

**Proposed Curriculum of MSc. in Food and Nutrition**  
**Under Choice Based Credit System**  
**in**  
**KANYASHREE UNIVERSITY**

**Overview of the Master of Science in Food and Nutrition (MSc. in Food and Nutrition)**

The Master of **Science in Food and Nutrition (MSc. in Food and Nutrition)** is an academic program, by which learners will gather wider and more comprehensive understanding of Food and Nutrition as a field of knowledge and it would enable the learners to acquire knowledge, attitude and skills with respect to the subject Food and Nutrition.

**Duration:** The Master of Science in Food and Nutrition (MSc. in Food and Nutrition) is of two-year postgraduate degree program which comprises of four semesters.

**Outline of Choice Based Credit System in MSc. in Food and Nutrition**

The curriculum has been prepared according to Choice Based Credit System (CBCS) which offers opportunities and avenues to learn core subjects as well as exploring additional avenues of learning beyond the core subjects for holistic development of an individual. The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, discipline specific elective, generic elective and ability enhancement compulsory and skill enhancement courses. The Choice Based Credit System in MSc. in Food and Nutrition is comprised of various choices like core courses, discipline specific elective courses, generic elective courses, discipline specific elective courses.

1. **Core Course (CC):** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.
2. **Elective Course:** Generally, a course which can be chosen from a pool of courses and this may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.
  - i. **Discipline Specific Elective (DSE) Course:** Elective courses may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective. The University/Institute may also offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).
  - ii. **Dissertation/Project:** An elective course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his/her own supported by a teacher/faculty member is called dissertation/project.
  - iii. **Generic Elective (GE) Course:** An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective. A core course offered in a discipline/subject may be treated as an elective by other discipline/subject and vice versa and such electives may also be referred to as Generic Elective.

**Eligibility for Admission:** The candidates having BSc. Honours in Biological and allied sciences, food and Nutrition and Chemistry are eligible for taking admission in Master of **MSc. in Food and Nutrition**. The reservation policy for taking admission in **MSc. in Food and Nutrition** with respect to the candidates from SC/ST/OBC categories will be followed according to government rules.

**Program Outcome:** Upon completion of the **MSc. in Food and Nutrition**, the students will have the following carrier options:

- i. Food and Nutrition is a multidisciplinary subject. It has a vast field in \*Research\*. To be a competent person for qualifying NET/SET in Home Science conducting PhD. in Home Science or Science
- ii. With a proper degree in Food and Nutrition, a person can work as a \*Dietitian or Nutritionist\* in hospitals and nursing homes, and practice clinically.
- iii. With a degree in nutrition, one can work in the community with \*Community NGO's\*.
- iv. One can also work in \*Food Industries\* after studying Food and Nutrition.
- v. With a degree in food and nutrition, one can work at a \*Food Testing Laboratory\*.
- vi. One can also work in a food safety industry as a \*Food Safety Officer\* with a degree in food and nutrition.
- vii. One can join the \*Fitness Industry\* and help people to stay fit with a degree in food and nutrition.
- viii. \*Entrepreneurship\* is always an option with a degree in nutrition by innovating new products.

**Evaluation System:** The performance of students should be assessed throughout the semester. It means assessment will be conducted continuously and comprehensively by the means like seminar presentation, assignments, term papers, case study & survey, quiz, debate & group discussion, class test, class assessment and participation in different activities. After each semester, there will be a term end examination on 40 marks for each and every course. The courses will be evaluated by the grading system, which is considered to be better than the conventional marks system.

<b>Continuous Assessment (10)</b>	<b>Term End Examination (40)</b>
Attendance	Test
Participation in activities	<b>Short Type</b> (5 × 4) = 20 Options 7 <b>Essay Type</b> (10 × 2) = 20 Options 4 <b>Or</b>
Seminar Presentation	
Assignment	
Term Paper	<b>Unit wise 4 questions with four options</b> 10 × 4 = 40
Case Study & Survey	
Quiz, Debate and Group Discussion	
Class Test	

**The Structure of Curriculum of MSc. in Food and Nutrition,  
Under Choice Based Credit System (CBCS) in Kanyashree University**

## Semester- I

Course Code	Course Type	Course Title	L	T	P	Credits	Marks
	CC-1 (Theory)	BASIC NUTRITION AND HEALTH	3	1	0	4	50
	CC-2 (Theory)	FOOD CHEMISTRY	3	1	0	4	50
	CC3(Theory)	APPLIED PHYSIOLOGY	3	1	0	4	50
	CC4(Theory)	FOOD ITEMS AND ITS CONSTITUENTS	3	1	0	4	50
	CC-5 (Theory)	NUTRITIONAL BIOCHEMISTRY	3	1	0	4	50
	CC-6 (Practical)	FOOD ANALYSIS AND APPLIED PHYSIOLOGY	0	0	4	4	50
		<b>Total</b>				24	300

## Semester- II

Course Code	Course Type	Course Title	L	T	P	Credits	Marks
	CC-7 (Theory)	FOOD MICROBIOLOGY AND FOOD TOXICOLOGY	3	1	0	4	50
	CC-8 (Theory)	DIETARY MANAGEMENT OF DISEASES	3	1	0	4	50
	CC9 (Theory)	COMMUNITY NUTRITION	3	1	0	4	50
	CC-10 (Practical)	FOOD MICROBIOLOGY AND FOOD PRESERVATION	0	0	4	4	50
	CC11 (Practical)	COMMUNITY NUTRITION AND DIET THERAPY	0	0	4	4	50
	CC12 (Practical)	HOSPITAL INTERNSHIP PROGRAMME	0	0	4	4	50
		<b>Total</b>				24	300

## Semester- III

Course Code	Course Type	Course Title	L	T	P	Credits	Marks
	CC-13 (Theory)	FOOD PROCESSING	3	1	0	4	50
	CC-14 (Theory)	BIostatISTICS COMPUTER APPLICATION	3	1	0	4	50
	CC-15 (Theory)	THERAPEUTIC NUTRITION	3	1	0	4	50
	CC-16 (Practical)	FOOD PROCESSING	0	0	4	4	50
	GEC	FAMILY NUTRITION AND HEALTH To be selected from other departments	3	1	0	4	50
	DSE(I) Any One	ADVANCED FOOD SCIENCE	3	1	0	4	50
		SPORTS NUTRITION AND SPACE NUTRITION	3	1	0	4	
		<b>Total</b>				24	300

## Semester- IV

Course Code	Course Type	Course Title	L	T	P	Credits	Marks
	CC-17 (Theory)	FOOD BIOTECHNOLOGY	3	1	0	4	50
	CC-18 (Theory)	GENETICS, NUTRIGENETICS AND NUTRIGENOMICS	3	1	0	4	50
	CC19 (Theory)	EPIDEMIOLOGY, FAMILY WELFARE PUBLIC HEALTH	3	1	0	4	50
	DSE (II) Any One	MATERNAL NUTRITION	3	1	0	4	50
		GERIATRIC NUTRITION	3	1	0	4	
	CC 20 (Practical)	DISSERTATION	0	0	8	8	100
						24	300

