

**SPECIALIZATION -I: M.Sc., CLINICAL NUTRITION AND DIETETICS
SEMESTER -1**

FN1.1: NUTRITION THROUGH LIFE CYCLE

THEORY

Unit-1 : Pregnancy: Impact of maternal malnutrition on outcome of pregnancy, Nutrient requirement, intake and gaps, prenatal and antenatal nutritional importance, metabolic adjustments in pregnancy; nutrition intervention and pregnancy outcome; common symptoms (nausea and vomiting, Heartburn- Pica, habits, constipation), nutritional management, problems and Complications, eclampsia, diabetes, adolescent pregnancy and Care of the premature babies.

Lactation: Nutritional requirements, intake, gaps, physiology of milk production, hormonal control, effects of lactation on Nutrition composition of Human-Milk, Factors affecting breast milk quality and comparative advantages & disadvantages of breast and formula feeding.

Unit-2 Infancy: Nutritional requirements, intake and gaps. Suitability of breast milk to the infant. Need for infant formulae, types of infant formulae, care in Preparation. importance of preparation of weaning foods using locally available foods,. Home prepared versus commercial weaning foods. Feeding problems-Lactose and cow's milk protein intolerance, vomiting, diarrhea, teething problems, concept of human milk bank for specific nutritional problems.

Unit-3 Pre-school children: Age, growth & development, nutrient requirements, Intake and gaps. Effects of Macro & Micro nutrient malnutrition in physical mental development.

School-going children: Nutritional demands, intake and gaps.Importance of breakfast and its impact on school performance, specific nutritional problems Macro and Micro nutrient deficiencies and their impact on health and nutritional status and control measures.

Unit-4 Adolescence: Nutritional requirements, intake and Gaps, Consequences of Nutritional deficiencies, adolescent pregnancy, Food habits in adolescence, Metabolic consequences of slimming diets & weight maintenance, specific nutritional problems, Anaemia, Anorexia, Bulimia, Amenorrhea, Obesity.

Adults: Nutritional Requirements, Intake and Gaps, Consequences of Nutritional deficiencies, Effect of stress on Nutritional status, Specific nutritional problems of adults.

Ageing: Physical, Physiological and Bio-chemical changes. Impact of Sociological and Psychological factors on nutrient intake, Nutritional Requirements, Intake and Gaps, Consequences of Nutritional deficiencies, Common health problems and disabilities like dementia disorders, Vision disorder etc.

REFERENCES

1. Anne loader, 1998. Pregnancy and Parenthood, Oxford, University press.
2. Bhavana Sabarwal, 1999. Public Health & Nutritional care, Common Wealth Publishers.
3. Benjimin I. Borton, 1990. Human Nutrition. New Delhi: Tata Mc. Grow Hill Publishers.
4. Mehtab S. Bamji, 1998. Text Book of Human Nutrition. New Delhi:Oxford and IBFI Publishing Co. (p) Ltd.
5. B.Srilakshi 2006 Dietetics. Bangalore: New Age International Pvt. Ltd. Publishers.
6. Shubhangini A Joshi, 2004 Nutrition and Dietetics, Second edition. New Delhi: Tata Mc Graw-Hill.
7. Gopalan C. Ramasastri B.V. and Balasubramaniam S.C 1999. Nutritive value of Indian Foods. Hyderabad: NIN,

JOURNALS

1. Proceedings of Nutrition Society of India
2. Indian journal of medical research, ICMR.
3. Journal of Human Nutrition.
4. Nutrition Reviews.
5. Nutrition Abstracts.
6. Indian journal of Nutrition and Dietetics.
7. Journal of obstetrics and gynecology of India.

SPECIALIZATION -I: M.Sc., CLINICAL NUTRITION AND DIETETICS
SEMESTER -1
FN 1.2 DIETITICS

THEORY

- Unit - 1 Introduction to clinical Nutrition and Dietetics: Definition and history of dietetics, Concepts of desirable diet for optimum nutrition and health- interrelationship between food, nutrition and health, Basic principles of planning healthy diet, Regulation of food intake - hunger, satiety - Role of neurotransmitters.
- Unit - 2 Role of a dietitian in hospital and community: specific functions of a therapeutic, administrative and consultant dietitian - team approach in patient care, psychological consideration in patient care, inter personal relationship with patients.
- Unit - 3 Nutritional care process: (NCP) -parameters in clinical situations and development of nutritional care plan for hospitalized and out patients - changes in nutritional status. Somatic, biological, clinical and dietary assessment, environmental and behavioral data analysis and interpretation.
- Objectives of diet therapy: Planning of regular/Routine hospital diet and rationale for modifications in energy and other nutrients, texture - fluid, soft diets etc.
- Unit - 4 Nutrition management of the critically ill eternal and Parental Feeding: Method of administration and monitory.
- Planning of special diets for
- a. Surgical conditions and burns, transplant patients.
 - b. Correction of fluid balance.
 - c. Special group feeding-children.

