

## **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.


### **OBJECTIVE OF THE COURSE:**

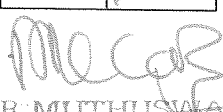
The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:

1. To provide basic knowledge and practice to enhance the quality of life through the improvement of human health and nutritional status.
2. To enable the students to implement the basic food science in operation
3. To develop 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 wastes.
5. To understand the prevalence of malnutrition in our Country and gain knowledge on effective methods to combat malnutrition

## SCHEME OF EXAMINATIONS

Subject Code	Subject	Hrs of Instruction	Max Marks				Credit Points
			Exam Duration (Hrs)	CA	CE	Total	
<b>First Semester</b>							
<b>Part - I</b>							
16UTL11T 15UHL11H 15UML11M 15UFL11F	Language-I Hindi-I Malayalam-I French-I	6	3	25	75	100	4
<b>Part - II</b>							
16UEG12E	English-I	6	3	25	75	100	4
<b>Part - III</b>							
16UFN13A	Core- I : Basic Food Science	5	3	25	75	100	4
16UFN13B	Core -II : Food Chemistry	3	3	20	55	75	3
16UFN13P	Core Practical - I: Food Science	3	3	20	30	50	2
16UCY1AA	Allied - I : Chemistry I	3	3	20	55	75	3
	Allied Practical : Chemistry	2	-	-	-	-	-
<b>Part - IV</b>							
15UFC1FA	Environmental Studies	2	3	-	50	50	2
		30				550	22
<b>Second Semester</b>							
<b>Part - I</b>							
16UTL21T 15UHL21H 15UML21M 15UFL21F	Language-II Hindi-II Malayalam-II French-II	6	3	25	75	100	4
<b>Part - II</b>							
16UEG22E	English-II	6	3	25	75	100	4
<b>Part - III</b>							
15UFN23A	Core - III : Human Physiology	5	3	25	75	100	4

  
 24/6/2016  
 BoS Chairman/HoD  
 Department of Food Science & Nutrition  
 Dr. N. G. P. Arts and Science College  
 Coimbatore - 641 048

  
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 Tamilnadu, India

15UFN23B	<b>Core - IV:</b> Principles of Nutrition	6	3	25	75	100	4
16UCY2AA	<b>Allied Paper - II:</b> Chemistry II	3	3	20	55	75	3
16UCY2AP	<b>Allied Practical-I:</b> Chemistry-I	2	3	20	30	50	2
<b>Part - IV</b>							
15UFC2FA	<b>Value Education</b> -Human Rights	2	3	-	50	50	2
		<b>30</b>				<b>575</b>	<b>23</b>
<b>Third Semester</b>							
<b>Part - I</b>							
16UTL31U 15UHL31H 15UML31M 15UFL31F	Language-III Hindi-III Malayalam-III French-III	5	3	25	75	100	4
<b>Part - II</b>							
16UEG32E	English-III	5	3	25	75	100	4
<b>Part - III</b>							
15UFN33A	<b>Core -V :</b> Nutrition in Health	6	3	25	75	100	4
16UFN33P	<b>Core practical-II :</b> Nutrition in Health	3	3	40	60	100	4
16UBC3AA	<b>Allied Paper - III:</b> Biochemistry	3	3	20	55	75	3
<b>Part - IV</b>							
16UFN3SA	<b>Skill Based Subject -I :</b> Basic Computer Science in Nutrition	4	3	10	40	50	2
	NMEC: I	2	3	-	50	50	2
15UFC3FA 15UFC3FB/ 15UFC3FC/ 15UFC3FD 15UFC3FE	Tamil/ Advanced Tamil(OR) Non-major elective-I (Yoga for Human Excellence)/	2	3	-	50	50	2

	Women's Rights/Constitution of India						
		30				625	25
<b>Fourth Semester</b>							
<b>Part - I</b>							
16UTL41U 15UHL41H 15UML41M 15UFL41F	Language-IV Hindi-IV Malayalam-IV French-IV	5	3	25	75	100	4
<b>Part -II</b>							
16UEG42E	English-IV	5	3	25	75	100	4
<b>Part - III</b>							
16UFN43A	<b>Core -VI :</b> Dietetics	4	3	25	75	100	4
16UFN43P	<b>Core Practical-III: Dietetics</b>	3	3	40	60	100	4
16UBC4AA	<b>Allied -IV:</b> Biochemistry	3	3	20	55	75	3
16UBC4AP	<b>Allied Practical-II: Biochemistry</b>	3	3	20	30	50	2
<b>Part - IV</b>							
15UFN4SA	<b>Skill Based Subject-II :</b> Food Hygiene and Sanitation	3	3	10	40	50	2
	NMEC: II	2	3	-	50	50	2
15UFC4FA/ 15UFC4FB/ 15UFC4FC/	Tamil/ Advanced Tamil(OR) Non-major elective -II (General Awareness)	2	3	-	50	50	2
		30				675	27
<b>Fifth Semester</b>							
<b>Part - III</b>							
16UFN53A	<b>Core -VII: Food Preservation</b>	6	3	25	75	100	4
15UFN53B	<b>Core- VIII: Food Microbiology</b>	6	3	25	75	100	4