**Abbreviations:**

CC- Core Course,

GEC: Generic Elective Course

DSE- Discipline Specific Elective

**Semester Total**

Semester	I	II	III	IV	Total
Credit	24	24	24	24	96
Marks	300	300	300	300	1200

## SEMESTER I

### Course Code: CC1 : BASIC NUTRITION AND HEALTH (Paper Code: T1.1)

Full Marks - 50 3L+1T=4 Credit-4

#### NUTRITION DURING LIFE SPAN

- 1. Pregnancy:** Physiological & Biochemical changes during Pregnancy, Nutritional requirements, Nutritional status of Indian pregnant women. Effect of malnutrition on outcome of pregnancy, Risk of pregnancy, Dietary management.
- 2. Lactation:** physiology of lactation, Factors affecting lactation, nutritional requirements. Effect of lactation on maternal malnutrition and fertility
- 3. Infancy:** Growth and development, nutritional requirements. Feeding pattern, Human milk composition, Milk substitute and their suitability for infant feeding. Weaning practices, and problems.
- 4. Preschool age:** Growth and development, nutritional requirements, special care in feeding preschoolers, nutritional problems specific to this age.
- 5. School age and adolescent children:** Growth and development, nutritional requirements.
- 6. Adults:** Nutritional requirements, Modern aspect of balanced diet, My plate of the day.
- 7. Elderly:** Nutritional requirements, Special needs, Nutritional problems

**Recommended Reading:** 1. Srilakshmi, B. 2000. Dietetics. Wiley Eastern Ltd. 4835/24, Ansari Road, Daryaganj. New Delhi. 2. Swaminathan, H. 1995, Essentials of Food and Nutrition Vol I & Vol. II Bappco. Bangalore. 3. Mahan, L.K. and Escott-Stump, S. (2000): Krause's Food Nutrition and Diet- Therapy, 10th Edition, W-13 Saunders Ltd.

### Course Code: CC2 : FOOD CHEMISTRY (Paper Code: T1.2)

Full Marks - 50 3L+1T=4 Credit-4

- 1. Proteins:** Structure, Classification and Properties –Native and denatured proteins, separation and purity of proteins, chemistry of amino acids, separation and purification of amino acids, functional properties of proteins, hydration, viscosity, gelation, texturation, emulsifying and foaming properties of proteins. Protein concentrate, isolate, hydrolysates and hydrolyser. Levels of protein structure- secondary and super secondary structures- domains, motifs, protein folding, active site.
- 2. Carbohydrates:** Properties and reactions of all types of carbohydrates, types of isomerism, structural elucidation of mono (glucose and fructose) and disaccharides (lactose and sucrose), Structure of homo and hetero polysaccharides.
- 3. Lipids:** Edible fats and oils — Classification and properties, Physical and Chemical properties of fatty acids, liposomes, phospholipids, cholesterol, saturated, monounsaturated, polyunsaturated fatty acids, trans chain fatty acids. Lipid modulators (Prostaglandins, leukotrienes, thromboxanes)
- 4. Nucleic acids & Nucleotides:** Structures of nucleotides (major bases — purines and pyrimidines), ribose and deoxyribose sugars, concept of nucleosides (mono, di, triphosphates), Types of DNA and RNA (Primary and secondary structure of DNA and RNA, organization of DNA in the cell).

**5. Dietary fibre:** Definition, fibre components – cellulose, hemicellulose, pectin substances, lignin, gums, mucilage and algal polysaccharides, Microbial polysaccharide – xanthan gum, gellan gum, curdlan, dextran, pullulan

**6. Water:** pH, structure and interactions of water molecule, Covalent, non-covalent bond, water in food, acid-base balance, buffer

**7. Vitamins:** Structure of fat soluble and water soluble vitamins and their biochemical functions, Coenzymes

**8. Minerals:** Minerals (Fe, Na, K, Ca, P, Cl, I, Zn, Mn, Se, Mo, Cu) as co factors, antioxidants, structural components

**9. Phytonutrients:** Polyphenols, flavonoids, lignans, stilbenes, phytosterols

**Recommended Readings:** 1. P.C.K. Cheung, B.M. Mehta (Eds.) Handbook of Food Chemistry 1st ed. 2015, XXIII, 1173 p. 209 illus., 36 illus. in color. 2. Food chemistry PDF book free download ICAR e Course. 3. **5th Edition Fennema's Food Chemistry** Edited By **Srinivasan Damodaran Kirk L. Parkin** Copyright Year 2017

**Course Code: CC3 : APPLIED PHYSIOLOGY (Paper Code: T1.3)**

**Marks: 50 3L+1T=4 Credit-4**

**1. Alimentation:** Mechanism of HCl secretion– physiological, nutritional and pharmacological aspects. Absorption of fat, minerals, vitamins. Bile formation and secretion; Nature of exo- and endopeptidases and their mechanism of action in protein digestion; Role of mucosal associated lymphocytes in health and disease; Neuroendocrine control of hunger and satiety. Physiology of obesity and starvation. The genomics of leptin mediated responses-obesity and its regulation.

**2. Immunology:** Cells and organs of Immune system. Innate immunity and Acquired immunity, Antigen, hapten and allergen. Immunoglobulins- different isotypes. Antigen-Antibody interactions. T cell cytotoxicity. Cell-mediated effectors function, Cytokines, Hypersensitivity reactions. Autoimmunity-autoimmune diseases, Immunodeficiency.

**3. Endocrinology:** Mechanism of action—Steroid and Protein hormones, Gastro-intestinal hormones: Site of origin, chemical nature and mode of action.

**4. Cell Biology :** Ultramicroscopic structure of organelles of animal cell. Plasma membrane- transport through cell membrane- Transport of nutrients, study of active and passive transport mechanisms, the glucose transporter as unique family of proteins. Golgi bodies, Endoplasmicreticulum, mitochondria, lysosomes- E/M structure related to functions. Cell junctions, cytoskeleton, Cell Cycle, factors controlling cell cycle; Cell to cell signaling: hormones and receptors, second messenger. Cell signaling pathways

**Recommended Readings:** 1. Cellular and Molecular Immunology, 10th Edition by Abul K. Abbas, MBBS, Andrew H. Lichtman, MD, PhD and Shiv Pillai, MBBS, PhD, Elsevier 2. Kuby Immunology, 8<sup>th</sup> edition, 2019, J., Punt, S. Strandford, P Jones, J Owen 3. Cooper, G.M., & Hausman, R.E. (2009). The cell: a molecular approach. Washington, D.C., ASM Press, Harvard 18<sup>th</sup> edition 4. Gastrointestinal Physiology: Mosby publication, Leonard Johnson, 9<sup>th</sup> edition 5. Physiology of the Gastrointestinal tract, 6<sup>th</sup> edition, Hamid Said 6. Harper's illustrated biochemistry 31<sup>st</sup> edition A& L Lange series, 2018