REFERENCES:-

1. Alfred H.Katz, Prevention and health, the Haworth, Press, New York 1999.
2. Arthur, Guyton,M.O,Human physiology and mechanism of diseases, WB Saunders Company 1987.
3. Chatterjee, Human physiology Volume No.I&2, Medical allied agency.
4. Dictionary of foods, Nutrition and dietetics.

5. Kawshik VK Haroco, problems of food nutrition and dietetics, Book enclave Jain Bhavan 1999.
6. Mahatab S,Bamji, Prahladarao, Vinodini Reddy, Text of human Nutrition, Oxford and IBM publishing Co., Pvt. Ltd.
7. Rose & Wilson, Anatomy and physiology in health &illness, ELBS in print, 7th Edition, 1990.
8. Vitamin Nutrition and Cancer-Karger Publications, K.N.Prasad.
9. Wilson Fisher, Principles of Nutrition, Wilen Easten Pvt. Ltd.
10. Economics of health and nutrition-Rani Gopal, Publications.

**SPECIALIZATION -I: FOR CN AND FSQC (common paper)
SEMESTER 1**

FN 1.3/ THIED PAPER: APPLIED PHYSIOLOGY

(For the Student admitted 2013-2014)

- Unit- 1** a) Physiology, growth and development- concept and definitions, cell -cell theory, structure of cell, cell cycle; Mitosis and Meiosis, tissue and their functions. Blood - Blood composition. erythropoiesis, Blood groups. Anemia. Homeostasis.
b) The immune system — Non specific defense mechanism: external and internal defense mechanism, specific defense Mechanism; Major histo compatibility complex (MHC) and antibodies. Innate immunity; phagocytosis. the complement system and Humoral mechanisms, Specific acquired immunity; Antibody mediated immune system (AMIS) and Cell mediated immune system (CMIS), the Leukocytes: Development and regulation. In-vitro detection of antigen — antibody reaction.
- Unit 2** a) Gastro intestinal system — Description of GI tract, Mouth, Salivary glands, pharynx, Oesophages, stomach, pancreas, liver and Biliary system, small and large intestine. Gastro intestinal enzymes and hormones, absorption and utilization of carbohydrates, proteins and fats. Some common disorders of the Digestive system.
b) Renal system — organs of urinary system. Kidney: structure and functions, Renal function tests, pathophysiology of kidney. Dialysis and kidney transplant.
- Unit 3** a) Cardiovascular system: Heart, Blood vessels and their control, cardiac out put, the cardiac cycle. Blood pressure, pathology of Hypertensions.
b) Respiratory system: organs of respiratory system. Mechanics of respiration, regulation of respiration and artificial respiration.
c) Homeostasis — body fluids, measurement of body fluid volumes, transport across cell membrane (passive transport and active transport) solute solvent Interaction.
- Unit 4** a) Physiology of endocrine glands Hormones, endocrine glands, pituitary gland, pancreas. adrenal glands (adrenal cortex and adrenal medulla). Penal gland, thymus gland, kidney as an endocrine gland

REFERENCES

TEXT BOOKS

1. Vidya Ratan. 1993. hand Book of Human Physiology. 7th Edn. Noida: Jaypee brothers Medical Publishers (P) Ltd.
2. Bhavana Sabarwal. 1999. Health, physiology& Anatomy.New Delhi: Common Wealth Publishers.

REFERENCE BOOKS

1. Guyton and Hall. 2005. Text book of medical physiology. 1 I Edn. Noida: Gopsons papers Ltd.
2. Sembuhingam, K and Prema Sembulingam. 2002. Essentials of medical physiology.
2 Editions. Noida: Jaypee publications.
3. Genog, W.F. 2002. Review of medical physiology. 21t Edition. Noida.

SPECIALIZATION -I: FOR CN AND FSQC (common paper)
SEMESTER 1

FN 1.4 RESEARCH METHODOLOGY

THEORY

- Unit 1 Research: concept, significance, current research in foods and nutritional science (related specializations), types of research - basic, applied, action, historical, experimental (laboratory and field), descriptive, ex post facto, survey, case study.
- Unit 2 Selection of research problem, hypothesis, types of hypothesis, statement of research problem, formulation of hypothesis, research design, methods of data collection - observation, interview, questionnaire. Types of sampling - simple random sampling and stratified random sampling, testing of hypothesis.
- Unit 3 Selection of research tools — schedule, questionnaire, checklist, inventories, scaling techniques, psychological tests, reliability and validity of tools, research report — concepts — characteristics, format and types.
- unit 4 Statistics — concept, significance, descriptive statistics — classification, tabulation, frequency distribution, diagrammatic and graphic representation, measures of central tendency — mean, median and mode, measures of dispersion - standard deviation, quartile deviation and mean deviation.

REFERENCES

1. Aalan bryman, quantity and quality and social research, unwin hyman limited U.K.
2. Bajapai,S.Methods of social service and research
3. Basotia.G.Rand, Sharma.KK research methodology,Mangal Deep Publications, Jaipur 1999.
4. Burns. RB, Introduction to research methods, Saga publications pvt. 2000.
5. Davin W.Stewart, sercondary research-information sources and methods,saga publications.
6. Gary R.Beecher, human nutrition research, first edition 1979.
7. Kothari, research methodology-methods and techniques,Wishwa Prakasam New Delhi 2000
8. Misra RP, Research Methodology concept ,publishing Co., A/15-16 commercial block New Delhi-2001
9. Research made simple, A hand book of social workers, Raymond, Saga publications 1996.

