

**BHARATHIAR UNIVERSITY, COIMBATORE**  
**B.Sc. FOOD SCIENCE AND NUTRITION WITH COMPUTER APPLICATIONS**  
**& COMPULSORY DIPLOMA IN CLINICAL NUTRITION AND DIETETICS**  
**SCHEME OF EXAMINATION - CBCS PATTERN (AFFILIATED COLLEGES)**  
**For the students admitted during the academic year 2008 – 2009 batch onwards**

Part	Study Components	Course title	Ins. hrs/ week	Examinations				Credit
				Dur.Hrs.	CIA	Marks	Total Marks	
	<b>Semester I</b>							
I	Language – I		6	3	25	75	100	3
II	English – I		6	3	25	75	100	3
III	Core Paper I - Principles of Nutrition		4	3	25	75	100	4
	Core Paper II - Basics of Computer Science in Nutrition		3	3	25	75	100	4
	Core Practical I Basics of Computer Science in Nutrition		3	3	20	30	50	2
	Allied A : Chemistry I		4	3	20	55	75	4
	Allied Practical		2	-	-	-	-	-
IV	Environmental Studies #		2	-	-	50	50	2
	<b>Semester II</b>							
I	Language – II		6	3	25	75	100	3
II	English – II		6	3	25	75	100	3
III	Core Paper III - Food Science		3	3	25	75	100	4
	Core Practical II Food Science Practical		3	3	20	30	50	2
	Core Paper IV Human Physiology		4	3	25	75	100	4
	Allied A : Chemistry II		4	3	20	55	75	4
	Allied Practical (Chemistry)		2	3	20	30	50	2
IV	Value Education – Human Rights #		2	3	-	50	50	2
	<b>Semester III</b>							
I	Language – III		6	3	25	75	100	3
II	English – III		6	3	25	75	100	3
III	Core Paper V - Family Meal Management		4	3	25	75	100	4
	Core Practical III - Computer Applications in Family Meal Management		2	3	20	30	50	2
	Allied B: Paper I – Bio-Chemistry - I		3	3	20	55	75	4
	Allied Practical - Bio-Chemistry		2	-	-	-	-	-
IV	Skill based Subject I – Diploma Paper I - Clinical Nutrition		3	3	25	75	100	3
	Tamil @ / Advanced Tamil# (OR) Non-major elective - I (Yoga for Human Excellence)# / Women's Rights#		2	3	75		75	2

<b>Semester IV</b>								
I	Language – IV	6	3	25	75	100	3	
II	English – IV	6	3	25	75	100	3	
III	Core Paper VI Dietetics	4	3	25	75	100	4	
	Core Practical – IV Computer Applications in Dietetics	3	3	20	30	50	2	
	Allied B : Paper II – Bio – Chemistry - II	4	3	20	55	75	4	
	Allied Practical - Bio – Chemistry	2	3	20	30	50	2	
IV	Skill based Subject 2 - Diploma Paper II Life style and chronic diseases	3	3	25	75	100	3	
	Tamil @ /Advanced Tamil # (OR) Non-major elective -II (General Awareness #)	2	3	75		75	2	
<b>Semester V</b>								
III	Core Paper VII Food Microbiology	6	3	25	75	100	4	
	Core Paper VIII Quantity Food Service and Physical Facilities	5	3	25	75	100	4	
	Core Paper IX Community Nutrition	5	3	25	75	100	4	
	Practical V - Nutrition Practical	3	3	20	30	50	2	
	Practical VI : Computerised Database Management in Nutrition	3	3	20	30	50	2	
	Elective 1	Theory		3	3	20	55	75
		Practical		2	3	10	15	
IV	Skill based Subject 3 Diploma Paper III Hospital Food service	3	3	20	55	75	3	
<b>Semester VI</b>								
III	Core Paper X – Food Service Management - Theory Practical	5	3	20	55	100	4	
		2	3	10	15			
	Core Paper XI – Post Harvest Technology	6	3	25	75	100	4	
	Elective – II	6	3	25	75	100	5	
	Elective – III	5	3	25	75	100	5	
	Practical VII : Food Preservation and Quality Control	3	3	40	60	100	4	
IV	Skill Based Subject 4 - Diploma Paper IV Health and Fitness	3	3	20	55	75	2	
	Diploma Paper V Dietary Internship report and viva	-	-	-	-	50**	1	
V	Extension Activities @	-	-	50	-	50	1	
	Total					3700	140	

\*\* One month internship in Dietary Department in the summer vacation after II year of study.

For Viva : 10 marks & report : 40 marks.

@ No University Examinations. Only Continuous Internal Assessment (CIA)

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<b>List of Elective papers (Colleges can choose any one of the paper as electives)</b>		
Elective – I	<b>A</b>	Bakery *
	<b>B</b>	Nutrition in Emergencies
Elective – II	<b>A</b>	Food Preservation
	<b>B</b>	Food Hygiene Sanitation
Elective - III	<b>A</b>	Food Quality Control
	<b>B</b>	Food Packaging

\* Training in Bakery for 15 days in semester break of V Semester compulsory to earn the 5 credits.  
Minimum ten practical exercises per paper per semester

**SEMESTER-I**  
**Core Paper-I**  
**PRINCIPLES OF NUTRITION**  
**Hours of instruction /week: 4**

Subject description:

Meaning of nutrition, basics about carbohydrates, proteins, fats, fat and water soluble vitamins, minerals and water balance.

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

**UNIT-I**

Introduction to Nutrition - General introduction, Classification of nutrients, Functions of food, social function of food, psychological functions of food.

Energy - Definition of Kilocalories, Joule, energy value of foods, determination, physiological fuel values, SDA of foods, determination of energy requirements of body, basal metabolic rate- determination, factors influencing BMR, Recommended Dietary Allowances for energy.

Carbohydrates - Classification, functions, source, digestion, absorption and utilization, dietary fibre and health.

**UNIT-II**

Protein - Classification, functions, sources and requirements, digestion, absorption and utilization, Protein quality - Definition of biological value, NPU, digestibility coefficient, PER-definition and measurement.

Deficiency due to shortage of protein and energy – PCM, kwashiorkor. Reference protein, essential amino acids and mutual supplementation of dietary protein.

Fats and Lipids - Classification, functions, sources, requirement, digestion, absorption and utilization, 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 & phosphorus - functions, absorption, utilization, requirements, deficiency and toxicity.