**Course Code: CC4 : FOOD ITEMS AND ITS CONSTITUENTS (Paper Code: T 1.4)**

**Full Marks - 50 3L+1T=4 Credit-4**

- 1. a. Processing of foods:** Primary, secondary and tertiary processing, historical perspective, traditional technologies used in food processing.
- b.** Effects of processing on components, properties and nutritional value of foods.
- 2. Processing of wheat:** Structure, composition, primary processing, study of preparation/ manufacture of common unleavened and leavened products like chapathi, bread, cake etc.
- 3. a. Rice:** Structure, composition, primary and secondary processing, rice processed products.
- b.** Millets: Types, composition, malting, other food uses.
- 4. a. Legume:** Types, composition, cooking & processed products.
- b.** Oilseeds: Use of oilseeds and oilseed meals, soya bean and groundnut - composition, processing and food uses.
- c.** Fruits and vegetables: Composition, pectins, plant acids, types of pigments, effect of cooking on colour and texture of vegetables.
- 5. Fats and oils:** Properties, manufacture, uses in food systems (as cooking media and shortening). Rancidity types, mechanism and prevention. Uses of fat replacers in processed foods.
- 6. a. Milk and milk products:** Composition, functionality in food system, processing of different products like ghee, butter, milk powders, khoa, paneer, cheese, milk products and ice creams.
- b.** Eggs: Quality grading, structure, composition, functional properties and products.
- 7. a. Flesh foods:** Types, composition, structure of muscle, conversion of muscle to meat-physio – chemical changes, cooking and processing.
- b.** Marine foods: Types, composition, cooking and processing.
- 8. a. Sugar and Jaggery:** Principles of sugar crystallization, stages of cookery and role in Indian traditional sweet preparations, manufacturing of candies and sweets.
- b.** Brief manufacturing process of coffee, tea, cocoa, alcoholic beverages (fruit wines). Ready to serve beverages.
- 9. Fast foods, Junk foods**
- 10. Sensory evaluation of foods:** Texture, Color, Aroma, flavor etc. of different foods

**Recommended Reading:** 1. Jelen, P. (2005). Introduction to Food Processing. Prentice Hall. 2. Fellows, P.J. (2005). Food processing technology: Principle and Practice. 2nd Ed. CRC Publishers. 3. ICMR.2010. Nutrient Requirements and Recommended Dietary Allowances for Indians, NIN, ICMR. New Delhi. 4. Srilakshmi, B. 2000. Food Science. Wiley Eastern Ltd. 4835/24, Ansari Road, Daryaganj. New Delhi.

**Course Code: CC5 : NUTRITIONAL BIOCHEMISTRY (Paper Code: T1.5)**

**Full Marks - 50 3L+1T=4 Credit-4**

- 1. Carbohydrate Metabolism:** Aerobic and anaerobic degradation, glycogenesis, glycogenolysis, gluconeogenesis, HMP shunt pathway; Regulations of blood glucose level; Biological oxidation and electron transport chain.

**2. Enzymology:** Nomenclature and classification, general properties, coenzyme and their function, factors influencing enzyme reaction kinetic properties, Michaelis constant inhibition, purification, methods for determining activities of some important enzymes, isoenzyme, mechanism of enzyme action, regulation of enzyme activity, allosteric and feedback inhibition

**3. Protein Metabolism:** Common methods of amino acid breakdown. Urea formation and uric acid biosynthesis- clinical significance

**4. Lipid Metabolism:** Fatty acid synthase and do novo biosynthesis of fatty acid; regulation and mechanism of chain elongation; biosynthesis of eicosanoids – prostaglandins, and their physiological importance; metabolism of cholesterol, its control and pathophysiological importance.

**Course Code: CC6 : FOOD ANALYSIS AND APPLIED PHYSIOLOGY (PRACTICAL) (Paper Code P1.1)**

**Marks: 50 (credit 4)**

### **Food Analysis**

1. Proximate Analysis of foods: carbohydrates, proteins, fats, total ash, moisture content
2. Determination of mineral content in food: Calcium, Iron
3. Determination of vitamins in Food: Ascorbic acid,  $\beta$ -carotene
4. Estimation of fibre in food including pectin content of fruits
5. Measurement of viscosity, surface tension and pH of food
6. Estimation of gluten content
7. Estimation of polyphenols
8. Determination of titrable acidity

### **Applied Physiology**

1. Separation of amino acids by paper chromatography
2. Separation of lipids by thin layer chromatography
3. Estimation of DNA by DPA method
4. Estimation of RNA by spectrophotometric method
5. Separation of proteins by electrophoresis on SDS– polyacrylamide gel
6. DNA gel electrophoresis
7. Salting out of proteins from a solution



## SEMESTER II

**Course Code: CC7 : FOOD MICROBIOLOGY AND FOOD TOXICOLOGY (Paper Code: T2.1)**

**Full Marks - 50 3L+1T=4 Credit-4**

- 1. Microorganisms important in food microbiology-** moulds, yeast, bacteria; Growth of Bacteria, isolation of pure culture and staining.
- 2. Physical and chemical means used in destruction of microbes:** Definition of sterilization and disinfection, role of heat, filtration and radiation in sterilization, use of chemical agents-alcohol, halogens and detergents 10
- 3. Importance of microbes in food: genetically engineered organisms, probiotics and single cell proteins;** Dairy products (cheese and yoghurt) and traditional Indian fermented foods and their health benefits.
- 4. Microbiology of water-** Number and kinds of microorganisms present in water sample. Detection, classification and confirmation of coliform bacteria, Faecal and non-faecal coliform bacteria, Purification of water. Diarrhoea causing microorganisms, toxins
- 5. Definition, sources of contamination and microorganisms involved in spoilages of various foods:** Milk, cereals, vegetables, fruits, fish, meat, egg and canned food.
- 6. Public health hazards due to microbial contamination of foods:** Important food borne infections and intoxications due to bacteria and moulds; Symptoms, mode of transmission and methods of prevention. Food adulteration and Natural toxicant in food, Heavy metal toxicity
- 7. Assessing the microbiological quality of food:** indicator organisms, microbiological standards, principles of GMP & HACCP in food processing. Safety management at household and industrial level.

**Recommended readings:** Frazier, W. C. and Westhoff, D. C. (1988): 4th edition, Food Microbiology, McGraw Hill Inc. 2. Jay James. N. (1986) : 3rd edition, modern Food Microbiology, Van Nestrand Reinhold Company Inc. 3. Pelczar, M.I. and Reid, K. D. (1978): Microbiology, McGraw Hill Company, New York. 4. Benson Harold, J. (1990) : Microbiological Application, Publishers, U.S.A. 5. Colling, C.E. and Lyne, P.M. (1976) : Microbiological Methods Butterworth. London 6.Jay JM, Modern Food Microbiology, CBS Publication New Delhi 3rd Ed. 1987 7.Bamrart George J, Basic food Microbiology, CBS Publication, New Delhi, 1987 8.Brain J. Wood Elsierver, Microbiology of Fermented Foods, Vol II & I, Applied Science Publication.

