et al* method
b. Quantification of Carbohydrate by DNSA method

REFERENCE BOOKS:

1. *D.T. Plummer*, (2006), **An Introduction to Practical Biochemistry,** 3rd edition, TMH, New Delhi.
2. *Pattabiraman T. N and Sitarama Acharya U.* (2015)**. Laboratory Manual in biochemistry,** 4th Edition. All India Traveller Book Seller.
3. *J Jayaraman, (*2015)**. Laboratory manual in Biochemistry.** 5th Edition. New Age International (P) Ltd.

17UFN4SA	SKILL BASED COURSE II- HEALTH AND FITNESS	SEMESTER - IV

Total Credits: 2
Hours/Week: 2

PREAMBLE

To understand the importance of health for quality living of foods and to appreciate the significance of food and exercise for good health.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Define health List the functions of food Explain the constituents of foods and their functions	K1, K_2

CO2	Explain the importance of health education Demonstrate personal hygiene Explain the scope of physical education Compare yoga with other gymnastic exercises	K_2
CO3	Explain kinanthropometry Identify the nutrition requirements during training and performance for athletes and endurance games	K2, K_3
CO4	Contrast Aerobic and anaerobic exercise Explain carbohydrate loading Illustrate the exercises to maintain fitness Identify the Ergogenic aids in Sports and Exercise. Plan the energy need of sports persons	K2, K_3
CO5	Identify the health club equipments and activities	K_3

Mapping with Program Outcomes

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

S - Strong; M - Medium; L- Low

17UFN4SA	HEALTH AND FITNESS	SEMESTER - VI

Total Credits: 2
Hours/week: 2

CONTENTS

UNIT I

Health – Definition, concept/ meaning of health and factors affecting health. Health promotion: Definition of food, Nutrition, Nutrients and Nutritional status. Functions of food – Physiological, psychological and socio - cultural functions, constituents of food and their functions

.

UNIT- II

Physical Fitness Assessment: Simple, Intermediary and combined

Health education – Definition, importance of health education, personal hygiene Physical education – Meaning and scope, role of gymnastic exercises and yoga in improving health, Difference between yoga and other gymnastic exercises

UNIT- III

Sports nutrition –Introduction to kinanthropometry, Requirements during training and performance for athletes and endurance games

UNIT- IV

Aerobic and anaerobic exercise, fuel for exercise, glycogen load

Exercise to maintain fitness – demand in exercise and sports. Ergogenic aids in Sports and Exercise. Determination of Energy Expenditure in Sports and Exercise

UNIT- V

Health club equipments and activities – Tread mill, hammer strength, steppers, cycles, body sculpting, kick boxing, Reebok ridge rocker, hanging, hand grips, swing, climbing and lifting weight**.**

Text Books

1. Kathleen M. L. Krause's– Food, Nutrition and Diet therapy, 2004, 11th Edition,

WB Saunders Company, Philadelphia

2. Williams M. H., Nutrition for Health, Fitness and Sports, 2002, Edition 5, Mc Craw Hill

Book Company, New Delhi

Reference Books

1. Judy A. D. Nutritional assessment for Athletes, 2002, Edition I, CRC Press, New York

2. Liane M. S. Nutrition, Exercise and Behaviour, 2001, Edition I, Wordsworth, Australia

17UFN53A	CORE VII – FOOD PRESERVATION	SEMESTER - V

PREAMBLE

- Enable students to understand the principles of food preservation and acquire skills in methods of food preservation and their applications in food industries

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	List the general principles and methods of food preservation Recall about the preservation by addition of sugar and salt	K1
CO2	Explain about the preservation by Use of High Temperature Illustrate about thermal death curve, calculation of process time, methods of heat transfer Compare the steps, merits and demerits and of canning and bottling Explain about principle of dehydration, types, merits and demerits of driers	K2
CO3	Explain about the preservation by use of low temperature – Illustrate about the types-refrigeration, freezing and its merits and demerits Outline the requirement of refrigerated storage, characteristic of refrigerant, refrigeration during transport, defects in cold storage	K2,K3
CO4	Explain about the preservation with chemicals Classify and summarize the role of the chemicals in preservation - Inorganic and Organic preservatives, Antibiotics, Mold inhibitors, Antioxidants and its role in preservation	K2,K3

CO5	Explain about the Food irradiation and Ohmic heating Techniques Illustrate about the Semi moist foods	K2,K3

Mapping with Program Outcomes

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

S- Strong; M-Medium; L-Low

17UFN53A	CORE VII – FOOD PRESERVATION	SEMESTER - V

Total Credits: 5
Hours/Week: 6

CONTENTS

UNIT- I

Food preservation - Definition, General Principles and Methods of Food Preservation - Classification of foods for processing, Preservation by addition of **sugar-** General principles and preparation of chemical preserves - jams, jellies, Marmalades, squashes and syrups, Preparation of candies theories of gel formation, **Preservation by addition of salt** – Pickling, Preparation of Indian Pickles, Sauerkraut.

UNIT – II

Preservation by Use of High Temperature – Condensation, Evaporation, methods of sterilization and pasteurization.
Canning - steps, types of cans, advantages, disadvantages, thermal death curve, calculation of process time, methods of heat transfer. Techniques- Ohmic heating of foods and pulse electric field

Bottling - steps, advantages, disadvantages.
Food dehydration - concept of dehydration and sun drying, Types of driers- advantages, Disadvantages, **Principle of dehydration**-heat and mass transfer

UNIT – III

Preservation by use of Low Temperature- Types - Common types of cold storage, refrigeration- requirement of refrigerated storage, characteristic of refrigerant, refrigeration during transport, defects in cold storage.
Freezing - Principles and methods of freezing, Freeze drying. Advantages and disadvantages

UNIT – IV

Preservation with chemicals

Mechanism of microbial inhibition, mechanism and action of preservatives in processed food, Inorganic and Organic preservatives. Antibiotics, Mold inhibitors, Antioxidants and its role in preservation.