**SPECIALIZATION -II: M.Sc., FOOD SCIENCE AND QUALITY CONTROL
SEMESTER –I**

FN (1.1 A): EXPERIMENTAL FOODS.

- Unit –1: Classification of foods (Basic 5 groups)
- Unit – 2: Energy rich foods:-
1. Cereal cookery/Starch cookery:- stages, Gelatin, factors effecting gelatin, Starch as thickness sources of starch, retro gradation of starch, quality of flour, dough, gluten formation.
 2. Sugar cookery: - stages of sugar cookery, crystallization, factors effecting size of crystals formed, fondant, fudges, caramels, brittles .Role of sugar in the preparation of cakes and Indian sweets, browning reactions.
 3. Fats and Oils:- Properties – Smoking point, melting point, Hydrogenation, shortening effect. – Changes during storage, rancidity – Oxidative and lypolytic, whipped cream as double emulsion.
- Unit – 3:
- i) Protein rich foods of vegetable and animal origin: Pulse cookery: Factors affecting the quality of cooked products, Effect of soaking, germination and fermentation.
 - ii) Milk cookery: Properties of milk proteins, cheese and other milk product egg cookery: Properties of egg proteins and uses in egg preparations, egg as a binding foaming and emulsify agent.
 - iii)Meat Cookery: Post mortem changes, changes in cooking fish types, changes during heat treatment.
- Unit – 4: Foods rich in micronutrients: vegetables and fruits: Structure of vegetable tissues starches, sugars, pectin substances, celluloses and their effect on texture and palatability. Plant pigments, plant enzymes and uses extraction of papain and effect on meat, browning reactions.
- Standardization of food preparations: Food Evaluation, sensory evolution, selection of taste panels

REFERENCES:-

1. Arnold Bender., ‘Meat and meat products in human nutrition in developing countries’., Vikas Publishing House PVT Ltd.,
2. Ardeshi- A.G. , Nutritified home economics, Binds eye walls ltd., (1983)
3. Base CK, Food processing Industries India, Willey estern ltd.,1995
4. Bhavana Saberwal, food composition and prevention, First Edition published by Ajay Varma, New Delhi 1999.
5. Henry and Willis., Milk and Milk products, 4th edition published by Tata MC Graw hill.
6. Dhote, Fundamentals of fruit protection, volume IV, National council of Educational research and training, New Delhi.
7. Gould F. Preservation of foods, American chemical society publications.

8. Mizare, A&Mary, Food preparation for the professionals , Raw publications, New York.
9. Muson, A.C. E.D. Mullard, earned foods thermal processing&Microbiology 7th edition 1980, British library cataloguing &publication data.
10. Richards botton, E.Oil fats&fatty foods first edition 1999. Biotech books, Delhi.

SPECIALIZATION -II: M.Sc., FOOD SCIENCE AND QUALITY CONTROL
SEMESTER –I
FN (1.2A) FOOD CHEMISTRY

Theory:

- Unit –1: General classification foods : Solids and liquid foods, discussion on physical state and characteristics with examples, objective and subjective methods of measuring physical attributes of foods. Physiochemical principles with special reference to food: True solutions colloidal solutions and suspensions, osmosis hydrogen ion concentration.
Water - its components, chemistry, types of water and water activity
- Unit – 2: Starch Chemistry: Types of starches, chemical and physical structure of cereals, millets, legumes, roots, and tubers. Starches-physical and chemical structures and properties of different starches, methods of extraction of starches and factors effecting properties of starches.
Protein chemistry:- Nature and types of proteins – Plant foods, Egg, Milk and fleshy foods, structure and properties of different proteins. Amino acid composition of different proteins. Physical and chemical changes in processing of proteins. Proteins of wheat and its importance in the preparation of flour products, factors effecting gluten formation, structure of dough.
- Unit – 3: Lipid chemistry:- Nature and types of fats- Plant and animal foods.
Physical and chemical structures and properties of different fats and oils. Principles and methods of determination of Specification number, Iodine number, free fatty acid number, and richert – meisel number. Chemical changes in fatty acids, chemical changes on Rancidity and heating, hydrogenation, inter-esterfication and acetylation etc., shortening power of fats
- Unit – 4: Fruits and vegetables: Chemistry – changes in post harvesting stages Including storage. Chemistry, composition of fruits and vegetables. Plant tissues and relationship texture browning reactions in fruits and vegetables and preventive methods. Plant pigments – water insoluble plastid pigments
Chlorophyll and carotenoids – Chemical structure and changes on cooking affect of acid, alkali, metal ions. Water soluble pigments, anthocyanins, anthoxanthins, flavones and tannings, chemical structure and chemical changes on cooking.
Food enzymes – types of enzymes in foods, functions and their importance to food quality.