**Course Code: CC8 : DIETARY MANAGEMENT OF DISEASES (Paper Code: T2.2)**

**Full Marks - 50 3L+1T=4 Credit-4**

- 1. Cardiovascular Disorders, Specific nutritional Causes, Prevention & Management:** Dyslipidimia, Mediterranean diet, Dietary effects on serum lipids & lipoproteins, Dietary sources of cholesterol, Atherosclerosis, Dietary guidelines for CVD, Prevention of CVDs by lifestyle and non-lifestyle modifications, Nutrition on hypertension

- 2. Renal functions and nutrition:** Nutritional assessment in renal patient, Daily nutrient & fluid needs, Stages in renal failure, Practical application of diet
- 3. Hepatic functions & nutrition:** Role of liver in normal nutrient metabolism, Impact of liver disease in nutritional metabolism, Nutritional evaluation & management of hepatic diseases
- 4. Nutritional management of diabetes:** Classification & diagnostic criteria, Gestational diabetes, Diabetic complications, Role of Physical activity on blood sugar control, Dietary management of diabetes
- 5. Osteoporosis and Osteopenia:** Causes & Consequences, Nutritional management
- 6. Cancer and Dietary aspects:** Types of Cancer, Nutritional Management, Nutritional management during, Chemotherapy of the patients
- 7. Dietary management in Surgical conditions & burns**

**Recommended readings:** 1. Mahan, L.K. and Escott-Stump, S. (2000): Krause's Food Nutrition and Diet-Therapy, 10th Edition, W-13 Saunders Ltd 2. Williams' Basic Nutrition & Diet Therapy (Williams' Essentials of Nutrition & Diet Therapy) 15<sup>th</sup> edition 3. Nutrition and Diet therapy, Peggy Stanfield, Y.H.Hui, Jones and Bartlett publishers.

**Course Code: CC9 : COMMUNITY NUTRITION (Paper Code: T2.3)**

**Full Marks - 50      3L+1T=4 Credit-4**

**1. Meaning of community and Community Nutrition**

2. **Malnutrition:** Meaning, Types of Malnutrition, Ecology of malnutrition-environmental, social, and economical factors. Classification of PEM- causes, signs and symptoms, Treatment and Preventive measures.

3. **Nutrition education** –Meaning, objectives, process of nutrition education, communication, suitable aids

4. **Nutrition Surveillance and monitoring:** definition, milestone in the development of nutrition surveillance. AAP approach, monthly monitoring and nutrition surveillance

5. **Approaches / strategies for improving nutrition and health status of the community** –immunization, safe drinking water, sanitation, prevention and management of diarrhoeal diseases.

6. **Concept definitions of food and nutrition security at national, household and individual level.**

7. **Principles of Nutrition Epidemiology. Structure, organisation and functions of public health set up in the country:**

- National Level - Union ministry of health and family welfare • Director General of health services • Health and family welfare • Indian system of medicine and homeopathy • Department of health research
- State Level - Director of health • Health and family welfare • Director of medical education
- Regional Level - Regional Director of health • Regional District Hospitals
- Sub divisional or Taluka Level - Community health centres (CHC)
- Sub Taluka or Mandal Level- PHC levels and sub-centres

Recommended books: Community nutrition, 3<sup>rd</sup> edition, Nweze Eunice Nnkwe

**Recommend Readings:** 1. Sheila Chander Vir ed. 2011. Public Health Nutrition in Developing Countries (Part I and II). Woodhead Publishing India Pvt Ltd. New Delhi. India. 2. Richard Skolnik. 2019. Global Health 101. 4<sup>th</sup> Edition. JB Learning. Burlington. USA. 3. Suresh C Babu et al. 2017. Nutrition Economics: Principles and Policy Applications. Academic Press. USA. 4. K. Park. 2021. Park's Textbook of Preventive and Social Medicine. 26<sup>th</sup> Edition. Banarsidas Bhanot Publishers. Jabalpur.India. 5. Mahajan & Gupta. 2013. Textbook of Preventive and Social Medicine. 4<sup>th</sup> Edition. Jaypee Brothers Medical Publishers Pvt Ltd. New Delhi. India.

**Course Code: CC10 : FOOD MICROBIOLOGY AND FOOD PRESERVATION (PRACTICAL) (Paper Code P2.1)**

**Marks: 50 (credit 4)**

### **Food Microbiology**

**1. Preparation of culture media** for bacteria, yeast, and fungus, Inoculation and staining of bacteria, fungus and yeast, Acid fast and endospore staining; Use of Biochemical tests for identifying bacteria

**2. Microbiological analysis** of Water, Milk, Canned product, Fruit juices and Street foods. Phosphatase test for pasteurization of milk, Gradation of milk by methylene blue reduction test, Coliform bacteria isolation from different water sources; MIC test for antibiotics

**3. Adulteration of food:** (i) Metanil yellow in sweets, ice-cream and beverages. (ii) Aluminium foil in sweet. (iii) Margarin in Ghee. (iv) Water in milk. (v) Chalk Powder in sugar. (vi) Khesari flower in Besan

### **Food Preservation**

#### **1. Inhibition methods**

- (i) Low temperature storage,
- (ii) reduction of water activity,
- (iii) fermentation
- (iv) Use of antioxidants

#### **2. Inactivation methods**

- (i) Sterilization
- (ii) Blanching

**3. Food packaging:** Estimation of shelf life of packaged food stuff. Water vapour of flexible packaging materials. Identification and chemical resistance of plastic film. Pre-packaging of vegetables. Familiarization of types of packaging materials. Evaluation of new food products.

#### **4. Visit to food industries and food technology institutes**

**Recommended readings:** 1. Food Safety A Practical and Case Study Approach, Edited by Anna McElhatton, Richard J. Marshall, Springer 2. Handbook of Food Preservation, edited M. Shafiur Rahman, CRC press 3. Fundamentals of Food microbiology, Bibek Roy, CRC press

**Course Code: CC11 : COMMUNITY NUTRITION AND DIET THERAPY (PRACTICAL) (Paper Code P2.2)**

**Marks: 50 (credit 4)**

**COMMUNITY NUTRITION**

- 1. Diet and nutrition surveys** a. Diet surveys and breast feeding and weaning practices of specific groups  
b. Assessment of nutritional status of community by using clinical and anthropometric technique
- 2. Methods of extension used in Community** a. Lecture and Method demonstrations to target groups for health and nutrition education  
b. Preparation of low cost nutritious recipes suitable for various vulnerable sections of population
- 3. Field visits to—** a. Observe the working of nutrition and health oriented programmes  
b. Observe public health centre, c. Food production centre
- 4. Use of factorial method for calculation of total energy requirement**
- 5. Methods of determination of nutrients requirement of individual, experiment with one common nutrient**
- 6. Meal Planning:** distribution of energy, nutrients, and food items according to different age groups
- 7. Use of food value table with its limitations**
- 8. Classification of locally available foods according to food groups**
- 9. Preparation of food exchange list**
- 10. Use of food exchange list in dietary calculation and meal planning**
- 11. Visit to an ongoing nutrition programme centre**

**DIET THERAPY**

1. Planning, preparation, service and evaluation of therapeutic diets covered in theory
2. Dietary counselling of patients for the disorders covered in the theory. A minimum of two case histories should be done by each student
3. Visit to hospitals

**Recommended readings:** **1.** Advances in diet therapy: Practical manual, New Age International Private Limited, V Vimala **2.** Kathleen Mahan and Sylvia Escort – Stump (2000) : Food, Nutrition & Diet Therapy 11th Edition, W.B. Saunder"s Company London. **3.** Scrimshaw, N.S. and Gleason, G.R. (1992) Assessment Procedures. Qualitative Methodologies for Planning and Evaluation of Health related Programmes. International Nutrition foundation for Developing Countries, Boston.