UNIT – V

Food irradiation-Types, Sources and units of radiation, Applications and Effect of irradiation on food components.
Preservation of Semi moist foods - Principles, Method involved in preservation of Intermediate moist foods

TEXT BOOKS:

1. *Manoranjan Kalia, Sangita Sood,* **Food Preservation and Processing, 2012,** Edition II, Kalyani Publishers, Ludhiana, India
2. *Vijaya Khader*, **Preservation of Fruits and vegetables, 1999,** Edition I, Kalyani Publishers, Ludhiana, India

REFERENCE BOOKS:

1. *Sivasankar B.,* **Food Processing and Preservation, 2002,** Edition I, PHI, New Delhi
2. **The Complete Technology book on Processing,** *Dehydration, Canning, Preservation of Fruits and Vegetables, 2008*

17UFN53B	CORE VIII - FOOD MICROBIOLOGY	SEMESTER - V

PREAMBLE

- To enable students to understand the The nature of foods and the causes of deterioration and the principles underlying food processing and the improvement of foods for the consuming public.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO 1	Understand the general importance of microorganisms in food. Intricate the Factors affecting the growth of microorganisms in food– pH, temperature, moisture, oxidation – Reduction potential, , Nutrient content and Inhibitory substances and biological structure.	K_1,K_2
CO 2	Illustrate the role of Microorganism in Food Safety Outline the GMP and Explain HACCP	K_2
CO 3	Summarize and Identify the Fermented food – Bread, dairy products, Fermented beverage, fermented fish and meat products	K_2,K_3
CO 4	Explain the Spoilage of food - cereals, vegetables, fruits, egg and milk – canned foods.	K_2, K_3
CO 5	Evaluate the Food borne diseases – Food poisoning and Food borne infections . Investigation of food poisoning outbreaks of Bacterial and Mycotoxins	K_3

Mapping with Program Outcomes

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

CO_3	S	S	S	S	M
CO_4	S	S	S	S	S
CO_5	S	S	S	S	S

S- Strong; M-Medium; L-Low

17UFN53B	CORE-VIII - FOOD MICROBIOLOGY	SEMESTER - V

Total Credits: 3
Hours/Week: 5

CONTENTS

UNIT – I

Food and Microorganisms – Important microorganisms in food (Bacteria, Mold and yeasts); Factors affecting the growth of microorganisms in food– pH, moisture, temperature, oxidation – Reduction potential, Nutrient content and Inhibitory substances and biological structure.

UNIT – II

Microbiology in Food Sanitation – Role of micro organisms in waste water management – Sewage and waste treatment Disposal.
Food microbiology – Good Manufacturing Practices – Hazard Analysis – Critical Control Points –Health of Employees.

UNIT –III

Fermented food – Bread, fermented fish and meat products – Fermented dairy products – Yoghurt and cheese. Fermented beverages: Wine and beer

UNIT – IV

Spoilage of food - cereals, vegetables, fruits, egg and milk – canned foods.

UNIT- V

Food borne diseases – Food poisoning and Food borne infections –Bacterial and Mycotoxins- Investigation of food poisoning outbreaks

TEXT BOOKS:

1. Frazier. W.C and D.C Westhoff. 1978. **Food Microbiology**. 3rd ed.Tata Macgraw Hill publishing Co., New Delhi.
2. Adams M.R. and Moss M. O., 2000. **Food Microbiology** 2ndedition. Panima Publishers.

REFERENCE BOOKS:

1. Roger.Y.Stainer. 2003. **Basic Food Microbiology**. 2nd edition, CBSPublishers.

2. Jay,J.M . 1991. **Modern Food Microbiology** 4th edition. Van Nostra and Rainhokdd Co.

17UFN53C	CORE IX – FOOD PROCESSING	SEMESTER -V

PREAMBLE

- To enable students to learn processing of foods and preservation methods and to understand the significance of non-thermal food processing techniques.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	List the processing techniques of cereals and their by products Recall the millet processing	K_1
CO2	Explain the pulse processing techniques Outline the processing steps for edible oil production	K_2
CO3	Explain the processing of dairy products and Identify the Indigenous milk products Illustrate the processing of meat and poultry Demonstrate the methods of manufacturing of egg and fish products	K_2
CO4	Explain the dehydration methods in vegetables Demonstrate the method of mushroom processing and its utilization.	K_2,K_3
CO5	Identify and make use of the latest non - thermal technologies in food processing	K_3

Mapping with Program Outcomes

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

CO_4	S	S	S	S	S
CO_5	S	S	S	S	S

S- Strong; M-Medium; L-Low

17UFN53C	CORE IX – FOOD PROCESSING	SEMESTER V

Total Credits: 5
Hours/Week: 6

CONTENTS

UNIT I

Milling technology of cereals
Paddy processing Technology - Processing, types and milling of rice, by products of rice milling and their utilization
Wheat Technology - Processing, extruded products
Millets – Processing and Types of minor and major millets,

UNIT II

Legumes and Pulses – wet and dry processing, protein concentrates and isolates, snack foods, development of low cost protein foods.

Technology of oil seeds - Processing of edible oil, Fats from non-traditional oil seeds, rice bran oil, processing of vegetable oils and hydrogenation of fats.

UNIT III

Processing of milk and milk products
Milk – Processing of different types of cheese, Probiotic milk products - yoghurt, and ice-cream, Indigenous milk products - khoa,paneer, ghee and lassi
Meat - Processing .Poultry - preparing poultry for consumption, packaging.

Fish and Egg - Whole egg powder, egg yolk powder, fish protein concentrate and fish oil. packaging of fish and egg products

UNIT IV

Vegetables - Drying techniques –drum drying, vacuum puffing, foam mat drying, freeze drying, accelerated freeze drying. Mushroom - processing, utilization.
Fruits- Sun drying and mechanical dehydration – use of kiln drier and tunnel drier.

UNIT V

Latest technologies in food Processing – Principles, advantages and disadvantages only - Non - thermal processes, ultrasound method, nanotechnology, oscillating magnetic field, High pressure processing and hydrostatic pressure technique

TEXT BOOKS:

1. *Subbulakshmi and Shobha Udipi*, **Food Processing and Preservation Technology2001,** Edition I, New Age International Publications, New Delhi
2. *Fellows P. J.* **Food Processing Technology, 2000,** Edition II, Wood Head Publishing Limited, England.