REFERENCES:

1. Berk.Z., Introduction to bio-chemistry of foods, dept. of food Engineering and biotechnology, Israel Institute of technology, Amsterdam, New York.
2. Clipton. E.Meloan, food analysis 3rd edition (Theory &Practice).
3. David and Robinson, Bio-chemistry and Nutritional value.
4. Dennis .D, Muller ., Food chemistry, a Laboratory Manual by inter science publication, John Willey&Sons Inc.
5. W.S.wong, mechanism and theory of food chemistry, CBS publishers and distributors 1996.
6. Seemayadav, Food chemistry, Publication of anmol pvt., ltd., 1997.
7. Owen R. Food chemistry 2nd edition.

SPECIALIZATION -I: FOR CN AND FSQC (common paper)

SEMESTER 2

FN 2.1/ FIRST PAPER: NUTRITIONAL BIOCHEMISTRY

Unit-1

- (a) High energy compounds and their role in bio-Chemical energetic as related to high energy expenditure activities.
- (b) Carbohydrate Metabolism: Carbohydrates, Oxidation of glucose by Glycolysis, TCA cycle, HMP path way, Glycogenesis, Glycogenolysis and Gluconeogenesis. Glycogen storage in normal and diseased states. Endocrinal influences on carbohydrate metabolism, Regulation of blood glucose concentration, the renal threshold for glucose disturbance in carbohydrate metabolism. Diabetes Mellitus, Diabetic ketoacidosis, inborn errors of carbohydrate metabolism.

Unit- 2

Protein Metabolism: Transamination, Oxidative deamination, Urea Cycle, Metabolic disorders in the Urea Cycle, Decorboxylation, Inborn errors of Amino acid metabolism, replication and transcription, translation, repair of DNA, Introduction to Recombinant DNA technology.

Unit- 3

- a) Fatty Acid Metabolism: Oxidation and bio synthesis of fatty acids, Ketone bodies and Ketosis, Bio synthesis of cholesterol and their regulation, Metabolism of bile pigments.
- b) Metabolic Interrelationships between Carbohydrate, Lipid and Proteins.

Unit- 4

- (a) Vitamins: An overview of structure, sources, functions (also their role as cofactors in metabolism) deficiency states, factors influencing bioavailability and requirements.
- (b) Minerals: An overview of structure, sources, functions (also their role as cofactors in metabolism) deficiency states, factors influencing bioavailability and requirements
- (c)Enzymes: General properties, IUB classification, M.M equation, significance of Km and Umax, factors influencing enzyme activity, enzyme inhibition.

REFERENCES

1. Ahmad.M. 1993. Text book of modern Biochemistry,volume 1, Bombay: Oxford& IBH Publishing co.Pvt.Ltd.
2. Berk .Z. Introduction to the Biochemistry of Food, Department of Food Engineering & Biotechnology. Ne York: Izreal Institute of Technology Haifa (Izreal), Amsterdam, Oxford.
3. Cantarow and Trumper ,Clinical biochemistry, seventh edition. Albert Partner L.Latnerpublisher W.B.Sunders company Philadelphia, London, Toronto.
4. Garret.H.R.1999. Grisham.M.C,Biochemistry.Second Edition. Sydney: Saunders College Publish ing..
5. Georffecy zubay,1988. Text book of biochemistry, second edition. New York: Publishing company.
6. Keshav Techar,1987, Text book of biochemistry, M.S.Sejwal for Wiley eastern ltd.
7. Sathyanarayana.U, 2001. Biochemistry. Calcutta: Books&Al lied (P) Ltd,8/ I —Chintharnani Das Lane.
8. Saini .A.S, Text Book Biochemistry,CBS. Delhi: Publishers&Distributors.485,Jain Bhavan, Shahdara.

SPECIALIZATION -I: M.Sc., CLINICAL NUTRITION AND DIETETICS

FN 2.2/ SECOND PAPER: CLINICAL NUTRITION

THEORY

- Unit -1 : Diet plan for nutritional deficiency disorders.
- a. Protein and energy malnutrition (hospital and domiciliary treatment)
 - b. Vitamin A deficiency
 - c. Other deficiencies — osteoporosis, iodine disorders, iron deficiency and anemia etc
- Unit -2: Food allergy: definition, development, causes, methods of detection and preventive measures.
- Dietary Management in febrile diseases — Fever-acute and chronic (Tuberculosis, typhoid, pneumonia, malaria)
- Unit -3: General principles of diet for the following conditions:
- a. Rheumatism. b. Cancer (home/hospital Management), Effect of cancer therapy on nutrition of the patient. c. AIDS (home/hospital management). d. Dental health. e. In born errors of Metabolism — Phenylketonuria, tyrosinemia, Maple syrup urine disease, Galactosemia, lactose intolerance.
- Unit- 4: Dietary Principles and Management of Diseases of gastro – intestinal- Etiology, symptoms treatment and prevention, Gastritis, Peptic ulcer, Diarrhea, Constipation, Malabsorption, syndromes - Sprue/tropical sprue, Ulcerative colitis, Crohn's disease, diverticulosis, hernia.