16UFN53C	<b>Core- IX : Food Processing</b>	6	3	25	75	100	4
16UFN53P	<b>Core Practical - IV : Food Preservation and Quality Control</b>	3	3	20	30	50	2
	Elective - I	5	3	20	55	75	3
<b>Part - IV</b>							
15UFN5SA	<b>Skill Based Subject-III : Fundamentals of Functional Foods and Nutraceuticals</b>	4	3	10	40	50	2
		<b>30</b>				<b>475</b>	<b>19</b>
<b>Sixth Semester</b>							
<b>Part III</b>							
16UFN63A	<b>Core -X : Community Nutrition</b>	6	3	25	75	100	4
16UFN63B	<b>Core -XI: Food Service Management</b>	5	3	25	75	100	4
16UFN63P	<b>Core Practical-V: Nutrition</b>	3	3	40	60	100	4
16UFN63Q	<b>Core Practical - VI: Food Product Development</b>	3	3	20	30	50	2
	Elective - II	5	3	20	55	75	3
	Elective - III	5	3	20	55	75	3
<b>Part - IV</b>							
15UFN6SV	<b>Skill Based SUBJECT- IV : Hospital Internship Report &amp; Mini Project Viva</b>	3	3	20	30	50	2
<b>Part - V</b>							
15UEX65A	Extension Activity	-		50	-	50	2
		<b>30</b>				<b>600</b>	<b>24</b>
<b>GRAND TOTAL</b>						<b>3500</b>	<b>140</b>

**LIST OF ELECTIVE PAPERS**

Choose any one of the paper as Electives

**ELECTIVE - I**

S. No	Subject code	Name of the subject
1.	15UFN5EA	Food Safety and Quality Control
2.	16UFN5EB	Food Additives
3.	15UFN5EC	Bakery

**ELECTIVE - II**

S. No	Subject Code	Name of the subject
1.	16UFN6EA	Food Product Development and Marketing
2.	15UFN6EB	Quantity Food Service and Physical Facilities
3.	16UFN6EC	Health and Fitness

**ELECTIVE - III**

S. No	Subject Code	Name of the subject
1.	15UFN6ED	Clinical Nutrition and Counseling
2.	15UFN6EE	Hospital Food Service
3.	15UFN6EF	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	Subject code	Name of the subject
1	I	16UNM34G	Fundamentals of Foods
2	II	15UNM44G	Food Preservation

## TOTAL CREDIT DISTRIBUTION

Subjects	Credits	Total		Credits	Cumulative Total
<b>Part- I</b> Tamil	4	4 x 100 =	400	16	32
<b>Part II:</b> English	4	4x 100 =	400	16	
<b>Part- III</b>					
Core	4	10 x 100 =	1000	40	86
Core	3	1 x 75 =	75	03	
Core Practical	4	3 x 100 =	300	12	
Core Practical	2	3 x 50 =	150	06	
Allied Paper	3	4 x 75 =	300	12	
Allied Practical	2	2 x 50 =	100	04	
Elective	3	3 x 75 =	225	09	
<b>Part- IV</b>					
Skill Based Subjects	2	3 x50 =	150	06	20
Skill Based Viva	2	1x50=	50	02	
Languages and	2	4 x 50 =	200	08	
NMEC	2	2 x 50 =	100	04	
<b>Part- V</b>					
Extension Activity	2	1 x 50 =	50	2	02
<b>Total</b>			<b>3500</b>	<b>140</b>	<b>140</b>

**Earning Extra credits is not mandatory for course 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/A CS Inter/ NPTEL Course	1	1
5.	Representation - Academic/Sports /Social Activities/ Extra Curricular / Co-Curricular activities at University/ District/ State/ National/ International	1	1
<b>Total</b>		5	5

**Rules:**

The students can earn extra credits only if they complete the above during the course 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 Course 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 course 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.	I sem to V sem	16UFNSS1	Food Fortification
2.		16UFNSS2	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 course 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 course period to obtain certificate through **Tamil Nadu Board of Technical Education**
4. Student can opt for Diploma/certificate/CPT/ACS Inter/ 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.

16UFN13A	<b>CORE-I: BASIC FOOD SCIENCE</b>	<b>SEMESTER - I</b>
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**Total Credits: 4**  
**Hours/Week: 5**

### **OBJECTIVES:**

To enable students

1. Obtain knowledge of different food groups, their composition and role in day's diet.
2. To gain knowledge of various methods of cooking foods.
3. Nutritive value and principles of cooking of foods.

### **CONTENT**

#### **UNIT -I**

**Food groups:** Basic 4, 5 and 7 food groups; functional food groups-energy yielding, body building and protective foods (only sources and not properties and functions), food pyramid.

**Study of various cooking methods:** Boiling, steaming, stewing, frying, baking, roasting, broiling, cooking under pressure.

**Cereals :** composition of rice, wheat, effects of cooking on parboiled and raw rice, principles of starch cookery, gelatinization.

#### **UNIT -II**

**Pulses and legumes :** Varieties of pulses, legumes and grams, composition, nutritive value, cooking quality of pulses, germination and its effect

**Vegetables:** Classification, composition, nutritive value, selection and preparation for cooking, methods and principles involved in cooking.

**Fruits** -Composition, nutritive value, changes during ripening, methods and effects of cooking, enzymatic browning.

### 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.

**Spices and Condiments** - Uses and abuses

**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 Sugar - Stages of sugar cookery, crystallization and factors affecting crystallization

### UNIT -IV

**Milk** - Composition, nutritive value, kinds of milk, pasteurization and homogenization of milk, changes in milk during heat processing, preparation of cheese and 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, methods of cooking meat and their effects.

**Poultry** - types, 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. (2003). Food Science.* 3<sup>rd</sup> 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

16UFN13B	<b>CORE -II: FOOD CHEMISTRY</b>	<b>SEMESTER - I</b>
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**Total Credits: 3**  
**Hours/Week: 3**

### **OBJECTIVES:**

To enable students

1. To understand the chemical nature and reactions in foods
2. Understand the scientific principles involved in food preparation
3. Understand the various properties exhibited by foods
4. Study the physico-chemical changes occurring in foods during cooking

### **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, Retrogradation, Syneresis, Effect of Sugar, Acid, Alkali, Fat and Surface Active Agents on Starch, Stages of Sugar Cookery, Crystal Formation and factors affecting it. Types of Candies, Action of Acid, Alkali and Enzymes. Chemistry of Milk Sugar, Non Enzymatic Browning

#### **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 Heating 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.