REFERENCE BOOKS:

1. *Sivasankar B.,* **Food Processing and Preservation, 2002,** Edition I, PHI, New Delhi
2. *Mridulla Mirajkar,* **Food Science and Processing Technology,** Volume I and II, Edition I, 2002, Kanishka Publishers, New Delhi

17UFN53P	CORE PRACTICAL –IV FOOD PRESERVATION AND QUALITY CONTROL	SEMESTER - V

Total Credits: 2
Hours/Week: 4

EXPERIMENTS

1. Methods of Food Preservation using salt and sugar.
   i. Pickles
   ii. Chutney
   iii. Sauce
   iv. Ketchup
   v. Jams
   vi. Jellies
   vii. Marmalades
   viii. Preserves
   ix. Squashes and cordial

2. Drying and Dehydration
   i. Vadams and vathal
   ii. Ready Mixes

3. Food Adulteration tests for some common foods.
   i. Milk
   ii. Honey
   iii.Turmeric powder
   iv. Chilli powder
   v. Pepper
   vi. Coffee powder
   vii.Tea Powder
   viii. Butter and ghee
   ix. Edible oil
   X. Green peas
   Xi. Jaggery

xii. Wheat flour

17UFN5SA	SKILL BASED COURSE III- BASIC COMPUTER SCIENCE IN NUTRITION	SEMESTER - IV

PREAMBLE

To enable students to gain knowledge on computer applications and to design and use computer based health and nutrition applications.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the concepts of windows	K1
CO2	Ability to Understanding MS Word documents and its tools	K2
CO3	Demonstration of different operations and views on MS Excel and MS PowerPoint	K2
CO4	Illustrates the working principles of tables and queries in MS Access.	K2
CO5	Ability to identify the computer applications in the field of nutrition	K3

COS/POS	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	M	M
CO2	S	S	M	M	S
CO3	S	S	S	S	M
CO4	M	M	S	S	M
CO5	S	S	S	S	S

Mapping with Program Outcomes

S - Strong; M - Medium; L- Low

17UFN5SA	SKILL BASED COURSE III- BASIC COMUTER SCIENCE IN NUTRITION	SEMESTER- IV

Total Credits: 3

Hours/Week: 4

CONTENTS

UNIT – I

Introduction to the world of computers

Basic concepts on computer - history, types of computers, input and output devices, peripheral devices, meaning of software and hardware

Ms Windows – Introduction, basic concepts on a windows, windows explorer, control panel, configuration, editor, Accessories – Paint brush

UNIT –II

Ms Word – concepts of document and template, creating documents and saving, concepts of editing, formatting, working with tables and tabs, tools, spell check, grammar check, file printing, mail merge, word art.

UNIT – III

Ms Excel – Concepts of spread sheet, creating, work sheet, work space, formatting a work sheet, basic operations on data, sorting, total and subtotal, creating link between documents, programming in macros, working with charts, printing worksheets.

Ms PowerPoint – concepts of PowerPoint, creating, opening, saving presentations, working with different views, working with slides – make a new slide, move, copy, go to a specific slide, layout, adding and formatting text, adding clipart and other pictures, designing slide show, tools – meeting minds, presentation conference.

UNIT – IV

Ms Access – Introduction to Access, working with databases, queries, tables, forms, reports, macros and charts Internet – Basics of internet, basics of e mail, browsing

UNIT – V

Computer applications in nutrition, dietetics, nutritional assessment, menu planning and counseling

TEXT BOOKS:

1. *Balagurusamy E.,* (1986), **Introduction to Computers Fundamentals of Computer Science,** TMH, New Delhi.

REFERENCE BOOK:

1. *Saravanan N.,* (2002), **Computer Fundamentals with MS Office Applications,** Scitech, Chennai
2. *Kathleen Mahan L.,* (2000), **Krause Food Nutrition and Diet Therapy**, Saunders Publications, USA

17UFN63A	CORE X – COMMUNITY NUTRITION	SEMESTER -VI

Preamble

- To know about the application of basics of nutrition in the community and to gain knowledge of community nutrition programmes of national and international organization.

Course outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Define Community, family, village and block. Know the meaning of optimum nutrition and malnutrition. Outline the factors contributing to malnutrition in the community.	K_1, K_2
CO2	List the direct and indirect nutritional status assessment methods. Illustrate the nutritional problems of women and men.	K_2
CO3	Identify and explain the nutritional problems of infants and children.	K_2, K_3
CO4	Outline the nutrition intervention programmes Identify the national and international organization and other health care involved in nutrition intervention.	K_2, K_3
CO5	Identify the role of Home-Scientists in rural development. Illustrate adult education and nutrition education methods.	K_2, K_3

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	S	S	S	M	S

CO3	S	S	S	M	S
CO4	S	S	S	M	S
CO5	S	S	M	M	S

S - Strong; M - Medium; L- Low

17UFN63A	CORE X – COMMUNITY NUTRITION	SEMESTER - VI

Total Credits: 4

Hours/Week: 5

CONTENTS

UNIT I

Definition - Community, family, village and block
Meaning of optimum Nutrition, **Malnutrition**- Under nutrition and over nutrition, Characteristics of community, IMR, MMR, morbidity
Causes of malnutrition-Factors contributing to malnutrition in the community – food habits, customs and practices, availability of food, Socio-economic factors.