**Course Code: CC12 : HOSPITAL INTERNSHIP PROGRAMME (PRACTICAL) (Paper Code P2.3)**

**Marks: 50 (credit 4)**

**VISIT TO A HOSPITAL**

## SEMESTER III

Course Code: CC13 : FOOD PROCESSING (Paper Code: T3.1)

Marks: 50 (credit 4)

**1. Food Storage and Spoilage:** Contamination and microorganisms in the spoilage of different kinds of foods and such as cereal and cereal products, vegetable and fruits, fish and other sea foods, meat and meat products, eggs and poultry, milk and products, canned foods. Classification of food based on pH, Food infection, food intoxication, definition of shelf life, perishable foods, semi perishable foods, shelf stable foods, Storage of different kinds of foods and such as cereal and cereal products, vegetable and fruits, fish and other sea foods, meat and meat products, eggs and poultry, milk and products, spices and canned foods.

**2. Food preservation:** Definition, objectives and principles of food preservation. Different methods of food preservation: Freezing and Refrigeration: Introduction to refrigeration, cool storage and freezing, definition, principle of freezing, freezing curve, changes occurring during freezing, types of freezing i.e. slow freezing, quick freezing, introduction to thawing, changes during thawing and its effect on food. Thermal Processing- Commercial heat preservation methods: Sterilization, commercial sterilization, Pasteurization, and blanching. Drying and Dehydration - Definition, drying as a means of preservation, differences between sun drying and dehydration (i.e. mechanical drying), heat and mass transfer, factors affecting rate of drying, normal drying curve, names of types of driers used in the food industry. Evaporation – Definition, factors affecting evaporation, names of evaporators used in food industry. Units of radiation, kinds of ionizing radiations used in food irradiation, mechanism of action, uses of radiation processing in food industry, concept of cold sterilization.

**3.Preserved Products:** Jam, Jelly, Marmalade, Sauces, Pickles, Squashes, Syrups types, composition and manufacture, selection, cost, storage, uses and nutritional aspects.

**4. Food Standards and Food Laws :** Introduction on Food standards and Food Laws, FSSAI, ISI, Agmark, FPO, MPO, PFA, HACCP, Codex Alimentarius.

**5.Food Adulteration:** Definition, Classification, Different types of adulterants

**6.Food Packaging:** Packaging Functions and Requirements, Printing of packages. Barcodes & other marking, Labeling

**7. Food additives:** food colour, preservatives, antioxidants, food toxins.

**8. Primary food, Proprietary food: Definition with examples.**

**9. Genetically Modified food, organic food: Definitions and their status in India.**

**10. Street foods: Concept; Common street foods; Significance.**

**11. Nutritive value of foods and concepts of RDA and safe upper limits of nutrients.**

**12. Extruder food machine, extruder food, extruder Industry.**

**Recommended readings:** 1. Emerging Technologies for Food Processing Da-Wen Sun 2. Handbook of Food Preservation Shafiur Rahman M.3. Introduction to Food Processing Jelen P. 4. Handbook of Analysis and Quality Control for Fruit and Vegetable products Ranganna S 5. Food Processing Technology: Principles and Practice P Fellows

## **Course Code: CC14 : BIostatistics and Computer Applications (Paper Code: T3.2)**

**Marks: 50 (credit 4)**

### **BIostatistics**

- 1. Introduction, Collection and presentation of data-** Concept of continuous and dis-continuous data, Tally mark, class limit, boundary, Frequency distribution, Cumulative frequency. Graphical presentation techniques including Histogram, Bar chart, Pie chart along with the concepts of frequency polygon, o-give (Level of teaching-Intermediate)
- 2. Measurement of central tendency and dispersion-** Mean, median, mode (grouped & ungrouped data) Mean absolute deviation (special case-Mean deviation), Mean square deviation (special case-variance), Root mean square deviation (special case- standard deviation), Range and coefficient of variation. (Level of teaching- Elementary)
- 3. Correlation and regression-** Scatter diagram, Correlation coefficient & Rank correlation coefficient (Spearman's) Regression Analysis. (Level of teaching- Intermediate)
- 4. Elements of Sampling-** Types of sampling, Complete enumeration vs sampling. Sampling error & bias. Standard Error. Statistics- sampling distribution of a statistic. Some distributions- Standard 14 normal distribution, Chi-square distribution, t-distribution and F-distribution (Level of teaching- in detail)
- 5. Statistical Inference:** Statistical hypothesis testing, Null hypothesis & alternative hypothesis, Critical region, Type I & Type II error, Level of Significance (Level of teaching- in detail)
- 6. Probability theory:** Introduction to the Classical & Frequency definition of probability. Elementary problems on simple & conditional probability. Theoretical distributions- Binomial, poisson, Normal (Level of teaching- Elementary).
- 7. Vital Statistics:** Introduction to the concept of various birth rates, fecundity rates and mortality rates (Level of teaching- Elementary).
- 8. Types of Research:** Descriptive/historical, Experimental, survey, case study; Research methods: Sample selection, questionnaire construction, interviewing techniques, interpretation of data, scaling methods. Bibliography & literature survey; Conclusions and recommendations; Summery techniques, Report writing
- 9. Standard deviation, correlation, Regression, Hypothesis, Testing, Basic of Image processing and image analysis**

### **COMPUTER APPLICATIONS**

- 1. Basic idea of Operating System**
- 2. Word Processing:** Opening, Creating, Saving and Quitting documents, using menus and toolbars. TEXT: Copy, Delete, move, spell check character & page formatting, size, font, header, footer, bordering, colouring, margins and justification, graph, text PICTURE: Creation, editing and import, printing. Use of other available features.
- 3. Document Preparation & Presentation:** Slide Preparation, adding special effects, adding picture, animation time control, and slide show.

**4. Spread sheet:** Data Entry, Moving data, range selection, use of toolbars and menus: Editing, Calculation and use of formula, display, print, graph and charts: Formatting Facilities for presentation (example: Changing fonts, colours, sizes, adding titles, legends, and gridlines)

**Recommended readings:** 1. Debjyoti Das (2012). Biostatistics. Academic Publishers. 2. E. Batschelet: Introduction to mathematics for Life scientists, Springer Verlag, International Student Edition, Narosa Publishing House, New Delhi (1971, 1975). 3. A. Edmondson and D. Druce: Advanced Biology Statistics, Oxford University Press; 1996. 4. W. Danial: Biostatistics: A foundation for Analysis in Health Sciences, John Wiley and Sons. Inc; 2004.