#### **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.

<b>16UFN13P</b>	<b>CORE PRACTICAL -I FOOD SCIENCE</b>	<b>SEMESTER-I</b>
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**Total Credits: 2**

**Hours/week: 3**

### **OBJECTIVES:**

To enable students

1. Understand different food groups, their composition and role in day's diet.
2. Use various methods of cooking foods
3. Prepare some food items.
4. Relate nutritive value and food selection.

### **Experiments:**

1. Food group- Grouping of foods, discussion on nutritive value
2. Measuring ingredients -
3. Methods of measuring different types of foods - grains, flours and liquids
4. Edible portion Determination of edible portion percentage
5. Stages of sugar cookery
6. Gelatinization of starch
7. Cereals - Methods of cooking fine and coarse cereals. Examination of starch
8. Pulses - Cooking of soaked, unsoaked, germination and fermentation of pulses. Common preparation with pulses
9. Vegetables Experimental cookery using vegetables of different colors and textures
10. Preparation of soups and salads, Common preparation with vegetables
11. Fruits - Prevention of darkening in fruits and vegetables. Fruit salad
12. Experimental cookery of Milk and milk products
13. Fleshy foods Fish, meat and poultry- preparations
14. Experimental cookery of Egg - boiled egg, poached egg. Common preparations with egg

15. Beverages Preparation of hot beverages- coffee, tea, Preparation of cold beverages-fruit drinks and milk shake
16. Evaluation Development of score card



16UCY1AA	ALLIED -I: CHEMISTRY - I	SEMESTER- I
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**Total Credits: 3****Hours/Week: 3****OBJECTIVES:**

On successful completion of this course the students shall 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.

**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.

15UFN23A	<b>CORE- III: HUMAN PHYSIOLOGY</b>	<b>SEMESTER - II</b>
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**Total Credits: 4**

**Hours/Week: 5**

### **OBJECTIVES:**

To enable students

1. 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.

### **CONTENTS**

#### **UNIT-I**

Cell - Structure and functions, Tissues - Structure and functions  
Digestive system - Anatomical consideration - structure and functions,  
Brief study of the organization of the digestion, absorption and assimilation of food

#### **UNIT-II**

Blood, RBC, WBC, Platelets and Lymph, Blood coagulation, blood grouping and Rh factor, Circulatory system - Heart structure and functions - cardiac cycle, ECG.

#### **UNIT-III**

Respiratory system - Basic anatomy of the respiratory system, process of respiration, transport and exchange of oxygen and carbon dioxide in the body  
Endocrine glands - Structure and function of pituitary, thyroid, islets of langerhans and adrenal gland

#### **UNIT-IV**

Reproductive system - Anatomy of the male and female reproductive organs, menstrual cycle.  
Sense organs - Structure and function of eye, ear and skin

## 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, 8<sup>th</sup> Edition, Churchill Livingstone.*

### REFERENCE BOOKS:

1. *Guyton, A.G. and Hall, J.B. (1996): Text Book of Medical Physiology, (9<sup>th</sup> 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.*

<b>15UFN23B</b>	<b>CORE- IV : PRINCIPLES OF NUTRITION</b>	<b>SEMESTER- II</b>
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**Total Credits: 4**  
**Hours/Week: 6**

### **OBJECTIVES:**

To enable students

1. Understand the vital link between nutrition and health
2. Gain knowledge on functions, metabolism and effects of deficiency of nutrients.

### **CONTENTS**

#### **UNIT-I**

Introduction to Nutrition - General introduction, 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, source, digestion, absorption and utilization, Dietary fiber and health

#### **UNIT-II**

Protein - Classification, functions, sources and requirements, digestion, absorption and utilization, Protein quality - PER, BV, NPU, digestibility coefficient, -definition and calculation Reference protein, essential amino acids and mutual supplementation of dietary protein Fats and Lipids - Classification, functions, sources, 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 disorders Water soluble vitamins -The B-complex vitamins - Thiamine, Riboflavin, Niacin, Folic acid, Biotin, Pantothenic acid and Vitamin C - functions, source, requirements and deficiency disorders.

#### 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 and utilization of iron 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, (1992)' "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.*

<b>16UCY2AA</b>	<b>ALLIED -II: CHEMISTRY -II</b>	<b>SEMESTER II</b>
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**Total Credits: 3**  
**Hours/Week: 3**

### **OBJECTIVES:**

On successful completion of this course the students shall 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.

### **CONTENTS**

#### **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 electron affinity, ionization energy, electronegativity, atomic radii and ionic radii.

#### **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.

**REFERENCE BOOKS:**

1. *Jayaraman J* 1981. **Laboratory Manual in Biochemistry**, 5<sup>th</sup> Edi. New Age Int. Publishers, New Delhi.
2. *Plummer DT* 1977 **An Introduction to Practical Biochemistry**, 3<sup>rd</sup> Edi. Tata McGraw Hill, Bombay. *Sawhney S K*, 2000. **Introductory Practical Biochemistry**, Narosa Publishing House.

16UCY2AP	ALLIED PRACTICAL- I: CHEMISTRY -I	SEMESTER- II
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Total Credits: 2  
Hours/Week: 2

## CONTENTS

### 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.*

15UFN33A	<b>CORE-V : NUTRITION IN HEALTH</b>	<b>SEMESTER- III</b>
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**Total Credits: 4**

**Hours/Week: 6**

### **OBJECTIVES:**

To enable the students

1. Understand the nutritional demands in various stages of life cycle.
2. Acquire skills in planning adequate meals in different stages of life cycle.