UNIT II

Assessment of the nutritional status of the community – functional assessment, direct and indirect methods - Anthropometry, Clinical and Biochemical, Diet Surveys.
Nutritional problems of women and men- Anemia, Vitamin A deficiency, B-complex Deficiency,

UNIT III

Nutritional problems of infants and children- PEM - Marasmus and Kwashiorkor, Vitamin A deficiency, B-complex deficiency diseases, anemia **other problems**- Goitre, fluorosis Lathyrism

UNIT IV

Nutrition intervention programmes - ICDS: Objectives and services, Noon meal programme, TINP, SNP, prophylaxis. National Organization- Role of ICMR, NIN International organization- WHO, FAO, UNICEF
Health Care - PHC, ESI

UNIT V

Home Science - Meaning and Objectives, Role of Home-Scientists in rural development with reference to ongoing programmers like Family Welfare

Programme, **Adult Education for community** - different methods, advantages and disadvantages, **Nutrition education**- merits and demerits of different methods of education

TEXT BOOKS:

1. *Vinodini Reddy*, *Praihad Rao, Gowrinath Sastry, J. and Kashinath, K.C.*, (1993). **Nutrition Trends in India**, N1N, Hyderabad,
2. *Park and Park,* (1995), **Text book of Preventive and Social Medicine**, Banarsidas Published by Jahalpu,

REFERENCE BOOKS:

1. *Michael J. Gibney*, (2004), **Public Health Nutrition,** Edition I, Black Well Scientific Publications, Oxford
2. *Arvind Wadhwa*, (2003), **Nutrition in the Community,** Edition 1, Elite Publications, New Delhi

17UFN63B	CORE XI - FOOD SERVICE MANAGEMENT	SEMESTER -VI

PREAMBLE

- To understand the principles of planning, organizing and controlling in food service institutions and sanitation and hygiene develop skills in meal planning to catering institutions

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO 1	List the types of catering institutions and services Name the food service institutions according to the methods of processing	K_1
CO 2	Tell the types and principles of organization State the principles and tools of management	K_2
CO 3	Outline the activities of personnel management Discuss the importance of human relations and ethics of employees and employers	K_2
CO 4	Illustrate the cost control techniques and financial management strategies Explain the sanitation and safety measures in health care food service institutions	K_2
CO 5	Use the principles of art and color in food service institutions Explain the application of art in table service and home furnishing techniques.	K_3

Mapping with Program Outcomes

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

CO_4	S	S	M	M	S
CO_5	S	S	M	M	S

S- Strong; M-Medium; L-Low

17UFN63B	CORE XI – FOOD SERVICE MANAGEMENT	SEMESTER -VI

Total Credits: 3
Hours/Week: 4

CONTENTS

UNIT I

Food Service Institutions
Different types of catering institutions and services, classifications of food service institutions according to
a**. Function**: Profit oriented, service oriented and public health facility oriented.
b. **Method of processing**: Conventional systems, Commissary system, fast food service system.
c. **Service of food**: Self service, tray service, waiter-waitress services

UNIT II

Organization - Types and principles, organizational structure for catering institutions. Management - Definition, principles and techniques of effective management, leadership and managerial abilities. Tools of management-organizational chart, work study and work improvement.

UNIT III

Personnel Management - Methods of selection, orientation, training, supervision and motivation of employees, importance of good human relations, legal aspects of catering,Professional ethics for employees and employers.

UNIT IV

Financial management - Cost control - Principles and methods of food cost control.
Factors affecting food, labor, operating and overhead cost, budget, inventories.

Sanitation and safety-significance of hygienic management in food preparation and service, sterilization, pest control, garbage disposal.
Health care of food service personnel, safety measures to be adopted in foodservice.

UNIT V

Art in food service - Design selection-structural and decorative, Elements of design, principles of design, their application in food service institutions
Color - Qualities of color, color schemes, flower arrangement-application of art principles in arranging flowers, styles and types.
Table service - Application of art in table service
Home furnishing - With special reference to furniture and accessories, selection, factors to be considered and current trends

TEXT BOOKS:

1. *Sushma Gupta*, **Textbook of Family Resource Management, 2013**, Edition 9, Kalyani – New Delhi
2. *Sethi and Mahan S.*-**Catering Management and integrated approach, John Wiley and Sons, New York.**

REFERENCE BOOKS:

1. *Joan C. Branson*, **Hotel, Hostel and Hospital House Keeping, 2004,** Edition 5, Book Power – London
2. *Sudhir Andrews,* **Textbook of Hotel, House Keeping Management and Operations, 2008,** Edition I, TMH, New Delhi

17UFN63P	CORE PRACTICAL V-NUTRITION	SEMESTER - VI

Total Credits: 2
Hours/Week: 4

EXPERIMENTS

Qualitative Analysis

1. Total protein
2. Minerals – Calcium, Iron, phosphorus, magnesium and sulphur

Quantitative Analysis

1. Demonstration of Bomb Colorimeter
2. Estimation of moisture content in one food
3. Determination of carbohydrates by Anthrone method
4. Demonstration of Nitrogen estimation and kjeldhal methods in foods.
5. Estimation of fibre content in food.
6. Estimation of Ascorbic Acid content in Citrus fruit juice.
7. Estimation of ash content in food
8. Determination of Calcium content in milk
9. Estimation of Iron content in food.
10. Estimation of Phosphorous content in food.
11. Determination of acid number of oils.
12. Determination of saponification number

17UFN63Q	CORE PRACTICAL VI - FOOD PRODUCT DEVELOPMENT	SEMESTER -VI

Total Credits: 2

Hours/week: 4

EXPERIMENTS

S.No. Practical

A Product Development and Standardization

1. Cereal and Millets based foods
2 Pulse based foods
3. Vegetable based foods
3 Fruit based foods
4 Milk and milk products
5. Nuts and seeds based products
6. Weaning and supplementary foods
7. Convenience foods, RTS and RTE foods

B Marketing of a Food Product

1. Selection of a Product, Preparation, Standardization and Quantity Cooking
2. Selection of Packaging Material, Labeling, Cost Calculation and Marketing
3. Presentation of Report

17UFN6SV	SKILL BASED COURSE IV- PROJECT & VIVA	SEMESTER -VI

Hours/week: 3
Total Credits: 3

OBJECTIVES

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

CONTENT

Project can be done in any specialized area

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

RULES

- The students should submit the research work in soft and hard copy with minimum 50 pages, Times new roman, font size 12, 1.15 line spacing.
- The students will be guided and supervised by a member of the teaching faculty of the concerned department. The dissertation in which the research culminates should reflect the student's own work.
- Research work should be presented during External Viva voce.