REFERENCES:

1. Sushangini Joshi. 2002. Nutrition Dietetics. New Delhi: Tata MC Graw Hill publications.
2. Townsend Carolrnon.E. 1999. Nutrition and Diet Theraphy. Albanz. Delmar publishers.
3. Roth Ruth.A. 2003. Nutrition and Diet Theraphy, New York: Thomson Delmar learning.
4. Lutz. 1944. Nutrition and Diet Theraphy, Philadelphia.:F.A. Devis company.
1. Koushik.V.K. 1998. Nutrition and Food Safety. Jaipur: Book Enclave publishers.
2. Janaki Rao, p. 2006. Nutrition and Food Science,, Jaipur: Aviskar publications.
3. Bhavana Sabarwal. 1999. Nutrition and Health Promotion. New Delhi:

Common Wealth publications.

4. Gibney Michel. 2004. Nutrition and Metabolism. Kundi: Blackwell Science Publisher.
5. Bhavana Sabarwal. 1999. Nutrition Auxiliaries and Nutrients. New Delh: Commonwealth publishers.
6. Bhavana Sabarwal. 1999. Nutrition and Health care. New Delhi: Commonwealth publications.
7. Kawshik V.K. Horaco, 1999. Problems of Food nutrition and Dietetics, Book Enclave Jam Bhavan.
8. Mahtab S. Bamji, Prahallad Rao, Vinodini Reddy, Text Book of Human Nutrition, Oxford and IBM publishing company Pvt. Ltd.
9. Redolph Ballentine 1978. Diet & Nutrition, Himalayan International Institute.
10. Ross & Wilson, Kathleen J.H. Wilson, 1990. Anatomy & Physiology in Health & Illness. ELBS in print. 7th edition.

SPECIALIZATION -I: M.Sc., CLINICAL NUTRITION AND DIETETICS
FN 2.3/ THIRD PAPER: NUTRITIONAL STATUS ASSESSMENT
METHODOLOGIES

THEORY

- Unit -1 Nutritional status- meaning. indicators. Nutritional Surveillance, Role of National Nutrition Monitoring Bureau (NNMB). Methods of nutritional status assessment.
- Unit -2 Anthropometry meaning, importance, methods, measurement of Height, Weight, Stature. Mid- Upper- arm circumference, Head circumference, Chest circumference, Fat fold Triceps and Subscapular. Tools and Techniques. Reference standards for comparison, classification of Nutritional Status.
- Unit -3 Diet survey — meaning, significance, methods, Food Balance Sheet Method. Inventory Method, Weighment Method, Expenditure Pattern Method, Diet history, Oral Questionnaire Method, Duplicate Sample Method, Dietary Score Method, Recording Method, Standardization of Dietary Assessment Vessels. Analysis and interpretation, problems in dietary surveys and management.
- Unit -4 Clinical assessment: Methods and Techniques for Clinical Assessment of Nutritional Status and diagnosis of signs and symptoms in relation to various nutrient deficiencies

Bio-Chemical Assessment: Need and importance, Laboratory tests, Protein Energy Malnutrition. Essential Fatty Acids. Fat Soluble Vitamins, Water soluble vitamins, minerals and trace elements. normal levels for comparison.

REFERENCES:

1. Mahtab S. Bamji .1999. Textbook of Human Nutrition. Oxford & IBH publishing Co. Pvt.Ltd..
2. Park and Park .1983. A textbook of preventive and social medicine, M/s. Banrasidas Bhanot publishers.
3. Robinson, Collier,1979. Fundamentals of Normal Nutrition, Mac. Millan International edition.
4. Shukla P.K, 1982. Nutrition Problems of India,, Prentice Hall of India.
5. Tara Gopaldas and Subadra Seshadri. 1987. Nutrition, monitoring and assessment. Oxford University press.

JOURNALS AND PERIODICALS:

Nutrition News

Journal of Applied Nutrition

SPECIALIZATION -I: FOR CN AND FSQC (common paper)

SEMESTER 2

FN 2.4/ FORTH PAPER: STATISTICS AND COMPUTER APPLICATIONS

THEORY:

- Unit –1: Meaning and scope of statistics-Role of statistics sin research.
Descriptive statistics – classification, tabulation, frequency distribution, diagrammatic and graphic representation, analysis, categorization, coding and sampling.
Measures of central tendency and dispersion (absolute and relative), skew ness and kurtosis. Probability distribution, normal distribution, use of normal probability tables.
- Unit-2: Elements of sample survey, sampling, types of sampling simple random sampling, stratified random sampling, two stage sampling and cluster sampling, evaluating sample-merits and demerits of each sampling.
Testing concepts of hypothesis, formulation of hypothesis, levels of significance.
Large sample tests for significance of difference between sample mean and population mean, difference of sample proportions and population proportions, true sample proportions, small sample tests(test for significance of the difference between small sample mean and population mean).
- Unit 3: Correlation, co-efficient of correlation and its interpretation, rank correlation, regression equation and predictions, Chi-square test for goodness of fit and independent attributes, F- test (ANOVA)
- Unit- 4 computer applications: Ms Office – Excel – Data entry, data Analysis and statistical functions in excel statistical packages in social sciences (SPSS).