**Course Code: CC15: THERAPEUTIC NUTRITION (Paper Code: T3.3)**

**Marks: 50 (credit 4)**

- 1. Counselling of patients for Diet therapy:** Concept, significance and methods
- 2. Formulation of Therapeutic Diets:** GI disorders: Swallowing disorders, gastritis and peptic ulcer, Steatorrhea, colitis, sprue, Constipation & Piles, short bowel syndrome, Irritable bowel disease, inflammatory bowel disease (Crohn's disease, ulcerative colitis), Intestinal fistula. Gall bladder and Pancreatic diseases: Gall stones, Cholecystitis, Pancreatitis-acute and chronic.
- 3. Infectious diseases:** Typhoid, cholera, tuberculosis, Mumps, Diarrhoea & dysentery, AIDS
- 4. Diet in** Gout, toxemia in pregnancy, COPD, Thalassemia, Polyneuropathy, Anaemia, Hypothyroidism and Hyperthyroidism, Stress, Sepsis,
- 5. Diet in Nutritional Deficiency Disorders:** Planning of diets and calculation of nutritive value for PEM, IDA, VAD, IDD.
- 6. Nutrition support for critical care management:** Total parenteral nutrition, enteral feeding, Nutrition in altered metabolic states.
- 7. Emergency feeding:** Planning of diet in disaster.

**Recommended readings:** 1. Anderson, L., Dibble, M.V., tukki, P.R., Mitchall, H.S., and Rynbergin H.J.: Nutrition in Health and Disease, 17th edition, J. B. Lipincott & Co. Philadelphia. 2. Anita F. P.: Clinical Dietetics and Nutrition, Second Edition, Oxford University Press, Delhi. 3. Mahan, L. K., Arlin, M. T.: Krause's Food, Nutrition and Diet Therapy. 8th edition, W. B. Saunders Company, London. 4. Robinson. C.H. Lawler, M.R. Chenoweth, W. L., and Garwick, A. E. (1986): Normal and Therapeutic Nutrition. 17th edition, MacMilian Publishing Co. 5. Williams. S. R.: Nutrition & Diet Therapy, 6th edition, Times Mirror/Mosby College Publishings, St. Louis. 6. Raheena, Begum: A textbook of food, nutrition and dietetics Sterling Publishers, New Delhi. 7. Joshi, S. A. : Nutrition and Dietetics, Tata McGraw Hill, Publications, New Delhi. 8. Mehan, L.K. and Arlin, M.T.( 1992). Krause's Food Nutrition and Diet Therapy, W.B. Saunders Company, Philadelphia.

**Course Code: CC16 : FOOD PROCESSING (PRACTICAL) (Paper Code P3.1)**

**Marks: 50 (credit 4)**

1. Study on Blanching and Browning Process.
2. Preparation of Fruit preserves (Jam, Jelly).
3. Preparation of vegetable preserves (Pickles)
4. Dehydrated Products – tray drying, sun drying etc.
5. Tomato Processing.
6. Fruit Pulping/Juice/Beverages production.
7. Preparation and Standardisation of Traditional Indian Fermented Food.
8. Visit to Food Processing and Preservation unit.
9. Detection of Adulterants in common Food Stuffs like Milk, Oil, Laddu, Turmeric etc.

**Course Code: GEC : FAMILY NUTRITION AND HEALTH (To be selected from other departments)**

**Marks 50 Credit 4**

1. Definition of food, fundamentals of nutrition, basic food groups and balanced diet, RDA for Indians, concept of BMI
2. Nutrition through lifespan:
  - a. Infancy: nutritional requirements, problems and deficiency diseases
  - b. Adulthood and old age: nutritional requirements, dietary guidelines problems and deficiency diseases
  - c. Special groups: nutritional requirements, dietary guidelines of pregnant women and lactating mothers
3. Diet and Health:
  - a. Planning diets for children suffering from gastrointestinal disorders and PEM
  - b. Planning diets for patients suffering from diabetes mellitus and heart diseases

**Recommended readings :** **1.** Guthrie, Hele, Andrews, Introductory Nutrition, 6thed. St. Louis, Times Mirror/Mosby College, 1988. **2.** Mudambi S.R, M.V Rajgopal Fundamentals of Foods and Nutrition (2nded) Wiley Eastern Ltd,1990. **3.** Swaminathan S.: Advanced text book on Foods Nutrition Vol. I, II (2nded revised and enlarged) B.app C.1985. **4.** Willson, EVAD Principles of Nutrition, 4thed. New York John Willey and Sons, 1979. **5.** Textbook of Nutrition-Ravinder Chadha & Pulkit Mathur, Orient Blackswan Pvt. Ltd. Telangana. **6.** Srilakshmi B.( 2018).Nutrition Science. New Delhi: New Age International. **7.** Clinical Nutrition & Dietetics- F. P. Antia and Philip Abraham, Oxford University Press.

**Course Code: DSE I: ADVANCED FOOD SCIENCE (Any one)**

**Marks: 50 (credit 4)**

1. **Genetic engineering:** recombinant DNA technology: Plasmids, cosmids, and bacteriophage based vectors for cDNA and genomic libraries. Principles and methods of protein and genetic engineering and gene targeting. Polymerase Chain Reaction, Genetically modified food for nutritional enhancement: principles, techniques, problem, prospects, and ethics.16



**2. Analysis of genetically modified food,** Comparison between GM food and Organic food.

Nutraceuticals and their importance. Functional food, structured lipids, Probiotics and prebiotics, synbiotics, commensalism

**3. Nanotechnology & food:** General development of nano science and nano technology in food and food processing processes. Nanocarriers for drug and nutraceutical. Properties Characteristics

**4. Enzyme Technology:** Structured lipids, synthesis of value added products, application of proteases, amylases and lipases, SCP, SCL, oleaginous

**Recommended readings :** 1. B. Srilakshmi : Food Science, New Delhi: New Age International. 2. Food Technology A.K. Singh e Course 3. Kaput J. and Rodriguez. R. L. (2006). Nutritional Genomics. John Wiley & Sons, Inc. 4. De Busk RM, Fogarty CP, Ordovas JM, Kornman KS. (2005). Nutritional genomics I practice: Where do we begin? J Am Diet Assoc. 105:589-598.

**Course Code: DSE I : SPORTS NUTRITION AND SPACE NUTRITION (Any one)**

**Marks: 50 (credit 4)**

**1. Introduction to sports:** Nutritional considerations for sports / exercising person as compared to normal active person. Determination of energy expenditure in sports and exercise using various methods. Physiology of energy systems.

**2. Activities:** Energy substrate for activities of different intensity and duration, aerobic and anaerobic activities.

**3. Carbohydrate needs, Macro nutrients:** Carbohydrate as an energy source for sport and exercise. Carbohydrate stores, Fuel for aerobic and anaerobic metabolism, Glycogen re-synthesis, CHO Loading, CHO composition for pre-exercise, during and recovery period.

**4. Fat needs,** Role of Fat as an energy source for sports and exercise. Fat stores, regulation of fat metabolism, factors affecting fat oxidation (intensity, duration, training status, CHO feeding) , effect of fasting and fat ingestion.