### **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.

#### **UNIT-II**

**Nutritional needs during Pregnancy** – Stages of pregnancy, Normal growth and weight change, complications, Nutritional requirements and meal planning **Nutrition during Lactation** - physiology of lactation, hormonal control and relaxation, nutritional components of colostrum 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.

**Weaning Foods** – Preparation of Weaning foods and commercially and other organization. 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** (1-5 year) 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 (men and women)** - In relation to occupation, Nutrition in Menopausal women, hormonal changes, Low cost balanced food

**Nutrition during Old Age** - Physiological changes in ageing- psychosocial and economic factors affecting eating behavior, Nutritional problems of aged 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.**

#### 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,

16UFN33P	<b>CORE PRACTICAL-II: NUTRITION IN HEALTH</b>	<b>SEMESTER III</b>
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**Total Credits: 4**

**Hours/Week: 3**

### **OBJECTIVES:**

To enable the students

1. Prepare and serve the planned menu.
2. 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 old age.

16UBC3AA	ALLIED - III: BIOCHEMISTRY-I	SEMESTER - III
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**Total Credits: 3**  
**Hours per Week: 3**

### **OBJECTIVES:**

This course has been designed to study the

1. Nature of biological macromolecules namely carbohydrate, lipids, and proteins.
2. Importance of DNA and RNA
3. Role of Vitamins, Minerals and Hormones in the functioning of cell.

### **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 derivatives - 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, prostaglandins Thromboxanes, Leukotrienes.

#### **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*. 2007. **Fundamentals of Biochemistry**, 1<sup>st</sup> edition. S. Chand and company Ltd.
2. *Sathyanarayana U*. 2008. **Biochemistry** 3<sup>rd</sup> Edition. Books and Allied (P) Ltd.
3. *Stryer L*. 1995. **Biochemistry** 4<sup>th</sup> Edition. W. H. Freeman and Company, New york.

#### REFERENCE BOOK:

1. *Zubay*, 1999. **Biochemistry** 4<sup>th</sup> edition. William.C.Brain publishers.



16UFN3SA	<b>SKILL BASED SUBJECT-I: BASIC COMPUTER SCIENCE IN NUTRITION</b>	<b>SEMESTER -III</b>
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**Total Credits: 2**

**Hours/Week: 4**

### **OBJECTIVES:**

To enable students

1. Gain knowledge on computer operations and applications
2. To design and use computer based projects and programs.
3. To use existing health and nutrition based software.

### **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 BOOK:**

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

#### **REFERENCE BOOKS:**

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

16UFN43A	CORE -VI: DIETETICS	SEMESTER -IV
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**Total Credits: 4**

**Hours/Week: 4**

### **OBJECTIVES:**

To enable students

1. Gain knowledge about principles of diet therapy and different therapeutic diets.
2. Develop aptitude for taking up dietetics as a profession.

### **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. Different types of feeding - Basic concepts of oral feeding, tube feeding, IV feeding, gastrostomy feeding.

#### **UNIT - II**

Therapeutic diets for the following disorders:

1. **Under weight** - definition, etiology, treatment
2. **Obesity** - definition, etiology, treatment.
3. **Diseases of the gastro intestinal tract**- ulcer, constipation ,diarrhea and malabsorption syndrome
4. **Diet in relation to deficiency diseases**-Protein calorie deficiency, vitamin A deficiency and anemia

#### **UNIT - III**

**Diseases of the liver and gall bladder** (risk factors and diet therapy)

a) Jaundice b) Hepatitis c) Cirrhosis d) Fatty liver e) Cholecystitis and Cholelithiasis

**Diseases of the cardio vascular system** (risk factors and diet therapy)

a) Atherosclerosis b) Arteriosclerosis c) Hypertension d) Congestive Heart Failure

## UNIT - IV

**Diabetes mellitus** - Types, causes, symptoms, bio-chemical changes, insulin, hypo- glyceic drugs - types only, food exchange list, dietary management

### **Diseases of the kidney and urinary tract**

- a. Acute and chronic nephritis
- b. Nephrotic syndrome
- c. Renal failure
- d. Urinary calculi

Causes and dietary treatment of kidney diseases and dialysis

Nutrition and cancer - Dietary guidelines for management

## UNIT - V

**Nutrition and cancer** - Dietary guidelines for management

**Diet in Allergy** - Definition, classification, common food allergy, test of allergy, diet therapy

**Diet in infection and fever .**

**Diet in relation to deficiency diseases**-Protein calorie deficiency, vitamin A deficiency and anemia

### 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.*

16UFN43P	<b>CORE PRACTICAL -III: DIETETICS</b>	<b>SEMESTER -IV</b>
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**Total Credits: 4**  
**Hours/Week: 3**

### **OBJECTIVES:**

To enable students

1. Plan, prepare and serve different therapeutic diets
2. 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.

16UBC4AA	ALLIED - IV: BIOCHEMISTRY-II	SEMESTER-IV
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Total Credits: 3  
Hours/Week: 3

### OBJECTIVES:

1. Provides much information related to carbohydrate, fat and protein metabolism that takes place in our body.
2. Interrelationship between carbohydrate, fat and protein metabolism.
3. Role of purine and pyrimidines in nucleic acid metabolism.
4. Various disorders related to each metabolism

### 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, 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 phenylalanine metabolism (structures not required)

Inter-relationship of carbohydrate, fat and protein metabolism (Flow chart only)

### TEXT BOOKS:

1. *Deb A.C.*, (2008), **Fundamentals of Biochemistry**, 6th Edition - NewCentral Book Agency, Calcutta
2. *Chatterjea M. N.* (2006), **Textbook of Medical Biochemistry**, Edition6, *Jaypee Brothers*, New Delhi.