### **UNIT-V**

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

#### Reference Books:

1. Essential of food & Nutrition –Vol. 1 M. Swaminathan,Bappco,Bangalore.
2. Human Nutrition and Dietetics –Davidson S. Passmore
3. Normal and Therapeutic Nutrition- Corinne .H.Robinson & Marilyn Lawler
4. Contemporary Nutrition - Gordon M. Wardlaw, Paul Insel et, al., (2000) Mosby,Chicago.
5. Nutrition- concepts and controversies- Eleanor Whitney –Eighth Edition (2000)
6. Basic principles of Nutrition- Seema Yadav, First edition (1997)
7. Essentials of Nutrition and Diet therapy -Sue Rodwell Williams, fifth edition, Times Mirror Mosby College Publishing, 1990.
8. Understanding Nutrition -Whitney P.N. and Roes S.R., West Publication Co, 1996.

### **SEMESTER-I**

#### **Core Paper-II**

### **BASICS OF COMPUTER SCIENCE IN NUTRITION**

**Hours of instruction / week: 3**

#### Subject description:

A brief study about computer basics, Ms –Windows, internet and applications in nutrition.

#### 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.

### **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 sub total, 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.

### **References:**

1. Introduction to computers – Balagurusamy (1995)
2. Internet –Complete reference – Hardley Hahn (1999)
3. PC software for office automation – T.Karthikeyan (2001)
4. Windows 98 – Microsoft Network (2000)
5. Ms Office - Microsoft Network (2000)
- 6 Introductory Nutrition – H.Guthrie, S. Andrew (1988)
7. Normal and Therapeutic Nutrition- Corinne H. Robinson, Marilyn R. Lawler, Wanda L., Chenweth, Ann Garwin
8. Food Nutrition and Diet Therapy- Krause, M.V. Hunseher, M.A. (1980)
9. Understanding Normal and Clinical Nutrition – Whitney,E.N and Cataldo (1994)

**SEMESTER – I**  
**CORE PRACTICAL I**  
**BASICS OF COMPUTER SCIENCE IN NUTRITION**  
**Hours of instruction / week: 3**

1. Organizing files and folders.
2. Ms Word
  - a. Creating, entering text and saving a document.

- b. Editing a document – add new text, find and replace, selecting text, delete, cut, copy, paste, move text.
  - c. Working with margins, pages, line spaces, header, and footer.
  - d. E mail a document and mail merge.
  - e. Adding graphics to a document.
  - f. Printing a document.
3. Ms Excel
- a. Creating, saving, opening, closing work book.
  - b. Entering data in worksheet
  - c. Editing work sheets
  - d. Working with ranges
  - e. Excel formulas
  - f. Creating charts
4. Ms Access
- a. Creating database, save, close, open
  - b. Table and relationship between tables
  - c. Form – create, modify, sort, filter data
  - d. Query – create and run
  - e. Report – create, customize, working with control
5. Ms PowerPoint
- a. Creating presentation
  - b. Working with slides
  - c. Transition and builds to presentation

**SEMESTER-II**  
**Core Paper-III**  
**FOOD SCIENCE**  
**Hours of instruction/week: 3**

Subject description:

A brief study about food groups, various cooking methods, Structure and composition of cereals and pulses, Classification, composition & nutritive value of fruits & vegetables, milk, fleshy foods and spices .

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.

UNIT –I

Food group: Basic 4, 5&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.

Stages of sugar cookery, crystallization and factors affecting crystallization.

### **UNIT –II**

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

Pulses and grams – Varieties of pulses & grams, composition, nutritive value, cooking quality of pulses, germination and its effect.

### **UNIT –III**

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 .

Milk - Composition, nutritive value, kinds of milk, pasteurization and homogenization of milk, changes in milk during heat processing, preparation of cheese and milk powder.

### **UNIT-IV**

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

Fleshy foods

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 .

### **UNIT –V**

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.

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.

#### **Reference Books:**

1. Food science, Chemistry and Experimental foods by M. Swaminathan.
2. Food Science by Norman.N.Potter.
3. Experimental study of Foods by Griswold R.M.
4. Food Science by Helen Charley.
5. Foundation of Food Preparation by A.G. Peckam.
6. Modern Cookery for teaching and trade, volume I&II ,Thangam Philip. Orient Longmans Ltd.
7. Food Fundamentals by MacWilliams, John Willy and son's, New York.
8. Food Facts & Principles by Shakunthala manay & Shadakhswamy.
9. Food Science by Srilakshmi , second edition,2002.

**SEMESTER-II**  
**Core Practical-II**  
**FOOD SCIENCE -PRACTICAL**  
**Hours of instruction/week: 3**

Subject description:

Hands – on experience for skill development on food groups, various cooking methods using foods in preparation of items.

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.

S.No.	Topic	Exercise
1.	Food group	Grouping of foods, discussion on nutritive value
2.	Measuring ingredients	Methods of measuring different types of foods – grains, flours & liquids
3.	Edible portion	Determination of edible portion percentage.
4.	Cooking methods	Moist heat methods – boiling, simmering, steaming, & pressure cooking. Dry heat methods – baking. Fat as a medium for cooking-shallow and deep fat frying.
5.	Cereals	Methods of cooking fine and coarse cereals. Examination of starch
6.	Pulses	Cooking of soaked and unsoaked pulses. Common preparation with pulses.
7.	Vegetables	Experimental cookery using vegetables of different colours & textures. Preparation of soups and salads. Common preparation with vegetables.
8.	Fruits	Prevention of darkening in fruits & vegetables. Fruit salad.
9.	Milk & milk products	Experimental cookery – cream of tomato soup, cheese curry & cooking vegetables in milk. Common preparation with milk, cheese & curd.
10.	Fleshy foods	Fish, meat & poultry- preparations.
11.	Egg	Experimental cookery- boiled egg, poached egg. Common preparations with egg.
12.	Beverages	Preparation of hot beverages- coffee, tea. Preparation of cold beverages-fruit drinks & milk shake.
13.	Evaluation	Development of score card.

Note: Prepare one recipe in each food group indicating best method of cooking

**SEMESTER-II**  
**Core Paper-IV**  
**HUMAN PHYSIOLOGY**  
**Hours of instruction/week: 4**

Subject description:

A brief study about Digestive system, Circulatory system, Respiratory system, Reproductive system, Central nervous system, Locomotor system and Sense organs.

Objectives:

To enable the students

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

**UNIT-I**

Cell - Structure and functions

Tissues - Structure and functions

Digestive system - Anatomical consideration – structure & 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, pulse rate and measurement of blood pressure –definition and normal value (only).

**UNIT-III**

Respiratory system - Basic anatomy of the respiratory system, process of respiration, transport and exchange of oxygen and carbon di oxide 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, nose, tongue 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.