17UFN5EA	ELECTIVE PAPER I - A FOOD SAFETY AND QUALITY CONTROL	SEMESTER -V

PREAMBLE

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

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Define food safety and principles of quality control in food industry List the practices to prevent food spoilage	K1
CO2	List the food laws and standards to be followed in industry Demonstrate the tests for food adulterants	K1, K2
CO3	Illustrate the food laws and standards followed by government	K2
CO4	Explain the methods for determining the quality of foods Select the sensory scores to assess the food products	K2,K3
CO5	Experiment with microbial analysis to enhance the shelf life of the food product Apply HACCP principles to maintain the standard of industrial sector	K3

Mapping with a Outcomes

CO s	PO 1	PO 2	PO 3	PO 4	PO 5
CO_1	S	M	S	S	S

CO_2	S	M	S	S	S
CO_3	S	M	S	S	S
CO_4	S	M	S	S	S
CO_5	S	M	S	S	S

S- Strong; M-Medium; L-Low

17UFN5EA	ELECTIVE PAPER I - A FOOD SAFETY AND QUALITY CONTROL	SEMESTER V

Total Credits: 4
Hours/week: 5

CONTENTS

UNIT-I

Food Safety - definition of food safety and food spoilage, factors affecting food safety and food spoilage: GMP, GAP, SOP, and GHP.
Principles of Quality control of food –Raw material control, processed control and finished product inspection.

UNIT-II

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

UNIT-III

Standards for foods – Cereals and pulses, sago and starch, milk and milk products, Coffee, tea, sugar and sugar products

UNIT-IV

Methods for determining quality - Subjective and objective methods
Sensory assessment of food quality-appearance, color, flavour, texture and taste, different methods of sensory analysis, preparation of score card, panel criteria, sensory evaluation room

UNIT-V

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

TEXT BOOKS:

1. *Mahindru S.N.* **Food Safety, 2000**, Edition I, TMH, New Delhi

2. *Philip R. A.,* **Food Flavorings, 1999**, Edition I, An Aspen Publications, Mary Land

REFERENCE BOOKS:

1. *Sriramakanna,* **Food Standards and Safety in Globalised World**, **2003,** Edition I, New Central Book Agencies Private Limited, New Delhi

2. *Mahindru S. N.,* **Food Additives, 2000,** Edition I, TMH, New Delhi

17UFN5EB	ELECTIVE PAPER I B- BAKING TECHNOLOGY	SEMESTER - V

PREAMBLE

- To enable the students to understand the science and technology of baking
- Understand the role of different ingredients in baking
- Develop skills in planning and maintenance of a bakery institution.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Define baking and its principles Classify baked foods and the types of equipment and operation techniques in baking industry with cleaning and sanitizing methods	K_1 , K_2
CO2	Relate the ingredients and their role in baking List the standard coloring & flavoring agents Explain on leavening agents	K_1 , K_2
CO3	Make use of the previous knowledge and categorize the preparation of all kinds of baked foods	K_3
CO4	List the decoration of baked foods and the types of icing and the role of other ingredients in icing	K_3
CO5	Explain the sanitation &hygiene of baking unit/plant layout & its design Compare the types of packaging materials used for bakery products, methods of packaging	K_3

Mapping with programme outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO 1	S	S	S	M	S
CO 2	S	S	S	M	S

17UFN5EB	ELECTIVE PAPER I-B BAKING TECHNOLOGY				SEMESTER - V
CO 3	S	S	S	M	S
CO 4	S	S	S	M	S
CO 5	S	S	S	M	S

S-Strong; M-Medium; L-Low

Total Credits: 4
Hours/week: 5

CONTENTS

UNIT I

Baking - Definition, Principles of baking, classification of baked foods. Types of equipments in baking industry, cleaning and sanitizing methods of baking equipments, baking temperature of different products, operation techniques of different baking equipments.

UNIT II

Ingredients and their role in baking – Flour, sugar, egg, shortenings, salt, baking powder, colouring, flavouring agents. List of standard colouring and flavouring agents. Leavening Agents.

UNIT III

Preparation of baked foods –Yeast Leavened breads, cakes and its varieties, different types of biscuits, cookies and pastries. Faults and remedies in bread and cake making

UNIT IV

Decoration of baked foods - Icing- Types of Icing used in different bakery product, Role of other ingredients used in icing

UNIT V

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. NIIR – New Delhi, NIIR Board, **Complete Technology Book on Bakery Products, 2005**,

2. *Yogambal A.,* **Theory of Bakery and Confectionery, 2009**, Edition I, PHI, New Delhi.

REFERENCE BOOKS:

1. *Friberg B.,* **Modern Pastry Chef, 2002,** Edition IV, John- Wiley and Son, New York

2. *Cerrole C.* **Essential Baking, 2000**, Edition I, Hermes House, New Delhi

17UFN6EA	ELECTIVE II - A FOOD PRODUCT DEVELOPMENT AND MARKETING	SEMESTER - VI

Preamble

- To enable students to develop new marketable, nutritionally and economically viable food products, develop entrepreneurship skills for setting up small scale food industries and to understand packaging of different food products

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO 1	Know the trends in food consumption pattern State the change for new product development	K_1
CO 2	Outline the status of food processing industry in India Tell the principles and purpose of new product development	K_2
CO 3	Relate various foods for new recipe development Discuss on foods for space and defense services	K_2
CO 4	Illustrate evaluation analysis, and testing of processed foods Describe the packaging materials for processed foods	K_2
CO 5	Use the financial management techniques in food product development Construct marketing strategies for developed food products.	K_3

Mapping with Program Outcomes

CO s	PO 1	PO 2	PO 3	PO 4	PO 5
CO_1	S	S	S	S	S
CO_2	S	S	S	S	S

CO_3	S	S	S	S	S
CO_4	S	S	S	S	S
CO_5	S	S	S	S	S

S- Strong; M-Medium; L-Low

17UFN6EA	ELECTIVE II – A FOOD PRODUCT DEVELOPMENT AND MARKETING	SEMESTER - VI

Total Credits: 4
Hours/week: 5

CONTENTS

UNIT I

Unit I Food consumption pattern

Trends in Food Consumption pattern. Economical, Psychological and Sociological Dimensions of Food Consumption patterns.
Trends in Social Change as a Base for New Product Development

UNIT II

Introduction to Food Processing and Product Development

Food Components, Types of Food Processing, Status of Food Processing Industry in India and Scope of Growth in Future Principles and Purpose of New Product Development, Product Design and Specifications.