REFERENCES:

1. Fisher A.R. Yates.F. “statistical table “ 6th Edition Longman group ltd, England, 1982.
2. Freud E.J.Smith,M.R. “Satatistics – a first course” 4th edition prentice –hall Inc.New Jersey.
3. Gupta S.P. “Sultan chand & sons, New Delhi, 1995.

4. Norma Gilbert "Statistics" 2nd edition, Holt saunders International.
5. Steel G D R ., Torrie, H.J."Principles and procedures of Statistics"2nd edition, M.hill International, 1981.
6. Welkowitz J.Ewen, B.R.Cohen.J."Introductory statistics for the behavioural Sciences"3rd edition, academic press, New York, 1982.
7. William.C.Hays, "Statistics" 3rd edition, Holt – Saunders International, 1980.
8. William C.Guenther "concepts of statistical inference" 2nd edition, Mc Graw Hill International 1981.
9. Vena,B.L, Sukla, Srivastava R.N."Biostatistics" CBS publishers & distributors, New Delhi, 1994.

SPECIALIZATION -II: M.Sc., FOOD SCIENCE AND QUALITY CONTROL
SEMESTER 2

FN 2.2(A)/ SECOND PAPER: FOOD ANALYSIS

- Unit-1 General principles of sampling. Moisture free and bound water in foods, principles and methods of analysis
- Unit—2 (a) Kjeldahl Procedure: Total proteins, Protein and Non protein nitrogen, methods and principles in Micro and macro determination of nitrogen, solubility separation of protein fractions.
(b) Determining fats in liquid and solid foods principles, method of separation of lipid fraction, neutral glycerol, fatty acids, phospholipids and cholesterol.
(c) Methods and principles of starch determination and reducing sugars and non reducing sugars determination.
- Unit-3 Crude fibre and fibre fractions determination: Soluble and insoluble, neutral, detergent fibre and methods of determining fiber fractions.
Methods of determination of ash, Principles and methods for determining Vitamins and Minerals Ca, Phosphorus, iron, Vitamin A, Beta carotene, Riboflavin and Vitamin C
- Unit-4 Colorimetric and Photometry and Spectrophotometry and Applications and Isoelectric points Separation Techniques, Electrophoresis (paper and boundary zone), chromatographic procedures in food analysis (Solid, liquid, gas, Column, paper and gas and High performance liquid chromatography with suitable examples) ultra centrifugation and ultra filtration techniques.

REFERENCES

1. Merk. Z. Introduction to the Biochemistry of food, Department of food engineering & Bio technology. New York: Izreal Institute of technology, 1-laifa (Izreal) Amsterdam, Oxford.
2. Clifton. F. Meloan, Food analysis 3rd edition (Theory & practice) yeshajahu pomerrauz,

3. David & Robinson, Food biochemistry & Nutritional value.
4. Food Chemistry a Laboratory manual by dennis D.MeIler Awilcy — Inter science publication John Wiley & Sons, INC.
5. Seemayadav. 1997. Food Chemistry. New Delhi: Author publication of Anmol Pvt. Ltd. 437/4B Ansari Road Dacyagen.
6. Dornihic W.S. Wong. 1996, Mecharisn and Theory the Food Chemistry. 1st edition. Author CBS. New Delhi: publishers & Distributors 4596/1A,
7. R. Fennema, Food chemistry 2m1 edition Revised & Expanded.

SPECIALIZATION -II: M.Sc., FOOD SCIENCE AND QUALITY CONTROL
SEMESTER 2

FN 2.3(A)/ THIRD PAPER: ADVANCES IN FOOD PROCESSING TECHNIQUES

THEORY:-

- Unit – I: Processing of cereals and millets:- Milling, methods of parboiling, malting, puffing, flaking, popping, Irradiation, Extrusion cooking – cold and hot. R.T.E., Cereal products, instant mixes, continuous vibrofluid bed roaster for breakfast cereals, roller drying, drum drying, bi- product of cereals and millets and its utilization.
- Processing of pulses:- Dehusking, Germination, drying, fermentation, soybean, extractions-oil, grits, Soya flour, protein concentration and protein isolates. Legume powders, protein mixes, composite mixes and weaning foods/complimentary foods.
- Unit –2- Processing of fruits and vegetables:- Dehydration, Re-hydration, Freezing, Freeze drying, Fermentation, pickling, solar drying, osmotic dehydration, quick freezing, quick cleaning, reverse osmosis, modified atmosphere storage and packing. Ultra low oxygen and cold storages. Ketchup, Jams and jellies, marmalades, squashes, cordials, clarifying juices. Intermediate moisture foods.
- Processing of sugar and confectionary: Processing of cane, beet sugar, jaggary, refined sugar, syrups, confectionery products and fortification of confectionary.
- Canning:-principles of canning operation ,methods of blanching, filling, exhausting, sealing, processing and cooling, cutout analysis and spoilage of canned products.
- Industrial use of enzymes in food processing.
- Unit – 3: - Processing of milk and milk products:-Pasteurization, homogenization, microwave heating, ultra high temperature, sterilizing of milk, Lactose peroxides system for enhancing shelf life, spray drying, application of immobilized enzyme technology for preparation of low lactose milk and lactose hydrolyzed products.