Reference Books:

1. Chaterjee, C.C., Human Physiology, Vol-I&II Medical allied agency, Calcutta 1981.
2. Beat and Taylor, Living body. Mc.Graw hill company, Newyork.
3. Sathya Narayana, Essentials of Biochemistry(2000)
4. Saratha Subramanian,Text of Human Physiology(2000).
5. Stuart Ira Fox ,Human Physiology(2003)

**SEMESTER-III**  
**Core Paper-V**  
**FAMILY MEAL MANAGEMENT**  
**Hours of instruction/ week: 4**

Subject description:

Basics of menu planning, Nutritional needs during different stages of life.

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.

**UNIT I**

Basic Principles of Meal Planning - Basic meal pattern and its need to suit different income levels age and physiological stages. Recommended 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 - Normal growth and weight change. Nutritional requirements, complications during various stages of pregnancy – hyper emesis gravid arum, preeclampsia and eclampsia and their management at family level.

Nutrition during Lactation - Function of breast, physiology of lactation, hormonal control and relaxation, Milk out put and factors affecting it, frequency of nursing- supply and demand, nutritional components of colostrum and mature milk. Nutritional requirements of lactating women.

**UNIT III**

Nutrition during Infancy - Growth and development, factors influencing growth, Advantages of breast feeding, difference between breast feeding and bottle feeding, factors to be considered in bottle feeding. Different types of milk formulae.

Weaning Foods - Weaning foods and commercially prepared baby foods. Uses of growth chart to monitor growth & development. Nutritional requirements of infants' upto one year. Weaning foods developed by different organizations. Problems of feeding in normal and premature infants.

**UNIT IV**

Nutritional needs of pre-school children (1-5 year) - Nutritional and food requirements of pre school children. Factors to be considered while planning meals for pre-school children. Eating problems of children and

their management, preparation of supplementary foods using available low cost foods.

Nutrition for School children - Nutritional requirement, meal planning for school children, dental caries and packed lunch.

## **UNIT V**

Nutrition during Adolescence - Physical Growth- changes and factors affecting height and weight, increments during menarche, Nutritional requirement. Nutritional problems in adolescence- Iron deficiency anemia, obesity , anorexia nervosa and bulimia nervosa.

Nutritional needs of adults (men and women) – Nutrition and work efficiency. Menopausal and post menopausal women, hormonal changes, nutritional requirement of the adult in relation to occupation.

Nutrition during Old Age - Physiological changes in ageing- psycho-social and economic factors affecting eating behavior. Nutritional problems of aged and their management.

### Reference Books:

1. Nutrition Trends in India -Vinodhini Reddy, Prahlad Rao, Govmth Sastry and Kashinath, NIN, Hyderabad, 1993.
- 2 Modern Nutrition in Health and Diseases- Shills, E.M. Olson, A.J. and Shike, Lea and Febiger
3. Dietetics -B. Srilakshmi, New Age International Pvt. Ltd, 2003.
- 4.NutritionScience-B.Srilakshmi,NewAgeInternationalPvt.Ltd., 2003.
- 5.Food,nutrition and diet therapy -Krause, Eleventh edition
6. Human Nutrition and Dietetics- Davidson S Passmore R, Brock JP, ELBS and Churchill, Livingstone.
- 7.Fundamentals of foods and Nutrition - Mudambi SR and Rajagopal M Y, Wiley Eastern Ltd.
- 8.ICMR- Nutritive value of Indian Foods, 1989.
- 9.Nutrition throughout the life cycle, Bonnie S.Worthinton, Roberts, Sue Rod well Williams.,The McGraw- Hill company,1996.
- 10.Nutrition in the life span- Virginia Beal, John Wiley & sons New York.

## **SEMESTER-III**

### **Core Paper Practical-III**

### **COMPUTER APPLICATIONS IN FAMILY MEAL MANAGEMENT**

**Hours of instruction/ week: 3**

Subject description:

Menu planning, preparation & nutrient calculation during different stages of life.

Objectives:

To enable the students

1. Plan a menu according to the nutritional demands in various stages of life cycle.
2. Prepare and serve the planned menu..
3. Determine the nutrient content of the menu per meal and per portion.

Contents:

- A. Planning, calculation of nutritive value and preparation of adequate meals for
  1. different age groups – pre-school, school, adolescent boy and girl, adult man & woman in relation to occupation and elderly, pregnancy and lactation, infancy.
  2. Weaning foods and supplementary foods.
- B. Preparation of powerpoint presentations on
  1. Procedures in weaning
  2. Weaning foods
  3. Supplementary foods
  4. Iron deficiency anaemia
  5. PCM
  6. Vitamin A deficiency
  7. Underweight
  8. Overweight

**SEMESTER - III**  
**DIPLOMA PAPER I CLINICAL NUTRITION**  
**Hours of Instruction / week : 3**

**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.

**UNIT I**

Patient Assessment –Pre – and Post treatment- Anthropometric assessment, Biochemical assessment, immunity assessment, Clinical observations, Medication history, Dietary assessment methods-24 hour recall method, 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 patients 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), 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, 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

#### **Practicals:**

1. Measurement of anthropometric indices.
2. 24 hour record of food and fluids.
3. Preparation of a food guide pyramid as a nutrition education aid.
4. Nutrition counseling for a specific condition.
5. Using a food exchange list.
6. Calculation of a nutritive value of a diet.
7. Measurement of blood pressure and pulse rate.
8. Estimation of blood glucose levels.
9. Development of formula for enteral feeding.
10. Observation of parenteral/enteral feeding.

#### **Reference Books:**

1. Krause, Food, Nutrition and diet therapy, 10<sup>th</sup> Edition, (2000), W.B. Saunders company.
2. B.Srilakshmi (2002), Dietetics, IV Edition, New age International (P) Limited Publication, New Delhi and Chennai.
3. Normal and Therapeutic Nutrition, 17<sup>th</sup> Edition, Robinson ET AL, Mac Millan Publication Co, New York.
4. Nutrition and Dietetics, Shubhangini A.Joshi, 2<sup>nd</sup> Edition (2002), Tata MC Graw Hill Publishing Company Ltd.
5. Principles of Nutrition and Dietetics (2001), M.S.Swaminathan, Bangalore Publication.Co.Ltd

**SEMESTER- IV**  
**CORE PAPER- VI**  
**DIETETICS**  
**Hours of instruction/week: 4**

Subject description:

Principles of diet therapy - hospital diets, therapeutic diets, disease of liver and gall bladder, cardiovascular system, kidney and urinary tract, diabetes mellitus and allergy.