UNIT III

Recipe Development

Traditional Foods, Weaning Foods, Convenience Foods, RTE, RTS, Extruded foods, IMF Foods, Speciality Products, Health foods, Nutritional Supplements, Functional Foods, Nutraceuticals and Designer Foods, Sports Foods, Foods for Defence Services, Space foods.

UNIT IV

Testing, Evaluation and Packaging of Products

Standardization, Portion size, Portion Control, Quantity Cooking, Shelf Life Evaluation- Sensory and Microbial Testing of Processed Foods, Nutrient Analysis.
Suitable Packaging Materials for Different Foods, SWOT Analysis

UNIT V

Financial Management and Marketing of Food Products

Institutional Support (Training and Finance) for Entrepreneurship Development.

Financial Institutions (Central and State Government) banks/Funding Agencies, Financial Accounting Procedures,Book Keeping,Market Research, Marketing Strategies, Cost Calculation , GST, Advertising Methods, Product sales, Product License, Legal specifications, Consumer Behaviour and Food Acceptance.

Textbooks

1. **Sudhir Gupta (2007) Handbook of Packaging Technology**, Engineers India Research Institute, New Delhi
2. **Khanaka, S.S., Entrepreneurial Development**, S. Chand and Company Ltd, New Delhi, 2006.

Reference Books :

1. **Suja, R. Nair(2004) Consumer Behaviour and Marketing Research**, 1st Edition, Himalaya Publishers.
2. **Hmacfie,(2007) Consumer led Food Product Development**, Weedhead Publishing Ltd., UK
3. **Fuller, Gordon, W(2005) New Food Product Development**, 2nd Edition, CRC Press, Boca Raton, Florida,**Schaffner .D,J, Schroder , W.R.(2000)Food Marketing and International Perspectives,** Web/McGraw Hill Publication

17UFN6EB	ELECTIVE PAPER II-B NUTRITION CARE PROCESS	SEMESTER - VI

PREAMBLE

To understand the importance of health for quality living of foods and to appreciate the significance of food and exercise for good health.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Define Nutrition Care Process Explain the Introduction, Definition, Purpose and the steps in NCP(Assessment, Diagnosis, Intervention , Monitoring and Evaluation)	K1, K_2
CO2	Explain the Nutrition care process for Underweight, overweight and Obesity, Diabetes Mellitus (T1DM, T2DM and Gestational Diabetes) a case study approach.	K_2
CO3	Explain Nutrition care process for Cardiovascular Diseases Identify the (Hypertension and hyperlipidemia), Cancer a case study approach.	K2, K_3
CO4	Contrast Nutrition care processes for Gastrointestinal Diseases, HIV/AIDS and Critically ill patients- a case study approach.	K2, K_3
CO5	Identify Case report writing, case presentation and medical record.	K_3

Mapping with Program Outcomes

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

S - Strong; M - Medium; L- Low

17UFN6EB	ELECTIVE PAPER II-B NUTRITION CARE PROCESS	SEMESTER - VI

Total Credits: 4
Hours/week: 5

PREAMBLE

- The Nutrition Care Process is a systematic approach to providing high-quality nutrition care. Use of the NCP does not mean that all patients/clients get the same care; the process provides a framework to individualize care, taking into account the patient/client's needs and values and using the best evidence available to make decisions.

EXPERIMENTS

UNIT I
Nutrition Care Process and Model: Introduction, Definition, Purpose and the steps in NCP (Assessment, Diagnosis, Intervention , Monitoring and Evaluation)

UNIT- II
Nutrition care process for Underweight, overweight and Obesity, Diabetes Mellitus (T1DM, T2DM and Gestational Diabetes) a case study approach.

UNIT- III
Nutrition care process for Cardiovascular Diseases (Hypertension and hyperlipidemia), Cancer a case study approach.

UNIT- IV
Nutrition care processes for Gastrointestinal Diseases, HIV/AIDS and Critically ill patients- a case study approach.

UNIT- V
Case report writing, case presentation and medical record.

17UFN6EC	ELECTIVE PAPER III-C CLINICAL NUTRITION AND COUNSELLING	SEMESTER - VI

PREAMBLE

To develop skills in assessing the nutritional status of patients, menu planning, nutrient calculation and feeding techniques.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Use the advanced techniques to assess the health and nutritional status of the community and give implication through nutritional counseling	K_1, K_2, K_3
CO2	Apply the principles of menu planning in therapeutic condition Identify the psychological and nutritional factors and educate for betterment of health	$K_{2,,}$ K_3
CO3	Use food guide and determine the Diet calculation to meet the requirement of the individual. Apply educational tools for nutrition intervention	$K_{2,,}$ K_3
CO4	Interpret and Identify the biochemical and clinical parameters of the patients to free from deficiency and diseases	$K_{2,,}$ K_3
CO5	Identify the condition of ICU patients and to apply nutritional administrative techniques to overcome the diseases	$K_{2,,}$ K_3

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	**S**	**S**	**S**	**S**	**S**
CO2	**S**	**S**	**S**	**S**	**S**
CO3	**S**	**S**	**S**	**S**	**S**

CO4	**S**	**S**	**S**	**S**	**S**
CO5	**S**	**S**	**S**	**S**	**S**

S - Strong; M - Medium; L- Low

17UFN6EC	**ELECTIVE PAPER III-C** **CLINICAL NUTRITION AND COUNSELLING**	**SEMESTER - VI**

Total Credits: 4
Hours/week: 5

CONTENTS

UNIT I

Patient Assessment –Pre and Post treatment- Anthropometric assessment, SGA, Biochemical assessment, immunity assessment, Clinical observations, Medication history, Dietary assessment methods-24 hour recall method, Plate wastage daily, day to day weight changes. Day to day recording of patient's diet and fluid intake and its implications.

UNIT- II

Therapeutic Menu Planning - Definition of diet therapy, factors to be considered while planning therapeutic diet, Principles of menu planning, Uses of food groups, food guide pyramid

Diet Modifications - Principles of diet modification, modification of the normal diet, impact of psychological factors in improving patient's health, nutritional counseling.