Processing of Egg: Use of low temperature, high temperatures, egg powders, shell powders. Albumin powders, Yolk powders and whole egg powders. Spray drying, freeze drying, foam mat drying, freezing technology for low cholesterol eggs and ultra pasteurization.

Processing of flesh foods: Curing, smoking, broiling, thermal processing, use of low temperatures, Chemical preservatives, irradiation, tumbling and massaging sausages. By products from fish industry and fish protein concentrates.

Unit4:-

Processing of oils and fats: Extraction, refining, hydrogenation of vanaspathi, margarine. Plasticity of fats, rice bran oils, red palm oil and low absorb technology of oils.

Processing of miscellaneous foods: Nuts, spices, condiments, instant masala mixes, processing of beverages tea, coffee, cocoa, soft drinks and alcoholic beverages.

REFERENCES :

1. Andrew .L, Winton., milk & Milk products, agro bios(India) 1999
2. Holland,B.Unwin,cereals& cereals products. Royal society of chemistry& ministry of agricultural, fisheries& food , 1998.
3. Gorden,G.Brich, food science, pergamon press headington Hill hall,1986.
4. John.A,Troller,Sanitation in food rprocessing,Acodamic press ,IN
5. 5.Potty, V.H Malky, M.S. Food processing, moharr primlani for Oxford &IBH publishing Co., pvt., Ltd., 66 Janpath, New Delhi

SPECIALIZATION -I: FOR CN AND FSQC (common paper)

SEMESTER-III

FN3.1: FUNCTIONAL FOODS

THEORY:

- Unit -1
- a) Current market scenario of the health foods-public demand -Indian market potential.
 - b)Hyper nutritious foods: protein powders-sources - Types - Method of extraction of proteins of Oil seed and legume cakes -Nutritional implications - therapeutic applications.
 - c) Fat free foods: - types of fats - PUFA oils n3, n6 fatty acids - fat free milk powder - low cholesterol oils - Cholesterol free foods.
- Unit -2
- a) Nutraceuticals: Definition, Need - Importance, classification\types - sources - processing of nutraceutical products - Role in health and Therapeutic applications.
 - b)Pharma foods: Diabetic nuts - Confectionaries-Sodium-free Lactose free phenylalanine free fiber rich foods - Nutritional implications.
- Unit- 3
- a) Dietary supplements-Fortification of nutrients in the processed foods & other dietary supplements - Role in health. b) Convenience foods: Ready to eat mixes, weaning foods and infant foods.
 - b) Non nutritive sweeteners: Definition, Need, importance, Types-Development of sugar free products-Nutritional implications current market trend-Artificial sweeteners therapeutic applications.
- Unit-4
- a) Biotechnology: Definition, need, importance of technologies and organisms for food biotechnology, food processing improvements through biotechnology-genetically modified foods-nutritional implications.
 - b) Definition, need important, identification of functions of a food processing techniques involved Designing a food, and Therapeutic applications.

REFERENCE:

1. Birch G.G. &Parker, KJ. Nutritive sweeteners - 2 applied sciences publishers, NewJersey, 1982.
2. Creighton, T-E. Proteins 2nd edition, W.HFreeman &Company New York 1993.
3. Hettiarachahy, S.N Ziegler R.G. Protein function in food systems, It's basic symposium series, Hongkong, 1994.
4. National Research council Designing foods, (Animal product options in Marketplace) National academy press, Washington, 1988.
5. Parker, K.G.Green, T.H, Developments in sweeteners. Applied sciences publisherws, London, 1983.

SPECIALIZATION -I: M.Sc., CLINICAL NUTRITION AND DIETETICS
Semester-3
FN 3.2. DIET NUTRITIONAL COUNSELING

THEORY

- Unit -1 Nutrition counseling - definition, concept, the roles of the clinical dietitian, the Recipients, Counseling environment and equipment. A systems approach to nutritional care - overview of the system, components of the system. Factors to be considered in counseling-nutritional and health conditions.
- Unit -2 Nutrition Care Plan - Assessment component-Methods of interview-verbal and nonverbal techniques. Counseling Models - data analysis (dietary, biological, environmental, behavioural data), facilitate or resource analysis.
- Unit-3 Planning component - Designing of counseling plans-goals and objectives. Implementation component-counseling the patient/client-client concurrence. Evaluation component-Measuring the success of performance of client and evaluating the counseling process
- Unit -4 Methods and Techniques of Diet Counseling - Medical terminology - Abbreviations in case record.
Diet and Nutrition in different conditions - counseling - Obesity, Diabetes. Cardio Vascular diseases Renal disorders. GIT, Liver and Gall bladder disorders.