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.

**UNIT – I**

Objectives of diet therapy - Role of a dietitian. Principles of diet preparation and counselling. Normal diet in the hospitals –regular diet, liquid, semi liquid, light, soft diet, and bland diet.

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

**UNIT – II**

Therapeutic diets for the following disorders:

- a. Under weight - definition, etiology, treatment
- b. Obesity - definition, etiology, treatment.
- c. Diseases of the gastro intestinal tract-Peptic ulcer and duodenal ulcer, Dumping syndrome, constipation
- d. Acute and chronic diarrhea -rehydration therapy.

**UNIT – III**

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

- a) jaundice    b) hepatitis    c) cirrhosis    d) fatty liver and diet therapy

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 – causes, symptoms, bio-chemical changes, insulin, hypo- glycemic drugs, changes in the metabolism of carbohydrate, fat and protein, 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
- e. Uremia

Causes and dietary treatment of kidney diseases and dialysis.

Nutrition and cancer - Dietary guidelines for management.

#### **UNIT – V**

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

Pre operative and post operative diets.

Diet in febrile conditions - Short duration e.g. Typhoid, Long duration e.g. Tuberculosis.

Dietetic management of gout and phenyl ketonuria.

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

Reference Books:

- 1.Krause and Mahan – Food ,Nutrition and Diet therapy, 6<sup>th</sup> Edition W.B. Saunders company, London
2. Normal and therapeutic nutrition –17<sup>th</sup> Edition, Robinson et. al ., Mac Millan Pub.Co., New York
- 3.ICMR(1989) Nutrient Requirements and recommended dietary allowances for Indians.
- 4.Antia FP (1987) Clinical Dietetics and Nutrition, Oxford University Press, New Delhi
- 5.Srilakshmi (2002) Dietetics, IVth Edition. New Age International (P) Limited, Publishers, New Delhi
6. Shubhangini. A. Joshi (2002) Nutrition and dietetics, Tata Mc Graw- Hill publishing company limited, New Delhi.
7. B. Srilakshmi (2002) Nutrition science, New age international (P) limited, New Delhi
8. Carolyn E.Town send and Ruth A. Roth (2002) Nutrition and Diet Therapy, Delmar publisher
9. Sue rod Williams, Nutrition and diet Therapy, Times Mirror Mosby College publishing,Boston, 1989.
- 10.The Indian journal of nutrition and dietetics, Avinashilingam Deemed University, Coimbatore

**SEMESTER- IV**  
**CORE PRACTICAL - IV**  
**COMPUTER APPLICATIONS IN DIETETICS**  
**Hours of instruction/week: 3**

Subject description:

Applying principles of diet therapy in planning, preparation and nutrient calculation of hospital diets, therapeutic diets for various diseases like disease of liver and gall bladder, cardiovascular system, kidney and diabetes mellitus

Objectives:

To enable students

1. Plan, prepare, 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 & bland diet.
  - b. Diet for obesity
  - c. Diet for under weight
  - d. Diet for anaemia
  - 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 & after dialysis.
  - h. Diet for diabetes – Type I & II, Diabetes with CVD disease.
  - i. Diet in febrile conditions- Short duration – typhoid; long duration – tuberculosis
  - j. Diet in liver diseases – Viral hepatitis and cirrhosis
3. Observation of a dietary department in a hospital.
4. Preparation of powerpoint presentations on diet and disease conditions.

**SEMESTER - IV**  
**DIPLOMA PAPER II**  
**LIFE STYLE AND CHRONIC DISEASES**  
**Hours of Instruction / week : 3**

Objectives

To enable students

1. Gain knowledge about the impact of life style modification .
2. Acquire skills in planning therapeutic diets.

**UNIT I**

Life Style Changes - Urbanization, westernization, work style & patterns, Food behavior changes, alcohol consumption, drug addiction, role of advertisements in food patterns.

Weight related Disorders - Underweight-Etiology, assessment, dietary management, modification of the diet.

Obesity - Etiology, theories of obesity, grades of obesity, assessment, regional distribution of adipose tissue, metabolism, complication and life style modification.

**UNIT II**

Diabetes - Etiology, Types, symptoms, diagnosis- GTT, glycemic index, nutritional therapy, exercise, oral antidiabetic drugs, complication and role of insulin and its types.

Kidney disorders – post organ transplant, diet on dialysis,

**UNIT III**

Dyslipidemia, atherosclerosis, IHD, cardiac failure, associated complications - Pathophysiology, dietary modifications.

Hypertension – etiology, symptoms, complications, dietary management.

#### **UNIT IV**

Cancer - Etiology, Classification of cancer, prevalence, diagnosis, nutritional therapy, nutritional implications of cancer and cancer therapy.

#### **UNIT V**

Liver disease – Liver function tests, liver failure – dietary management  
Problem in later adulthood - Physiological changes, changes in physical activity, hormonal changes in post menopausal women, nutritional problems of aged and their dietary management.

#### **Practicals:**

1. 24 hour record of physical activity to assess life style.
2. Assessment of food behaviour.
3. Assessment of body weight – BMI.
4. Assessment of body composition – fat mass and muscle mass.
5. Observation of dialysis.
6. Planning a diet for patients undergoing cancer therapy.
7. Liver function tests.
8. Assessment of nutritional problems in the elderly.
9. Interpretation of blood lipid levels.
10. Determination of glycemic index of foods.

#### **Reference Books:**

1. Krause, Food, Nutrition and diet therapy, 10<sup>th</sup> Edition, (2000), W.B. Saunders company.
2. B.Srilakshmi (2002), Dietetics, IV Edition, New age International (P) Limited Publication, New Delhi and Chennai.
3. Robinson, C.H and Lawler, M, Normal and Therapeutic Nutrition, Mac Millan Publishing Co., Inc, New York, 1987.
4. Nutrition and Dietetics, Shubhangini A.Joshi, 2<sup>nd</sup> Edition (2002), Tata MC Graw Hill Publishing Company Ltd.
5. Principles of Nutrition and Dietetics (2001), M.S.Swaminathan, Bangalore Publication.Co.Ltd

**SEMESTER- V**  
**Core Paper-VII**  
**FOOD MICROBIOLOGY**  
**Hours of instruction / week: 6**

#### **Subject description:**

Microbiology history, growth and development of various microorganisms, contamination of different food products by microorganisms and microorganisms in water.