UNIT- III

Diet calculation - Definition and objectives of exchange list, recommended dietary allowance, use of food consumption assessment, calculation of nutrients intake

UNIT- IV

Normal and abnormal physiological and biochemical parameters and their interpretation

Blood pressure, pulse rate, **Urine and stools**- routine, albumin, sugar and urine culture, **Blood-** sugar (fasting, post-prandial, random),HbA1C, urea, creatinine, lipid profile, protein, A:G ratio, bilirubin, SGPT, SGOT, uric acid, calcium phosphate, alkaline phosphatase, Hb, CBC, PCV, ESR, Peripheral smear, serum iron and ferritin, TIBC. Imaging and endoscopy tests –X ray, ultrasound scan, CT scan, endoscopy, MRI, colonoscopy, biopsy.

UNIT- V

Intensive care nutrition, Nutrition in trauma and burns

Parenteral Nutrition - Definition and administration techniques, TPN formulas, advantages and complication of TPN.

Enteral Nutrition - Definition, types of tube feeding, formulas for enteral feeding, problems encountered during enteral feeding and advantage of tube feeding.

Compulsory ten days internship at a dietary department of a hospital during the semester.

Text Books

1. Nutrition and Dietetics, ShubhanginiA.Joshi, 2nd Edition (2002), Tata McGrawHill Publishing Company Ltd.
2. Jacqueline C., Dietitians Guide Assessment and Documentation, 2011, Edition I, Jones and Bartlett, London

Reference Books

1. Krause,Food, Nutrition and diet therapy, 10th Edition, (2000), W.B. Sauders Company

2. Joshi Y. K. Basic Clinical Nutrition , 2003, Edition I, J. P. Brothers, New Delhi

17UFN6ED	ELECTIVE PAPER III – D FOOD PACKAGING	SEMESTER- VI

PREAMBLE

- To understand the need for food packaging and the recent trends in packaging materials and labeling
- Learn and gain knowledge on food packaging and its applications.

COURSE OUTCOMES

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

Mapping with Program Outcomes

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

S- Strong; M-Medium; L-Low

CO Number	CO Statement	Knowledge Level
CO1	Illustrate the functions of packaging materials for different foods, List out the characteristics of packaging material.	K_1, K_2
CO2	Outline the purpose and requirements of packaging materials Classify the modern packaging materials and forms	K_1, K_2
CO3	Explain rigid containers, flexible containers Interpret the general methods for establishing radiation stabilization Demonstrate the importance of biodegradable packaging material	K_2
CO4	Identify the techniques in packages of dehydrated products Outline the package forms and components of plastics	K_2,K_3
CO5	Apply the packaging techniques for finished goods and fulfill the standards of Labeling Make use of the types of labels and apply with labeling regulation in food packaging	K_3

17UFN6ED	ELECTIVE PAPER III – D FOOD PACKAGING	SEMESTER VI

Total Credits: 4

Hours/week: 5

CONTENTS

UNIT I

Food packaging

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

UNIT II

Packaging materials

Packaging materials - Introduction, purpose, requirements, types of containers. Modern packaging materials and forms-Glass containers, metal cans, composite containers, aerosol containers, rigid plastic packages, semi rigid packaging, flexible packaging.

UNIT – III

Packages of radiation stabilized foods

Introduction, rigid containers, flexible containers, general methods for establishing radiation stabilization, Radiation- measurement of radiations
Biodegradable packaging material – biopolymer based edible firm.

UNIT – IV

Packages of dehydrated products

Orientation, metallization, co-extrusion of multilayer films, stretch, package forms and techniques, Aspectic packaging, retortable containers, modified and controlled atmosphere packaging, skin, shrink and cling film packaging, micro-oven able containers, other package forms and components of plastics

UNIT – V

Packaging of finished goods

Weighing, filling, scaling, wrapping, cartooning, labeling, marking and trapping
Labeling: Standards, purpose, description types of labels, labeling regulation barcode, nutrition labeling, health claims, and mandatory labeling provision

TEXT BOOKS:

1. *Vijaya Khader,* **Text book of food science and technology,** Indian council of Agricultural research New Delhi, 2001.

2. *Srilakshmi,* **2007Food Science, ,** Edition 4, New Age International Publishers, New Delhi,

REFERENCE BOOKS:

1. NIIR Board, Food Packaging Technology Handbook, 2008, NIIR, Delhi.
2. NIIR Board, Handbook on Modern Packaging Industries, 2008, NIIR, Delhi

17UNM34G	NON MAJOR ELECTIVE I - FUNDAMENTALS OF FOODS	SEMESTER -III

Total Credits: 2
Hours/week: 2

PREAMBLE

Obtain knowledge of different food groups, their composition and role in day's diet.

CONTENTS

UNIT – I

Food group: Basic 4 food groups; functional food groups-energy yielding, body building and protective foods, food pyramid, Classification of nutrients Cereals – Nutritive value of rice, wheat.

UNIT –II

Pulses and grams – Varieties of pulses and grams, composition, nutritive value of pulses, germination and its benefits
Vegetables – Selection, Classification, nutritive value
Fruits - Selection, Classification,nutritive value and enzymatic browning

UNIT –III

Beverages - Classification, nutritive value
Spices and Condiments – medicinal benefits (ginger, garlic, turmeric, pepper)
Fats and Oils - Types and function of oils

UNIT –IV

Milk - nutritive value, kinds of milk, Egg - selection, nutritive value,

UNIT –V

Meat - nutritive value, selection of meat
Poultry – types, nutritive value, selection
Fish - nutritive value, selection of fish

TEXT BOOKS:

1. *Srilakshmi, B.* (2003). **Food Science**, III Third Edition, New Delhi: New Age International.

2. *Shakunthala Manay and Shadakhraswamy M, 2008*, **Food Facts and Principles,** Third Edition, New Age International Publishers, New Delhi.

REFERENCE BOOKS:

1. *Mudambi. R. Sumathi and Rajagopal M.V (2008),* **"Food Science",** New Age International Publishers, New Delhi.