**4. Protein needs** Protein and amino acid requirements, Factors affecting Protein turnover, Protein requirement and metabolism during endurance exercise, resistance exercise and recovery process. Protein supplement.

**6. Micronutrient needs,** Important micronutrients for exercise. B complex vitamin and specific minerals. Exercise induced oxidative stress and role of antioxidants.

**7. Fluid needs** Fluid balance in sports and exercise, importance, symptoms and prevention of dehydration, Sports drink

**8. Nutritional guidelines for different sports and games:** Nutritional requirements- carbohydrates, fats, proteins and micronutrients in different sports events: strength sport, weight class sport, racket sport, field sports, court sports. General training Diet. Meal planning (Pre & post game)

**9. Management of selected nutritional problems among sportsperson:** Management of selected nutritional problems among sports person: Anaemia - causes, consequences, and role of nutrition in the prevention and management. Osteoporosis - Bone Physiology, Effect of Nutrition, age, sex and exercise on bone health, Preventive and curative strategies of osteoporosis. Nutritional management of Exercise Injuries, Nutrition for Weight Management in Sports. Disorders among sports persons, Types of Sports with weight restrictions -Need for weight loss and weight gain, Negative aspects of weight loss and

recovery strategies -Dietary & Lifestyle Approaches for weight and fat loss and gain. Chronic dieting and eating disorder. Female athletic triad

**10. Dietary Supplements:** Definition and regulations of dietary Supplements (country-specific). Classification of Dietary or Nutritional supplements and its composition, Benefits and applications of nutritional supplements and macronutrient supplements like pure proteins (e.g., whey, casein, egg albumen, soy protein, pea protein and other vegan proteins or protein blends), protein bars. Weight gainers like amino acid supplements, glutamine, arginine, carbohydrate supplements and EFAs, glycerol. Meal replacement powders, ready to drink protein shakes (RTDs), sports drinks & Sports gels. Anti-doping regulations and harmful effects of use of steroids and other banned substances.

**12. Space Nutrition:** Classification of space food, processing of food for space flight, planning and serving food.

**Recommended readings:** **1.** Campbell BI. (2014). Sports Nutrition: Enhancing Athletic Performance, CRC Press, Taylor& Francis, **2.** Haff GG. (2008). Essentials of Sports Nutrition Study Guide, Humana Press. **3.** Dunford M and Doyle JA. (2008). Nutrition for Sport and Exercise, Thomson Wadsworth. **4.** Srilakshmi B. (2018). Dietetics, New Delhi: New Age International.

## SEMESTER IV

**Course Code: CC17 : FOOD BIOTECHNOLOGY (Theory) (Paper Code T4.1)**

**Marks: 50 (credit 4)**

**1. Functional foods and nutraceuticals:** Concept of functional food, metabolism of Nutraceuticals with its potential health benefit- definition, types of phytomolecule as a nutraceutical. Perspective for food applications for Polyphenols, Phytoestrogens, phytosterols, pigments like lycopene, carcumin. Phytatics, Protease inhibitors, analyse inhibitors, Saponins, Catechin. Functional food and nutraceutical concept. Techniques for the separation of nutraceuticals. Prebiotics probiotics, and postbiotics-concept, health beneficial effects.

**2. The general concept of Nanotechnology as a tool for food science:** Types of nanoparticles, basic concept of formulation of nanoparticles, examining biological process relating to metabolism by Nanotechnology due to limitation of sampling tissue, Nanotechnology and sports supplement, Development of nanoparticles, Nano diet therapeutics. Nutrient delivery by nano particles- loading and unloading concept. Food nano biosensors

**3. Food preservation:** Different methods.

**4. Fermentation technology:** Microbial growth – batch culture, contentious culture, Fed–batch culture. Application of fermentation: Microbial biomass, microbial metabolites, microbial enzymes. Components of fermentation process (brief). Cost effective commercial production of fermented products by-mutation, recombination, rDNA Technology. Fermented milk foods-dahi, sweetened dahi, yoghurt, acidophilus milk, kumiss, Bulgarian, butter milk, natural butter milk cultured butter milk , Propiono –Acido- Bifido (PAB) milk. Cereal based fermented product- idli, dosa, pulse based-soya sauce, tempe, fish based dry fish, fish sauce, meat based-sausage, salami, starch corn products-gargi, tape and others like vinegar, pickled mushroom.

**5. Physiochemical changes in food:** colloidal properties, gelatinization, gel formation, emulsion, foam, browning reaction - enzymatic and non-enzymatic, crystallization.

**6. Sugar cookery:** fondants , fudges, caramel, brittle sweets, molasses; Pulses: effect of soaking, germination, fermentation and cooking; Egg: uses in food preparation and as a binding agent, foaming, and emulsifying agent.

**7. Meat and fish:** Post mortem changes in meat, smoked fish.

**8. Food processing methods:** freeze drying, microwave irradiation, dehydration extrusion, cryopreservation, baking and roasting, factors effecting nutritive value in processed food;

**9. Food additives:** food colour, preservatives, antioxidants, food toxins.

**10. Applications of food biotechnology, packaging and technology**

**Recommended readings:** 1. Subalakshmi, G and Udipi, SA (2006): Food processing and preservation, 1st Ed. New Age International (P)Ltd. 2. SrilakshmiB(2018): Food Science, 7th Colour Ed. New Age International (P) Lt 3. Potter NN and Hotchkiss JH(1999): Food science,5th Ed , Spinger. 4. Srivastava RPO and Kumar S (2014): Fruit and Vegetable Preservation Principles and Practices, 3rd Ed. International Book distribution Company. 5. McWilliamsM and Paine H(1984): Modern Food preservation. Surjeet Publications. 6. CruessWV(2004):Commercial Fruits and Vegetable Products, Agrobios India. 7. Desrosier NW and Desrosier JN(2006):The Technology Of Food Preservation, 4th Ed. CBS Publishers and Distributors, New Delhi. 8. Adams M and NoutMJR (2001): Fermentation and Food Safety, Spinger.

**Course Code: CC18 : GENETICS, NUTRIGENETICS AND NUTRIGENOMICS (Theory) (Paper Code T4.2)**

**Marks: 50 (credit 4)**

1. Introduction to nutraceuticals and nutrigenomics, epigenetics, Food omics, DNA testing, CRISPER technology Evolutionary perspective or taste genetics
2. Concept of Nutrient gene interaction. Nutrient and Gene expression with special reference to vitamin and other macronutrients, Epigenetic effect of nutritional supplement Influence of cholesterol and triglycerides levels of regulation of LDL receptors gene and apolipoprotein gene expression in liver and G.I tract. Nutrient control of lipoprotein lipase gene expression. Basic idea and field of metabolomics, metabolome represent the ingredient of life, Basic idea and field of metabolomics, metabolome represent the ingredient of life, Techniques adopted in the study of proteomics and metabolomics with special reference to role of nutrients.
3. Pharmacodynamic - influence of nutrients, Bioavailability of drug – influence of nutrients, Mechanism of Drug action, Potency, efficacy, agonist, antagonist, Pharmacokinetic of drug – influence of nutrition, effect of nutrient on Pharmacodynamics, Influence of nutrient on Biotransformation, stability of the drug, gastric emptying. Drug and nutrient compete for absorption, Bioavailability of drug – influence of nutrients.
4. Bioinformatics and its application in Food Science

**Recommended Reading:** 1. Srilakshmi, B. 2000. Nutrition Science. Wiley Eastern Ltd. 4835/24, Ansari Road, Daryaganj. New Delhi. 2. Srilakshmi, B. 2000. Food Science. Wiley Eastern Ltd. 4835/24, Ansari Road, Daryaganj. New Delhi.