**Objectives:**

To enable the students

1. Become aware of the micro organisms in food and environment
2. Apply basic principles of sanitation in food service
3. Understand the importance of personal hygiene for food and service personnel

**UNIT I**

Introduction and History of Microbiology - The theory of spontaneous generation, gene theory of disease, Louis pasteur's experiment. Different terminology of Heterotrophic nutrition, autotrophic nutrition, saprophytic, holozoic, host, culture, parasite.

Bacteria - Morphology, reproduction, growth curve, nomenclature, genera of bacteria important in food microbiology. Observation of motility of bacteria in bottle milk.

Mold - Morphology, reproduction, physiology and nutrition, genera of mold important in foods. Demonstration of mold growth in bread.

**UNIT II**

Yeast - Morphology, reproduction, classification, physiology and nutrition, process of hybridization, importance of yeast in food. Observation of yeast cells

Virus - Occurrence, morphology, reproduction, human viral disease caused by virus.

Algae - Occurrence, morphology, reproduction, importance of algae.

General principles underlying spoilage- fitness and unfitness of food for consumption, causes for spoilage, factors affecting kinds and number of micro organism in food, factors affecting the growth of micro organism in food.

**UNIT III**

Contamination and kinds of micro organisms causing spoilage of cereal products- grains, flour, baked products and cake. Contamination and kinds of micro organisms causing spoilage of fruits and vegetables and their products- fruit juice, pickles. Contamination and kinds of micro organisms causing spoilage of fleshy foods- meats, poultry and fish. Observation of milk spoilage.

**UNIT IV**

Contamination and kinds of micro organisms causing spoilage of eggs and milk and milk products- cream, milk frozen desserts and butter.

Contamination, kinds of micro organisms and spoilage of fats and oils, bottled beverages, spices and condiments.

Food poisoning, food infection and food borne diseases.

Micro organism in air, air borne diseases.

**UNIT V**

Micro-organisms in Water - sources, bacteriological examinations, total count, test of E.Coli, purification of water, water borne diseases.

Micro organisms in sewage and sewage disposal.

Destruction of bacteria- sterilization, physical agents, light, desiccators, electricity, heat and chemical agents. Visit to micro lab to learn most probable number.

Reference Books:

1. Frazier WC, Food Microbiology Mc Green Hill Book, 1985
2. Sullia SB and S Shantharam- “ General Microbiology” Oxford and IBH Publishing Ltd., 1998.
3. Michael J. Pelczar, E.C.S.Cahn & Noel. R.Kruef- Microbiology.Tata McGraw- Hill Edition-1993.
4. Nicklin J. Graeme- Cook K, Page& Killington R- “ Notes in Microbiology Bros Scientific Publishers- Preprinted 2001, 2002.
5. Eugene Rosenlarg & Irun R. Cohea- Microbial Biology- Holt- Saunders International Editions 1983.
6. James M.Jay ‘ Modern Food Microbiology International Thomson Publishing- Fifth Edn-1996.
7. Paul A.Ketchem- “Microbiology Concepts and applications Wiley International Edition-1942.
8. West BB wood-L Harger VT- Food Service in Institutions, John Wiley, 2003
9. Karls L Qauntity ,Food Sanitation, John Wiley, 1973

**SEMESTER-V**  
**Core Paper-VIII**  
**QUANTITY FOOD SERVICE AND PHYSICAL FACILITIES**  
**Hours of instruction/week: 5**

Subject description:

Basics of quantity food production, floor planning and layout for a food service institution, food storage, preparation, service and cleaning.

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.

**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**

Meal 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.

#### Reference Books:

- 1.Sethi and Mahan s.-Catering Management and integrated approach ,Johnwiley & Sons,New York .
- 2.Lillicarp DR – Food and Beverage Service ,Edward Arnold Pub.Malbourne .
- 3.Longnee K and Bieker CC – sanitary techniques in food service, Johnwiley & Sons,New York
- 4.Tersel MC and Harger – Profession food preparation , Johnwiley & Sons,New York
- 5.Kotschevar LH and Terrell ME “Food Service Planning Layout and Equipment “, 2<sup>nd</sup> Edn.,John Wiley and sons ,New York ,1977.
- 6.Glow ,G.,”Catering Equipment and Systems Design “ , Applied Science Publishers Ltd.,1977.
- 7.Unkelsbay,Nand Unkilesbay,k.”Energy management in Food service : Ellis Harwood Ltd.,England 1982.
- 8.West ,BB, Wood ,L.,Hargu VF and Shugart GS “Food service in Institutions” ,Johnwiley & Sons,New York .
- 9.Kinton ,R and Ceserani ,V.”The Theroy of catering “, Arnold – Heinemam ,1985
10. Fundamentals of menu planning .Vanmost and Rein Hold Company , New york.
- 11.Marian C.Spears ,Food Service Organisation – Managerial and system approach ,prentice hall.inc.Osio,III rd edition ,1995

**SEMESTER- V**  
**Core Paper-IX**  
**COMMUNITY NUTRITION**  
**Hours of instruction/week: 5**

Subject description:

Meaning of community, impact of malnutrition, assessment of the nutritional status of the community, nutritional problems, nutrition intervention programmes and nutrition education.

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

**UNIT I**

Definition - Community, family, village and block  
Meaning of Optimum Nutrition, Malnutrition- Under nutrition and over nutrition..  
Characteristics of community- Demography, Vital statistics, IMR, MMR, morbidity.  
Causes of malnutrition-Factors contributing to malnutrition in the community - food habits, customs and practices, availability of food, Socio-economic factors, Housing and hygienic conditions, population explosion.

**UNIT II**

Assessment of the nutritional status of the community -direct and indirect methods - Anthropometry, Clinical and Biochemical, Diet Surveys.  
Nutritional problems of women and men- Anemia, Vitamin A deficiency, B-complex deficiency.  
Nutritional problems of infants and children- PEM-Marasmus and Kwashiorkor, Vitamin A deficiency, B-complex deficiency diseases, anemia-incidence, prevalence, epidemiology and prevention , other problems- Goitre, fluorosis and Lathyrism-prevalence, causes and symptoms and programmes to control.

**UNIT III**

Nutrition intervention programmes - ICDS: Objectives and services, Noon meal programme, TINP, SNP, Vitamin A prophylaxis.  
National Organization- Role of ICMR, NIN, NNMB & ICAR  
International organization- WHO, FAO , UNICEF, DANIDA & World Bank.

**UNIT IV**

Home Science- Meaning and Objectives. Role of Home-Scientists in rural development-with reference to ongoing programmers like Family Welfare Programme, Adult Education for community-different methods, advantages and disadvantages. Nutrition education- merits and demerits of different methods, Concept of nutrition garden.