### REFERENCE BOOKS:

1. *Lehninger, Nelson*, (1975), **Biochemistry**, Edition II, Cox-CBS Publishers
2. *Murray R.K., Granner D.K., Mayes P.A and Rodwell U. W.*, (2005) - **Harper's Biochemistry**: Lange Medical Publications, 26th edition.
3. *D.T. Plummer*, (2002), **An Introduction to Practical Biochemistry**, Edition I, TMH, New Delhi

16UBC4AP	ALLIED PRACTICAL-II : BIOCHEMISTRY	SEMESTER- IV
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**Total Credits: 2**  
**Hours per Week: 3**

**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**

1. Quantification of Protein by Lowry *et al* method
2. Quantification of Carbohydrate by DNSA method

**REFERENCE BOOKS:**

1. *David T. Plummer* 1978. **An introduction to practical biochemistry** 2<sup>nd</sup> Edition. McGraw Hill Higher Education.
2. *Pattabiraman T. N and Sitarama Acharya U.* 1994. **Laboratory Manual in biochemistry** 2<sup>nd</sup> Edition. All India Traveller Book Seller.
3. *J Jayaraman,* 2005. **Laboratory manual in Biochemistry.** 1<sup>st</sup> Edition. New Age International



15UFN4SA	<b>SKILL BASED SUBJECT - II FOOD HYGIENE AND SANITATION</b>	<b>SEMESTER -IV</b>
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**Total Credits: 2  
Hours per Week: 3**

### **OBJECTIVES:**

1. Design food hygiene and sanitation measures to control the spread of microorganisms.
2. Explain the links between water, sanitation and health.

### **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 microorganisms: microorganisms important in food sanitation, microorganisms 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 industries, Purification and disinfection of water, preventing contamination of potable water supply

#### **UNIT-IV**

##### **Cleaning practices:**

Effective detergency and cleaning practices: Importance of cleaning technology, physical and chemical factors in cleaning, classification and formulation of detergents and sanitizers, cleaning practices

## UNIT-V

### **Sanitation practices:**

Sanitary aspects of waste disposal, Establishing and maintaining sanitary practices in food industry, 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 Jercoy
2. *S. Roday., Food Hygiene and Sanitation in Food Industry, 1999*, edition I, TMH, New Delhi

### **REFERENCE BOOKS:**

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

16UFN53A	<b>CORE-VII: FOOD PRESERVATION</b>	<b>SEMESTER -V</b>
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**Total Credits: 4**

**Hours/Week: 6**

## **OBJECTIVES:**

To enable students

1. Understand the principles of food preservation.
2. Acquire skills in methods of food preservation

## **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 methods of preparation of jams, jellies and Marmalades, theory of gel formation, Preparation of preserves, squashes and syrups, **Preservation by addition of salt** - Pickling, Preparation of Indian Pickles, Sauerkraut.

### **UNIT - II**

**Preservation by Use of High Temperature** - Pasteurization, Sterilization and their types,

Thermal death curve, calculation of process time, methods of heat transfer

**Canning** - steps, types of cans, advantages, disadvantages, 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

### 1. Preservation with chemicals:

- a. Mechanism of microbial inhibition, mechanism and action of preservatives in processed food
- b. Inorganic and Organic preservatives.
- c. Antibiotics
- d. Mold inhibitors.
- e. Antioxidants and its role in preservation.

## UNIT - V

1. a) **Food irradiation**-Types, Sources and units of radiation, Applications and Effect of irradiation on food components  
b) Techniques-Ohmic heating of foods and pulse electric field
2. Preservation of Semi moist foods:
  - a. Principles
  - b. 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*

15UFN53B	<b>CORE- VIII: FOOD MICROBIOLOGY</b>	<b>SEMESTER- V</b>
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**Total Credits: 4**  
**Hours/Week: 6**

### **OBJECTIVES:**

The course is used to study

1. The nature of foods and the causes of deterioration,
2. The principles underlying food processing and the improvement of foods for the consuming public.

### **CONTENTS**

#### **UNIT - I**

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

#### **UNIT - II**

**Microbiology in Food Sanitation** – Bacteriology of Water – Sewage and waste treatment Disposal – Microbiology of Food Product – Good Manufacturing Practices – Hazard Analysis – Critical Control Points – Health of Employees.

#### **UNIT -III**

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

#### **UNIT - IV**

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

#### **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.

16UFN53C	<b>CORE- IX: FOOD PROCESSING</b>	<b>SEMESTER -V</b>
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**Total Credits: 4**

**Hours/Week: 6**

### **OBJECTIVES:**

1. To enable students to learn different food processing and preservation techniques.

### **CONTENTS**

#### **UNIT- I**

**Introduction to food processing** - Nature and properties of food, fluid and visco elastic behavior of foods, Principles of different food processing such as membrane filtration (ultra, osmosis and reverse osmosis, dialysis)

**Rice Technology** - Processing, types and milling of rice, by products of rice milling and their utilization

**Wheat Technology** - Processing, manufacture of breakfast cereals,

**Millets** - Processing and Types of minor and major millets ,

#### **UNIT-II**

**Legumes and Pulses** - Processing flour, protein concentrates and isolates, extrusion cooking technology ,snack foods, development of low cost protein foods.

**Technology of oil seeds** - Processing for production of edible oil, meal concentrates and isolates, 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. manufacturing and 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 of banana and grapes; 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 in membrane technology

#### TEXT BOOKS:

1. *Subbulakshmi and Shobha Udipi, Food Processing and Preservation Technology*2001, 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

<b>16UFN53P</b>	<b>CORE PRACTICAL -IV FOOD PRESERVATION AND QUALITY CONTROL</b>	<b>SEMESTER- V</b>
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**Total Credits: 2**

**Hours/Week: 3**

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

4. Drying and Dehydration

- i. Vadams and vathal
- ii. Ready Mixes

5. 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

15UFN5SA	<b>SKIL BASED SUBJECT-III: FUNDAMENTALS OF FUNCTIONAL FOODS AND NUTRACEUTICALS</b>	<b>SEMESTER- V</b>
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**Total Credits: 2**  
**Hours/Week: 4**

### **OBJECTIVES:**

This course is designed to enable students to:

1. Gain knowledge about functional foods and Nutraceuticals
2. Have thorough understanding about the health effects
3. Be familiar with applications in industry.