2. *Thangam E. Philip (1998):* **Modern Cookery Volume II, II Edition**. Orient Longman, Hyderabad

17UNM44G	NON MAJOR ELECTIVE II - FOOD PRESERVATION	SEMESTER - IV

Total Credits: 2
Hours/week: 2

PREAMBLE

- To enable students to understand the principles of food preservation.
- Acquire skills in methods of food preservation.

CONTENTS

UNIT- I

Fruits and Vegetables - General Principles of selection for processing, global production versus Indian production, SWOT in food industry

UNIT- II

Food Preservation – Definition, General Principle and Methods of Preservation.
Preservation by Addition of Sugar – General Principle, Preparation of Jam and Squash

UNIT –III

Preservation by Addition of Salt - General Principle, Preparation of Pickles and fermented pickles -Sauerkraut and Dill Pickles. Preservatives –class I and II Preservatives.

UNIT- IV

Preservation Using High Temperature: definition, application - Pasteurization, canning, bottling & dehydration

UNIT- V

Preservation Using Low Temperature: Refrigeration and Freezing Advantages and Disadvantages
Preservation by Radiation – Microwave heating, Application in Food Processing and Preservation

TEXT BOOKS:

1. *Manoranjan Kalia, Sangita Sood,* **Food Preservation and Processing, 2012**, Edition II, Kalyani Publishers, Ludhiana, India
2. *Vijaya Khader,* **Preservation of Fruits and vegetables, 1999**, Edition I, Kalyani Publishers, Ludhiana, India

REFERENCE BOOKS:

1. *Sivasankar B.,* **Food Processing and Preservation, 2002**, Edition I, PHI, New Delhi
2. The Complete Technology book on Processing, Dehydration, Canning, Preservation of Fruits and Vegetables, 2008

17UFNSS1	SELF STUDY PAPER- FOOD FORTIFICATION	SEMESTER III

Total Credits: 1

PREAMBLE

Obtain knowledge on different food fortificants, technologies in fortification, special fortified foods

CONTENTS

Unit-I

Food fortification – Needs, objectives, principles and rationale, selection and basis of
Fortificants.

Unit-II

Technology of fortifying cereal products

Characteristics of nutrients used in cereal fortification; Types and levels of micronutrients to be added; Fortification methods; Fortification premixes, Design and composition of premixes and quality control; Fortification of bread, pasta, noodles, biscuits, and breakfast cereals.

Unit-III

Technology of fortifying beverages, candies, snack products

a) Technology of fortifying beverages - Importance of beverage fortification, Health benefits of fortification, Selection of nutrients for fortification, Levels to be added, Characteristics of fortificants and method of fortification, Bioavailability, Organic Vs inorganic salts.

b) Technology of fortifying candies - Product formulation, Factors to be considered in selecting fortificants, Nutrient bioavailability and its interactions, Packaging, storage, shelf life and cos.

c) Snack products - Rationale for micronutrient fortification of snack products, Merits and demerits of fortification, Choice of products and selection of micronutrients, Setting level of fortification, Safety limits, Technological and cost limits, Challenges in fortifying snack products, Nutrient interaction and bioavailability.

Unit-IV

Other special fortified products - salt, sugars, oils, Nutri-bars, Granola bars.

a) Salt -Technology of fortifying salt with iron and iodine, Iodine stability and quality of double fortified salt, Safety issues, Levels to be added.

b) Sugars - Fortification with iron and vitamin A, Premix formulation, Fortification level, Packaging.

c) Oils- Fortification with vitamin A, Rationale of vitamin A fortification, Stability of vitamin A in oil during storage and cooking, Effects of frying on Vitamin A content, Efficacy and safety of vitamin A added to oil, Technology of fortifying, Packaging.

d) Nutri bars - Selection of nutrient, Advantages and disadvantages of fortification, Technology of fortification, Packaging.

e) Granola bars- Production of the product, Physical parameters of bars, Incorporation of

fortificants, Technology of fortification, Packaging.

Unit-V

Health foods - Selection of nutrients, Technology of incorporation, Bioavailability, Packaging.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

17UFNSS2	SELF STUDY PAPER- NUTRITION EDUCATION	SEMESTER - III

Total Credits: 1

CONTENTS

UNIT -I

Nutrition education: definition, rational, history, need and effectiveness. Role of nutrition educators.

UNIT -II

Needs assessment -educational assessment Assessing patients and family needs, coping techniques

UNIT -III

Theories of human behavior and health choices. Health belief model, Theory of planned behavior and motivation. Stages of change. Social Cognitive Theory, Tran theoretical model and stages of change, Diffusion of Innovations Theory

UNIT -IV

Public health nutrition and Health promotion. Planning nutrition education. Competencies and skills of nutrition education and nutrition education specialists**.**

UNIT -V

Health communication, Communication skills.

Information Education Communication approaches to improve health and nutrition : Concepts – Scope- Elements- Models of communication -

Communication Process - Approaches and Barriers to communication,

Communication for Extension Education and Development.

TEXT BOOKS:

1. *Reddy.V., Rao.P, Sastry .G. J and Kashinath K.C.*, 1993., "**Nutrition Trends in India**", N1N, Hyderabad, India.
2. *Park and Park*, 1995., "**Text Book of Preventive and Social Medicine**", Banarsidas Published by Jahalpu.

REFERENCE BOOKS:

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

Dr. N.G.P. ARTS AND SCIENCE COLLEGE
Department of Nutrition and Dietetics
Model Question Paper (Core paper)
B.Sc. Food Science and Nutrition

Time: 3Hours
Max.marks: 75

Subject: _____

SECTION-A

I. Answer all the questions (Either Choice) 5x5 = 25Marks

SECTION-B

II. Answer all the questions (Either Choice) 5x10 = 50Marks

Dr. N.G.P. ARTS AND SCIENCE COLLEGE
Department of Nutrition and Dietetics
Model Question Paper (Elective)
B.Sc. Food Science and Nutrition

Time: 3Hours
Max.marks: 55

Subject:

SECTION-A

I. Answer all the questions (Either Choice) 5x3 marks = 15Marks

SECTION-B

II. Answer all the questions (Either Choice) 5x8 marks = 40Marks

10/11/2018
BoS Chairman/HoD
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