## **UNIT V**

Communication- Principles, methods and classification. Advantages and limitations of different methods.

Audio-visual aids- Types, advantages and limitations.

Health care- delivery, challenges & strategies. Set up of PHC, school health services and employees state insurance.

### Reference Books:

1. Jelliffe DN, Assessment of Nutritional Status of the community.
2. Ritchie JA, Teaching Nutrition FAO, 1979.
3. Rajalakshmi R, Applied Nutrition, Oxford and JBH Publishers, 1981.
4. Devadas RF, Nutrition in Tamil Nadu, Sanfam Publishers, Madras, 1972.
5. Mc.Laren S, Nutrition and the community, John Wiley & Sons, 1982.
6. Reddy AA, Extension Education, Srilakshmi Press, Bapla, 1971.
7. Dahama OP and Bhatnagar OP Education and Communication for development.Oxford IBH Publishing Co.,1980.
8. Savile AH, Extension in rural communities, Oxford University Press, 1965.
9. Nutrition News-NIN.
10. Proceedings of Nutrition Society of India.
11. Popular Publications of NIN on nutrition rural India.
12. Nutrition Science, Srilakshmi (2001).
13. Nutritional problem in India-PK Shukla,Prentice Hall, India.
14. Foundations of community Health Education, Mc Graw Hill,London.

**SEMESTER V**  
**CORE PRACTICAL V**  
**NUTRITION PRACTICAL**  
**Hours of instruction/ week: 3**

1. Determination of Gluten content in wheat.
2. Estimation of Acidity in wheat flour.
3. Estimation of Fibre content in any one food.
4. Determination of acid number of oils.
5. Determination of iodine number of oils.
6. Estimation of ash content in any one food.
7. Determination of Calcium content in milk.
8. Estimation of Iron content in any one food.
9. Estimation of Phosphorous content in any one food.
10. Demonstration of Protein content in foods.
11. Estimation of Ascorbic Acid content in Citrus fruit juice.

**SEMESTER V**  
**CORE PRACTICAL VI**  
**COMPUTERISED DATABASE MANAGEMENT IN NUTRITION**  
**Hours of instruction/ week: 3**

- A. Database management of
  - 1. Anthropometric indices
  - 2. Biochemical indices
  - 3. Dietary recall
  - 4. Energy expenditure and intake
- B. Preparation of presentations for nutrition education for deficiency disorders
  - 1. Vitamin A deficiency
  - 2. Marasmus and Kwashiorkor
  - 3. Iron deficiency anaemia
  - 4. Fluorosis
  - 5. Lathyrism
  - 6. Iodine deficiency disorder
- C. Preparation of presentations for community awareness of
  - 1. Hygiene and health
  - 2. Management of diarrhoea
  - 3. Healthy choice of foods

**SEMESTER - V**  
**DIPLOMA PAPER III**  
**HOSPITAL FOOD SERVICE**  
**Hours of Instruction / week : 3**

**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.

**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 & 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 & sanitizing agents, bleaches and disinfectants.

### **UNIT IV**

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

Food supply for attendant.

Cost concept – Components & behaviours of cost.

Cost control - Principles and methods of food cost control, labour, 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 & sales returns book.

#### **Practicals:**

1. Equipments used in hospital food service.
2. Checklist for cleanliness in hospital food service.
3. Observation of raw and prepared food storage in hospitals.
4. Observation of pest control program.
5. Calculation of food cost.
6. Organisation chart and identification of duties in a local hospital.
7. Records maintained in a dietary department.
8. Purchasing methods for food items.
9. Observation of different fuels used in hospital food service.
10. Observation of garbage / waste disposal.

#### **Reference Books:**

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

**SEMESTER-VI**  
**Core Paper-X**  
**FOOD SERVICE MANAGEMENT**  
**Hours of instruction/week: 5 + 2**

Subject description:

Basics of running the food service, principles and techniques of effective management, principles and types of organization, personnel management and cost control.

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.

**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**

Organisation - Types and principles, organizational structure for catering institutions.

Management - Definition, principles and techniques of effective management, leadership and managerial abilities. Tools of management-organisational 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.

**UNIT IV**

Cost control - Principles and methods of food cost control.

Financial management –Factors affecting food, labour, 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.

Reference Books:

1. West ,BB, Wood “Food service in Institutions” ,Johnwiley & Sons,New York
- 2.Khan MA “Food service operations”, AVI publishing Company Inc.1987.
- 3..Sethi and Mahan S.-Catering Management and integrated approach, Johnwiley & Sons,New York .
4. Kotas R and Davis B “food cost control” Billing & Sons Ltd, Great Britian ,1976
5. Dr. B.K. Chakravati, “ A Technical guide to Hotel operation” , Metropolitan, New Delhi India.
6. Earl R. Palan and Judity A. Stadler (1986) Preparing for the food service Industry, AVI – Publishing& co
7. Mickey Warner (1989) Recreatoinal food service Management Van Nostrand Reinhold, Newyork.
8. J.M. Diwan (1997) Catering and food service Management, Common Wealth publishers.
- 9.Tersel MC and Harger – Profession food preparation , Johnwiley & Sons,New York

## **FOOD SERVICE MANAGEMENT PRACTICALS**

**Hours of instruction/week: 2**

- a. Standardisation of recipes
- b. Napkin folds
- c. Fruit and vegetable carving
- d. Table setting
- e. Quantity preparation and sale
- f. Visit to hospital food service
- g. Visit to Hotel food service
- h. Visit to Industrial canteen

## **SEMESTER VI**

### **CORE PAPER XI**

### **POST HARVEST TECHNOLOGY**

**Hours of instruction/ week: 6**

Subject description:

Introduction to post harvest technology, food losses during storage, handling and transportation of commodities, control of spoilage agents and processing methods of selected food items.

Objectives:

To enable students

1. Understand the safety control measures in handling foods from harvest to consumption agencies of control.
2. Knowledge about food processing methods.

### **UNIT I**

Introduction to Post Harvest Technology - Definition, importance and problem encountered.

Buffer stock – definition, quantity of stores available.

Governmental measures to augment food production- need for food conservation.

Food loss in the post harvest period, extent of losses, loss in the field, threshing yard, storage, marketing loss.

Role of Post Harvest Technology in combating malnutrition in India.

### **UNIT II**

Agents Causing Food Losses - Physical agents, (moisture, temperature), Chemical losses, biological losses- insects- insects attacking food grains - types and life cycle, damage caused to food grains and detection of insect infestation, rats and rodents, birds, animals- Nature of damage, identification.