### **CONTENTS**

#### **UNIT- I**

Functional Foods and Nutraceutical - Definition, Historical perspective, scope and future prospects, Classification, applied aspects of the functional foods and nutraceutical Sciences. Sources, Relation of functional foods and Nutraceuticals (FFN) to foods and drugs

#### **UNIT -II**

Functional Foods

1. Herbs as functional foods -
2. Health effects of flax seeds, grapes, soy, fish, mushroom, algae, chlorophyll, green tea, berries ad caffeine

#### **UNIT- III**

Definition, Classification, properties and functions of nutraceuticals  
Alkaloids, Phytoestrogens, Antioxidants, Polyunsaturated Fatty Acids, Polyphenols, Glucosinolates, Carotenoids, lycopene

#### **UNIT- IV**

Probiotics, probiotics and symbiotic - presence in natural foods, usefulness and effects, effect of processing, food supplements and products

## UNIT- V

Neutraceutical for cognitive decline, arthritis, osteoporosis, circulatory problems, hypoglycemia, cancer and ulcer  
Research Frontiers in Functional foods and neutraceuticals

### TEXT BOOKS:

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

### REFERENCE BOOKS:

1. *Anil Kumar Dhimain,* **Common Drug Plants and Ayurvedic remedies, 2004**, Edition I, Relience Publishing House, New Delhi
2. *Andreas M. P.* **Antioxidant Status, Diet, Nutrition and Health, 1999**, Edition I, CRC, New York

16UFN63A	<b>CORE- X: COMMUNITY NUTRITION</b>	<b>SEMESTER- VI</b>
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**Total Credits: 4  
Hours/Week: 6**

### **OBJECTIVES:**

To enable the students

1. Know about the application of basics of nutrition in the community
2. Gain knowledge of community nutrition programmes of national and international organization.

### **CONTENTS**

#### **UNIT- I**

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

#### **UNIT- II**

**Assessment of the nutritional status of the community** - direct and indirect methods - Anthropometry, Clinical and Biochemical, Diet Surveys

**Vital Statistics**- Age Specific Mortality Rate(IMR&MMR), Morbidity and Cause of Specific Mortality Ecological Factors, Methods of Obtaining Information, Background Data  
General Survey Data and Special Survey,

#### **UNIT -III**

**Nutritional problems in community** - Anemia, Vitamin A deficiency, B-complex Deficiency, Lathyrism, PEM - Marasmus and Kwashiorkor, VitaminA deficiency,  
B-complex deficiency diseases, other problems- Goitre, fluorosis and IDD

## UNIT- IV

**Nutrition intervention programmes** - ICDS: Objectives and services, Noon meal programme, Anemia 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. **Nutrition Education** -Meaning and Objectives of Nutrition Education, Methods of Nutrition Education - Direct and Indirect Methods, Individual and Group Contacts, Types, Methods, Merits and Demerits , Organizing Programmes in Nutrition Education.

### TEXT BOOKS:

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

### REFERENCE BOOKS:

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

<b>16UFN63B</b>	<b>CORE -XI: FOOD SERVICE MANAGEMENT</b>	<b>SEMESTER- VI</b>
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**Total Credits: 4**

**Hours/Week: 5**

### **OBJECTIVES:**

To enable students

1. Understand the principles of planning, organizing and controlling in food service institutions
2. Develop skills in meal planning to catering institutions
3. Understand the principles of sanitation and hygiene.

### **CONTENTS**

#### **UNIT-I**

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

Cost control - Principles and methods of food cost control.

Financial management -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*



16UFN63P	<b>CORE PRACTICAL -V: NUTRITION</b>	<b>SEMESTER-VI</b>
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**Total Credits: 4**

**Hours/Week: 3**

**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

16UFN63Q	<b>CORE PRACTICAL - VI: FOOD PRODUCT DEVELOPMENT</b>	<b>SEMESTER -VI</b>
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**Total Credits: 2  
Hours/Week: 3**

## CONTENTS

### OBJECTIVES :

1. To develop skills in product development
2. To understand the steps involved in costing
3. To learn sales techniques

### S.No.

### Practical

#### **A.Product Development and Standardization**

1. Cereal and Pulse Based Foods
2. Fruit Juices, Squash , Jams and Preserves
3. Pickles, Ketchup, Sauce
4. Weaning Foods
5. Health Foods and Nutritional Supplements
6. 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

<b>15UFN6SV</b>	<b>Skill Based Subject-IV: Hospital Internship Report &amp; Mini Project Viva</b>	<b>SEMESTER-VI</b>
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**Total Credits: 2**

**Hours/week: 3**

1. Dietitian Internship training in a multi specialty hospital for one month.
2. Submission of the internship training report
3. Two Major Case studies to be reported as project
4. Project Viva voce

15UFN5EA	<b>ELECTIVE - I : FOOD SAFETY AND QUALITY CONTROL</b>	<b>SEMESTER -V</b>
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**Total Credits: 3**  
**Hours/week: 5**

### **OBJECTIVES:**

To enable the students to

1. Study about the control of quality and use of additives
2. Gain Knowledge on standards for food quality and food laws.