**Course Code: CC19 : EPIDEMIOLOGY, FAMILY WELFARE PUBLIC HEALTH (Theory) (Paper Code T4.3)**

**Marks: 50 (credit 4)**

- 1. Health and Dimension of Health:** Positive health Versus Absence of disease
- 2. Secondary Sources of Community Health data:** Sources of relevant vital statistics of infant, child & maternal mortality rates
- 3. Immunization:** Importance and Immunization schedule for children, adults and for foreign travelers.
- 4. Community Water and Waste Management:** Importance of water to the community, etiology and effects of toxic agents, water borne infectious agents, sources of water, safe drinking water, potable water, waste and waste disposal, sewage disposal and treatment, solid waste and disposal, liquid waste disposal.
- 5. Concept of Epidemiology:** Study of the epidemiologic approach-determinants of disease preventive & social means.
- 6. Communicable and infective disease control:** Nature of communicable and infectious diseases, infection, contamination, disinfections, decontamination, transmission-direct & indirect, vector borne disease infecting organisms and positive agents, environmental agents and epidemiological principles of disease control.
- 7. Public health hazards due to contaminated foods:** Food borne infections and intoxications: symptoms, mode of transmission and methods of prevention, investigation and detection of food borne disease outbreak.

**Recommended readings:** 1. Smith, G.W.: Preventive Medicine and public health. 2nd edition. McMillan Co. New York. 2. Park: Park's Textbook of preventive and Social Medicine. 9th edition. M/s. Banarasi das Bhanot. Jabalpur. 3. SeshubabuVVR (2011): Review in Community Medicine, 2nd Ed, Paras Medical Books Pvt Ltd. 4. Mahajan BK, Roy RN , Saha I, Gupta, MC (2013):Text book of Preventive and Social Medicine, 4th Ed. Japee Brothers. 5. Vir SC(2011): Public Health Nutrition in Developing Countries, Woodhead Publishing India. 6. Willett W(2012): Nutritional Epidemiology, 3rd Ed. Oxford University Press,USA.

**Course Code: DSE I: MATERNAL NUTRITION (Any one)**

**Marks: 50 (credit 4)**

- 1. Nutrient and Health Needs During Normal Pregnancy:** Nutrient Recommendations and Dietary Guidelines for Pregnant Women, Optimal Weight Gain, Physical Activity and Exercise in Pregnancy
- 2. Nutrient Needs and Factors Related to High-Risk Pregnancy:** Obesity and Pregnancy, Pregnancy and Weight Loss Surgery, Nutrition in Multifetal Pregnancy, Adolescent Pregnancy: Where Do We Start? Anorexia Nervosa and Bulimia Nervosa During Pregnancy Diabetes and Pregnancy Preeclampsia, Role of

Nutrition during Pregnancy • Regulation of nutrient supply to the fetus. • The energy cost of Pregnancy. • Birth Weight- the effect of maternal age, maternal weight and energy intake. • Nutrient requirements during pregnancy. • Lifestyle factors that impact on pregnancy outcome.

**3. Role of Nutrition during Lactation:** • Compositions of breast milk and implications of maternal nutrition. • Factors improving lactation performance. Nutrition and Maternal Survival in Developing Countries

**Recommended readings:** **1.** International Child Health : A Digest of current information. **2.** Barker, D.J. P (1998), Mothers, Babies and Health in later life. Edinburgh, Churchill livingstone. **3.** Ward, R.H.T; Smith, S.K. Donnai, D. (Eds.) (1994) Early fetal Growth and Development. London, & COG Press. **4.** Wallace, H.M. and Giri, K. (1990), Health care of women and children in developing countries, third party publishing co. Oakland.

**Course Code: DSE II: GERIATRIC NUTRITION (Any one)**

**Marks: 50 (credit 4)**

**1. The ageing process:** Molecular Theories of Aging, Physiological changes accompanying the ageing process, Psychological changes during aging

**2. Nutrients needs during ageing:** Dietary Guidelines, Food based guidelines

**3. Special healthy eating pattern related to age-related changes of elderly**

**4. Immunity and Nutrition:** Nutritional Requirements in Older Adults, Energy Balance, Water Metabolism, Vitamin Disorders, Trace Elements, Nutritional Assessment in Older Persons, Geriatric Assessment and Its Interaction with Nutrition, Nutritional Assessment in the Asian community

**4. Common health problems during old age:** The Role of Nutrition in the Prevention of Age-Associated Diseases, The Oral Cavity and Nutrition, Management of Protein-Energy Undernutrition in Older Adults, Prescription for Enteral Nutrition, Prescription for Parenteral Nutrition,

**5. Nutritional Factors in Dementia, Nutrition and Depression, Nutrition and Behavior, Nutritional Management of Hypertension, Nutrition and Cancer:** Some Practical Approaches to Management, Nutrition and Type 2 Diabetes Mellitus in the Geriatric Patient, COPD and Undernutrition: A Complex Interaction, Nutrition and Gastrointestinal Function, Drug–Nutrient Interactions, Nutrition and the Endocrine System, Nutritional Anemia in Older Persons, The Role of Nutrition in Prevention and Management of Pressure Ulcers, Nutrition and Fracture Risk, Multicultural Issues, Choice and Nutritional Ethical Issues, Index

**Recommended readings:** **1.** Human Nutrition by H. Guthrie and M.F. Piccianom, WCB McGrawHill,1995. **2.** Robinson CH, Lawler MR, Chenoweth WL, GarwickAE (1991): Normal And Therapeutic Nutrition, 17th Ed, MacMillan Publishing Company, New York, **3.** Insel PM, Turner RE and RossD (2004): Nutrition, Jones & Bartlett Learning, **4.** Morley JE and Thomas DR(2007): Geriatric Nutrition, 1st Ed. CRC Press. **5.** Watson RR (2008):Handbook of Nutrition in the Aged, 4th Ed. CRC Press. **6.** Chernoff R(2013):Geriatric Nutrition : The Health Professional's Handbook, 4th Revised Ed. Jones and Bartlett Publishers.

**Course Code: CC20 (Practical) DISSERTATION (Paper Code P4.1)**

**Marks: 100 (credit 8)**

The students will be guided and supervised by a member of the teaching faculty of the department. The dissertation in which the research culminates should reflect the student's own work. Final Dissertation Thesis has to be submitted in hard copy and the candidates have to do a presentation of their work followed by viva-voce.