### **UNIT III**

Control of Spoilage Agents - Importance and methods of sanitary handling, physical, chemical, biological and other means of control of insects, rats and rodents and birds.

Insect control methods- Physical methods and chemical methods including fumigation techniques.

Handling and Transport of Food Commodities - Traditional and improved methods.

Nutrient losses in spoiled grains and National program to save grains.

### **UNIT IV**

Storage of Grains - Importance of storage structures- requirements, traditional & modern and underground & above ground storage and their improvements, FCI godowns. PDS.

Agencies Controlling Food Losses - Role of SGC, FCI, CWC, SWC, IGSI in controlling food losses.

### **UNIT V**

Food Processing of Selected Food Items – wheat, rice, breakfast cereals, pulses, oilseeds.

Related Experiences:

1. Visit to FCI
2. Visit to Processing Mill (Cereal & Pulse)

Reference Books:

1. Handling and storage of food grains- S V Pingale ICAR, New Delhi, 1976.
2. Handling and storage of food grains in tropical and subtropical areas- D W Hall, FAD, Rome, 1970.
3. Food Science, N.W.Potter- The A VI Publishing Co., The Westport, 1973.
4. Food Technology, Prescott and Proctor.B.B.Mc Graw Hill Book Co., New York, 1937.
5. Gordon G Birth, Food science, Pub in New York.

6. Robins M Philip Convenience food- Recent Technology 1976.
7. Technology of cereals by NL Kent and JAD Evers.
8. Food protection technology by Charles W., Felix Havis Pub.1987.
9. John A Troller, 1983, Sanitation in food processing, Academic press.

**SEMESTER-VI**  
**CORE PRACTICAL VII**  
**FOOD PRESERVATION AND QUALITY CONTROL**  
**Hours of instruction/week: 3**

1. Methods of Food Preservation using salt and sugar.
2. Drying and Dehydration
3. Food Adulteration tests for some common foods.
4. Preservation and bottling of fruit and vegetable products.
5. Preservation by using chemicals
6. Sensory analysis of preserved and processed foods.

**SEMESTER - VI**  
**DIPLOMA PAPER IV**  
**HEALTH AND FITNESS**  
**Hours of Instruction / week : 3**

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.

**UNIT I**

Health – Definition, concept/ meaning of health and factors affecting health. Health hazards – environment, population explosion, explosives, adulteration, dampness and measures to prevent health hazard.

**UNIT II**

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 III**

Health improvement

Balanced diet – Definition & objectives, food selection

Health education – Definition, importance of health education, personal hygiene.

Physical education – Meaning & scope, role of gymnastic exercises and yoga in improving health. Difference between yoga & other gymnastic exercises.

#### **UNIT IV**

Sports nutrition –Introduction to kinanthropometry, Requirements during training and performance for athletes and endurance games, aerobic and anaerobic exercise, fuel for exercise, glycogen load. Exercise to maintain fitness.

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

#### **UNIT V**

Health insurance scheme (government & non government) – Mediclaim policy, Employee state insurance scheme, ICICI health scheme, Specialised insurance scheme and others.

#### **Practicals:**

1. Identification of health hazards.
2. Simple tests for food adulteration.
3. Food intake during cultural festivals.
4. Food selection for balanced diet for different age groups.
5. Planning a health education for any specific group.
6. Visit to a health club / fitness centre.
7. Assessment of fitness – simple test, Stepper technique (any two).
8. Guest lecture on health insurance schemes.
9. Observation of / Compulsory yoga exercise.
10. Observation of physical training for sports person.

#### **Reference Books:**

- 1.Sizer F, Eleanor Whitney - Nutrition concepts and controversies, Eighth Edition (2000).
2. Narayan dash B – Health & physical education, 1<sup>st</sup> edition, 2003, Neelkamal publications, Hyderabad.
3. Krause's– Food ,Nutrition and Diet therapy 6<sup>th</sup> Edition WB Saunders company, London.
4. <http://www.ihsnet.org.in/Events/FHP.htm>
5. <http://www.nantulkethealthclub.com/facilites.html>
6. <http://adfdell.pstc.brown.edu/classes/readings/>

### **ELECTIVE PAPER I - A**

#### **BAKERY**

**Hours of instruction/ week: 3+2**

#### **Subject description:**

Baking principles, role of various other ingredients during baking, preparation of various baked products, baking unit layout and packaging materials for baked food items.

**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

**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.

**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 & design of a baking unit sanitation and hygiene. Types of packaging materials used for bakery products, method of packaging.

**Reference Books:**

1. Potter, N. Food Science, The AVI Publishing Co., Inc., West Port, Connecticut, 1975.
2. Baker's Handbook on practical Baking .Wheat Associates, USA, New Delhi.
3. Dubey, SC, Basic Baking Science and Craft, Jwalmukhi Job Press, Bangalore, 1979.
4. Modern Pastry Chab, Vol.I and II, A VI Publishing Co., Inc., West Port, Connecticut, 1977.
5. Bakery Journal

**Practicals:**

1. Breads
2. Cakes
3. Biscuits and cookies
4. Pastries
5. Icing

## **ELECTIVE PAPER I - B**

### **Nutrition in Emergencies**

#### **Objectives:**

1. The course is intended to provide a general insight in the dimensions of disasters/emergencies caused by nature beyond the human control as well as the disasters and environmental hazards induced by human developmental activities.
2. Understand strategies for nutritional rehabilitation management of health of emergency disaster affected populations.

#### **UNIT I**

##### **Emergency situations**

Famine, drought, flood, earthquake, cyclone, Tsunamis, coastal hazards, war, civil and political emergencies and factors giving rise to emergency situation in these disasters. Illustration using case studies from Indian subcontinent.

#### **UNIT II**

##### **Nutritional problems in emergencies in vulnerable groups**

Causes of malnutrition in emergency situations. The old and the new WHO standard references of malnutrition measurements. Major deficiency diseases in emergencies – Protein– Energy malnutrition and specific deficiencies.

#### **UNIT III**

##### **Communicable diseases**

Infectious diseases-measles, ARI, diarrhea diseases. Vector-borne diseases-malaria, dengue fever. Principles of out break investigation and control. STDs/ HIV infection. Common mental health problems and their prevention and treatment.

#### **UNIT IV**

##### **Environmental Health**

Conducting environmental sanitation surveys, types of sanitary facilities, pests and vector control, general hygiene in camps and refugee centers.

Assessing water needs and calculating minimum daily requirement, standards, treatment and protection of water sources.