### **CONTENTS**

#### **UNIT-I**

Food Safety - definition of food safety and food spoilage, factors affecting food safety and food spoilage: GMP, GAP, SSOP, 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

16UFN5EB	ELECTIVE -I : FOOD ADDITIVES	SEMESTER-V
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**Total Credits: 3**  
**Hours/week: 5**

### UNIT-I

**Food additives** - definitions, classification and function , preservatives, antioxidants, colours and flavours, emulsifiers, sequesterants, humectants, hydrocolloids, sweeteners, acidulents, buffering salts, anticaking agents, etc. - chemistry, food uses and functions in formulations, indirect food additives; toxicological evaluation of food additives. Proteins, starches and lipids as functional ingredient; isolation, modification, specifications, functional properties and applications in foods.

### UNIT -II

#### **Functionality of food additives, regulatory and legal aspects, sensory properties of foods**

objectives of additives, functional classification of additives, additives of natural origin, synthetic additives. Health and safety aspects of food additives. Present status of various food additives..Controversial food additives Saccharin, history, function, controversy status, aspartame, nitriteand nitrate compounds, nitrosamines.

### UNIT -III

Additives to improve acceptability, permitted food colors, natural and artificial, food flavours,natural and artificial, sweeteners natural and artificial. acidulents, antimicrobials, aerating agents,ant staling agents, bodying agents, clouding agents, curing agents clarifiers, dietary supplements,dietary fiber , emulsifiers, enzymes, fat replacers, gelling agents, leavening agents, stabilizers,surfactants, tenderizers, texturizers, thickeners, vitamins, nerutraceuticals, viscosity modifiers,whipping agents.

### UNIT-IV

**Flavor technology**; types of flavours, flavours generated during processing - reaction flavours,flavor composites, stability of flavours during food processing , analysis of flavours, extraction techniques of flavours, flavours emulsions; essential oils and oleoresins; authentication of flavours etc.

### UNIT-V

**Food adulteration** - definition, reasons for food adulteration, methods of adulteration, and methods of detection. Consumer's responsibilities, consumer organizations. The prevention of food adulteration Act, 1954. The consumer protection Act 1986, normal food adulterants in coffee, tea leaves, edible oil, milk, cereals, spice powders.

### TEXT BOOKS AND REFERENCE MATERIALS:

1. Manay,S.N and Shadaksharaswamy.M., 2008 .,“Food, facts and Principles”., 3<sup>rd</sup> Edition., New Age International(P) Ltd. Publishers., New Delhi.,India.
2. Potter.N.N and Hotchkiss.J.H.,1996., “Food Science” CBS Publishers.

15UFN5EC	ELECTIVE - I: BAKERY	SEMESTER -V
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**Total Credits: 3**  
**Hours/week: 5**

## **OBJECTIVES:**

To enable the students

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

## **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, Yeast, sugar, egg, butter, salt, baking powder, colouring, flavouring agents. List of standard colouring and flavouring agents. Leavening Agents.

### **UNIT-III**

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

### **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

16UFN6EA	<b>ELECTIVE - II: FOOD PRODUCT DEVELOPMENT AND MARKETING</b>	<b>SEMESTER-VI</b>
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**Total Credits: 3**  
**Hours/week: 5**

### **OBJECTIVES:**

To enable students

- Develop new marketable, nutritionally and economically viable food products
- Develop entrepreneurship skills for setting up small scale food industries
- Understand packaging of different food products

### **CONTENTS**

#### **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 , Advertising Methods, Product sales, Product License, Legal specifications, Consumer Behaviour and Food Acceptance.

### **TEXT BOOKS:**

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

<b>15UFN6EB</b>	<b>ELECTIVE - II: QUANTITY FOOD SERVICE AND PHYSICAL FACILITIES</b>	<b>SEMESTER-VI</b>
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**Total Credits: 3**

**Hours/week: 5**

### **OBJECTIVES:**

To enable students

1. Understand the physical requirements for quality food production
2. Gain knowledge and develop skills in handling food service equipment
3. Understand the basics of quantity food production and meal planning.

### **CONTENTS**

#### **UNIT-I**

Floor planning and layout - characteristics of typical food service facilities. Floor plan - physical planning, space allocation for the various areas and flow of traffic through receiving, storage, preparation, service and dish washing areas. Working heights and dimensions of work centers, lighting, ventilation and pest - rodent control

#### **UNIT-II**

Materials - Basic materials used in the manufacture of equipment, finishes and insulation, Strength and limitation of materials.

#### **UNIT-III**

Equipment - Equipment required for quantity food service-major and minor equipment with reference to food storage, preparation, service and cleaning. Factors influencing their selection and purchase, Arrangement of equipment in work centers, use, care and maintenance of equipment, Transition from traditional to modern equipment

#### UNIT-IV

Menu Planning - Menu-principles involved in planning menu, types of menu.

Fuel: Cooking fuels-selection, advantages, limitations, safety measures and fuel saving techniques.

#### UNIT-V

Quantity food preparation - Selection, purchasing and storage of foods, standardization of recipe, portion control, utilization of left over foods, Marketing of foods -Importance and need for advertisement

#### TEXT BOOKS:

1. *Sethi and Mahan s.-Catering Management, 2003*, Edition II, John Wiley and Sons, New York .
2. *Sushma Gupta, Textbook of Family Resource Management, 2013*, Edition 9, Kalyani - New Delhi

#### REFERENCE BOOKS:

1. *Asmita T., Catering Science and Food Safety, 2011*, Edition I , Anthon
2. *Sudhir Andrews, Textbook of Hotel, House Keeping Management and Operations, 2008*, Edition I, TMH, New Delhi

16UFN6EC	<b>ELECTIVE- II: HEALTH AND FITNESS</b>	<b>SEMESTER-VI</b>
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**Total Credits: 3**  
**Hours/week: 5**

### **OBJECTIVES:**

To enable students

1. Understand the importance of health for quality living
2. Acquire knowledge about the role of food and exercise for sound health.