Public Health and its role in Disaster Management: Public health systems, Health promotion and disaster prevention, integrated approach. Public health emergencies in Disasters – Water borne, vector borne and other diseases.

#### **UNIT V**

##### **Nutritional rehabilitation**

Basic principles of treatment of severe malnutrition in selective feeding programs. Livelihoods and food economy approach, food distribution strategy-identifying and reaching the vulnerable group, mass and supplementary feeding, transportation and food storage, Basic concepts in food security and current trends in nutrition: general nutritional, support International agencies, non-government organizations, and government programs involved with food aid and relief.

## REFERENCES

1. Semba R. D., & Bloem M. W. (2001). Nutrition and health in developing countries. Humana Press. ISBN 0896038068.
2. World Health Organization (2000). The management of nutrition in major emergencies. Geneva, Switzerland: World Health Organization. Available online at: <http://whqlibdoc.who.int/publications/2000/9241545208.pdf>.
3. Young, H., Borrel, A., Holland, D., & Salama, P. (2004). Public nutrition in complex emergencies. *Lancet*, 364(9448), 1899-1909.
4. WHO. (2005). Communicable disease Control in Emergencies: A field manual, pp. 145-149; 172- 178 & 181-184 & Retrieved from <http://who.int/infectious-disease-news/IDdocs/whocdc200527/whocdc200527full.pdf>.
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## ELECTIVE PAPER II - A

### FOOD PRESERVATION

Hours of instruction/ week: 6

#### Subject description:

Principles of food preservation, general principles and methods of preparation of sugar and salt preserved products, preservation by use of high and low temperature, preservation with chemicals and preservation of food by radiation.

#### Objectives:

- To enable students
1. Understand the principles of food preservation.
  2. Acquire skills in methods of food preservation

### 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 & syrups. Preservation by addition of salt- Pickling. Preparation of Indian Pickles, Sauerkraut.

Status & scope of food processing industry in India in developing Entrepreneur.

## **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**

Preservation with chemicals

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

## **UNIT – V**

Radiation of Foods

- a. Sources of radiation, units of radiation
- b. Mode of action of irradiation, radiation effect on proteins enzyme system
- c. Microwave heating, properties of microwaves, applications in food processing and preservation.

Preservation of Semi moist foods:

- a. Principles
- b. Intermediate moist foods

Reference Books:

1. The technology of food preservation- NV Desroisier
2. Food Science- Norman Potter
3. Food Technology- Prescott and Procter
4. Technology of food preservation -ICAR
5. Food Microbiology- W C Frazier
6. Preservation of Fruits and Vegetables- Siddappa S G, ICAR New Delhi
7. Shirley J. Vangarde and Margy Wood Burn, (1999) Food Preservation and Safety, Surabhi Publications, Jaipur.
8. D.K.Salunkhe,S.S.kadam-Handbook of vegetable science and technology,Marcel Dekker Inc,New York,2005.

## **ELECTIVE PAPER II - B**

### **Food Hygiene and Sanitation**

#### **Objectives:**

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

#### **UNIT-I**

##### **Food hygiene**

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

#### **UNIT-II**

##### **Safe and effective insect and pest control**

Extraneous materials in foods, Principles of Insects and pests control. Physical and chemical methods of control. Effective control of micro-organisms: microorganisms important in food sanitation, micro-organisms as indicator of sanitary quality.

#### **UNIT-III**

##### **Sanitary aspects of water supply**

Source of water, quality of water, water supply and its uses in food 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.

#### **REFERENCES**

- 1 Guide to Improve Food Hygiene - Gaston and Tiffney
2. Practical Food Microbiology & Technology - Harry H. Weiser, Mountney, J. and Gord, W.W.
3. Food Poisoning and Food Hygiene - Betty C. Hobbs
4. Principles of Food Sanitation - Marriott and Norman, G.
5. Hygiene and Sanitation in Food Industry - S. Roday

## **ELECTIVE PAPER III - A**

### **FOOD QUALITY CONTROL**

**Hours of instruction/week: 5**

Subject description:

Principles of food quality control, food standards, food grades, food laws, food adulteration, methods to assess the food quality, food safety, risks, hazards and labeling.

Objectives:

To enable the students to

- a. Study about the control of quality and use of additives
- b. Gain Knowledge on standards for food quality and food laws.

#### **UNIT-I**

Principles of Quality control of food –Raw material control, processed control and finished product inspection.

Leavening agents, classification, uses and optimum levels.

Food additives - Preservatives, colouring, flavouring, sequestering agents, emulsifiers, antioxidants.

#### **UNIT-II**

Standardisation systems for quality control of foods-National and International standardization system, Food grades, Food laws-compulsory and voluntary standards.

Food adulteration - Common adulterants in foods and tests to detect common adulterants.

#### **UNIT-III**

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.

Reference Books:

1. Food science-Norman potter
2. Food Technology-Presscott.S.C.and Procter
3. Food chemistry-Meyer

4. Food science, Chemistry and experimental foods-M.Swaminathan
5. Food chemistry-Lee
6. Food science-Srilakshmi(2001)2<sup>nd</sup> edition, New age international publishers-(2001)
7. Rerfus.K.Guthrie-Food sanitation –3<sup>rd</sup> edition –Van Nostrand Reinhold Newyork 1988.
8. Mahirdra-S.N.-Food safety –A techno-legal analysis-Tata McGrawhill publishers 2000.
9. Manoranjan Kalia-Food processing and preservation.
10. Roday-Food hygiene and sanitation.
11. Indian Food industry,2000,Vol19:2

## **ELECTIVE PAPER III - B**

### **Food Packaging**

#### **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.

#### **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. Aspheric packaging, retortable containers, modified and controlled atmosphere packaging, skin, shrink and cling film packaging, micro-ovenable containers, other package forms and components of plastics.

## **UNIT - V**

### **Packaging of finished goods**

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

### **REFERENCES**

1. Vijaya Khader, Text book of food science and technology, Indian council of Agricultural research New Delhi, 2001.
2. Stanley Sacharous. Roger C Griffin. Principles of food packaging 2<sup>nd</sup> Ed. Avi pub Co. Westport.
3. F.A. & Paine. H.Y. Leonard hill. A hand book of food packaging. Blackie Sons Ltd London.
4. Sacharows. S. Handbook of packaging materials. Avi Pub Co. Westport.
5. Croshy N.T. Food packaging materials. Applied Science pub Ltd. London.
6. Paine F.A. The packaging media. Blackie & Sons Ltd. London.
7. NIIR. Food packaging technology Handbook, Delhi.