### **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*, 11<sup>th</sup> 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

15UFN6ED	<b>ELECTIVE - III-: CLINICAL NUTRITION AND COUNSELLING</b>	<b>SEMESTER -VI</b>
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**Total Credits: 3**

**Hours/week: 5**

**OBJECTIVES:**

To enable the students

1. Gain knowledge and develop skills in assessing the patients.
2. Acquire skills in menu planning, nutrient calculation and feeding techniques.

**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 using nutritive value book.



## UNIT- IV

Normal and abnormal physiological and biochemical parameters and their interpretation

- a. Blood pressure, pulse rate
- b. Urine and stools- routine, albumin, sugar and urine culture
- c. 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**, *Shubhangini A.Joshi*, 2nd Edition (2002), Tata McGraw Hill 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. Saunders Company
2. *Joshi Y. K.* **Basic Clinical Nutrition** , 2003, Edition I, J. P. Brothers, New Delhi

15UFN6EE	<b>ELECTIVE - III: HOSPITAL FOOD SERVICE</b>	<b>SEMESTER-VI</b>
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**Total Credits: 3**  
**Hours/week: 5**

### **OBJECTIVES:**

To enable students

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

### **CONTENTS**

#### **UNIT-I**

Types of service in hospitals - Food service definition and its types, equipment used for serving the food in hospitals and hygienic role of persons delivering Food

#### **UNIT-II**

Physical requirements:

Kitchen area - Size and type of kitchen, design of kitchen, ventilation, lighting, flooring, carpets, wall covering and sample layout of kitchen.

Storage area - Meaning, types of storage, infrastructure, sanitary measures and safety storage of food materials.

Equipment - Equipment required for hospital food service - major and minor equipment with reference to food storage, preparation, holding and food service.

### UNIT-III

Purchasing - Meaning of purchase and buying methods.

Receiving and Storing - Importance of receiving raw materials and storage procedures

Production - Menu planning for patients and process of food production, holding of foods - methods and specifications

Cleaning - Meaning of cleaning, dishwashing, types of cleaning and sanitizing agents, bleaches and disinfectants

### UNIT-IV

Management - Definition, principles and techniques of effective management, leadership and managerial abilities (in a hospital and dietary). Tools of management - organizational chart of the food service team of the hospital. The patient care team -role of medical and paramedical staff interaction, Food supply for attendant

Cost concept - Components and behaviors of cost

Cost control - Principles and methods of food cost control, labor, operating and overhead cost

Sample costing of a dish, methods and factors affecting pricing

### UNIT-V

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

### TEXT BOOKS:

1. *Sethi M and Mahan S.-Catering Management an integrated Approach , 2006, 2<sup>nd</sup> edition, John Wiley and Sons, New York.*
2. *Sudhir Andrews, Textbook of Hotel, House Keeping Management and Operations, 2008, Edition I, TMH, New Delhi*

### REFERENCE BOOKS:

1. *Mohini Sethi, Institutional Food Management, 2004, Edition I, New Age International Pvt. Ltd, New Delhi*
2. *Mohinder C., Managing Hospitality Operations, 2009, edition I, Anmol, New Delhi*

15UFN6EF	<b>ELECTIVE - III: FOOD PACKAGING</b>	<b>SEMESTER-VI</b>
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**Total Credits: 3**  
**Hours/week: 5**

### **OBJECTIVES:**

1. To understand the need for food packaging and the recent trends in packaging materials and labeling.
2. Learn and gain knowledge on food packaging and applications during transportation.

### **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, Aseptic 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

<b>16UNM34G</b>	<b>NON MAJOR ELECTIVE - I FUNDAMENTALS OF FOODS</b>	<b>SEMESTER-III</b>
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**Hours/week: 2**  
**Total Credits: 2**

**OBJECTIVES:**

1. 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 - 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, role of egg in cookery

**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

15UNM44G	NON MAJOR ELECTIVE -II FOOD PRESERVATION	SEMESTER-IV
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**Total Credits: 2**  
**Hours/week: 2**

**OBJECTIVES:**

To enable students

1. Understand the principles of food preservation.
2. Acquire skills in methods of food preservation.

**CONTENTS**

**UNIT-I**

Fruits and Vegetables - Production, global India, General Principal of selection for processing, SWOT in food industry

**UNIT-II**

Food Preservation - Definition, General Principal and Methods of Preservation Preservation by Addition of Sugar - General Principal, Preparation of Jam and Squash

**UNIT-III**

Preservation by Addition of Salt - General Principal, Preparation of Pickles and fermented pickles Preservatives -class I and II Preservatives.

**UNIT-IV**

Preservation Using High Temperature: Pasteurization, canning and bottling  
Dehydration - Advantages and Disadvantages

**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

16UFNSS1	<b>SELF STUDY PAPER-I: FOOD FORTIFICATION</b>	<b>SEMESTER I - V</b>
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**Total Credits: 1**

**FOOD FORTIFICATION:**

**OBJECTIVES:**

1. 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**, 2<sup>nd</sup> Edition, NIIR Board, Asia Pacific Business Press, 2002.

<b>16UFNSS2</b>	<b>SELF STUDY PAPER-II: NUTRITION EDUCATION</b>	<b>SEMESTER I-V</b>
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**Total Credits: 1**

### **UNIT -I**

Nutrition education: definition, rationale, 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”* , 1<sup>st</sup> Edition, Black Well Scientific Publications, Oxford.
2. *Wadhwa.A, 2003, “Nutrition in the Community”*, 1<sup>st</sup> 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**  
**10X1mark =10Marks**

**SECTION-B**

**II. Answer all the questions (Either Choice) 5x5**  
**marks = 25Marks**

**SECTION-C**

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



**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**  
**10X1mark = 10Marks**


**SECTION-B**

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

**SECTION-C**

**III. Answer all the questions (Either Choice)** **5x6**  
**marks = 30Marks**

  
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