REFERENCES

1. Narayana Rao. S. 1991. Counselling and guidance 2nd edition. New Delhi: Tata Me. Graw Hill publishing company ltd.
2. Culley .S 1991. Integrative counselling skills in action. London: Sage Publications.
3. Windy Dryden Rational. 1990. Emotive counseling in action. Sage publication.
4. Dryden .W key 1992. Issues for counseling in action. London: Sage publications.
5. Dryden .W 1993. Questions & answers on conuselling in action. London: Sage publications.
6. Bond .T 1993. Standards & ethics for counseling in action. London: Sage Publications.
7. Dryden .W and Thorre .B 1992. Training & scyesvision for counseling in action. London: Sage publications.
8. Windy Dry den, Brian Thorne. 1991. Training & supervision for counseling in action. London: Sage publication.
9. Lewise. Patterson 2000. The counseling process Elizabeth Reynolds welfel,
10. Jimmie Lindon, Lance Lindon. 2000. Mastering counselling skills, Macmillan press Ltd

JOURNALS

1. Journal of the American Dietetic Association.
2. Nutrition and Dietetics, The Journal of Dietitians Association of Australia.
3. Journal of the Royal Society of Medicine, London.
4. The Tokaj Journal of experimental and clinical medicine - Japan
5. The Kero Journal Medicine - Japan.
6. The Indian Journal of Nutrition and Dietetics.
7. Nutrition Reviews, Sweden.
8. Nutrition, NIN, Hyderabad
9. Nutrition Abstracts and Reviews - United Kingdom.
10. Indian Journal of Medical Research, ICMR.
11. Journal of Indian Medical Association, Kolkatta.

SPECIALIZATION -I: M.Sc., CLINICAL NUTRITION AND DIETETICS
Semester-3
FN3.3/THIRD PAPER: DIET THERAPY

THEORY

- Unit -1 Dietary Principles and Management of Diseases of the liver, gall bladder and pancreas - Hepatitis (A,B,C), Cirrhosis, Cholecystis, Chole lithiasis, Pancreatitis (Functional tests to be discussed).
- Unit -2 Dietary Principles and Management of Metabolic disorders - Obesity - Classification, causative factors, approaches to treatment & control. Diabetes Mellitus - incidence, etiology, classification, treatment, prevention, diagnostic/monitoring criteria, long-term and short-term management. Gout-Symptoms, causes, treatment and prevention.
- Unit -3 Diseases of the renal system-etiology, symptoms, nephritis and nephrosis-metabolic and Nutritional implications in acute/chronic renal failure, kidney transplant. Renal calculii.
- Unit -4 Cardio vascular diseases - Role of specific nutrients in cardiac efficiency - etiology, incidence, symptoms long-term and short-term treatment in coronary disease - Myocardial infarction, cerebral infraction (atherosclerosis as one of the causative factor) Other acute and chronic conditions - congestive heart failure, hypertension.

REFERENCES

TEXT BOOKS

1. Sushangini Joshi. 2002. Nutrition Dietetics. New Delhi: Tata MC Graw Hill publications.
2. Townsend Carolmon.E. 1999. Nutrition and Diet Therapy. Albanz. Delmar publishers.
3. Roth Ruth.A. 2003. Nutrition and Diet Therapy, New York: Thomson Delmar learning.
4. Lutz. 1944. Nutrition and Diet Therapy, Philadelphia-.F.A. Devis company.

REFERENCE BOOKS

5. Koushik.V.K. 1998. Nutrition and Food Safety. Jaipur: Book Enclave publishers.
6. Janaki Rao, P. 2006. Nutrition and Food Science/. Jaipur: Aviskar publications,
7. Bhavana Sabarwal. 1999. Nutrition and Health Promotion. New Delhi: Common Wealth publications.

8. Gibney Michel. 2004. Nutrition and Metabolism. Kundi: Blackwell Science publisher.
9. Bhavana Sabarwal. 1999. Nutrition Auxiliaries and Nutrients. New Delh: Commonwealth publishers.
10. Bhavana Sabarwal. 1999. Nutrition and Health care. New Delhi: Commonwealth publications.
11. Kawshik V.K. Horaco, 1999. Problems of Food nutrition and Dietetics, Book Enclave Jain Bhavan.
12. Mahtab S. Bamji, Prahallad Rao, Vinodini Reddy, Text Book of Human Nutrition, Oxford and IBM publishing company Pvt. Ltd.
13. Redolph Ballentine 1978. Diet & Nutrition, Himalayan International Institute.
14. Ross & Wilson, Kathleen J.H. Wilson, 1990. Anatomy & Physiology in Health & Illness, ELBS in print, 7th edition.

JOURNALS

1. Journal of the American Dietetic Association.
2. Nutrition and Dietetics, The Journal of Dietitians Association of Australia.
3. The Indian Journal of Nutrition and Dietetics.
4. Nutrition, NIN, Hyderabad
5. Nutrition Abstracts and Reviews - United Kingdom.
6. Indian Journal of Medical Research, ICMR.
7. Journal of Indian Medical Association, Kolkatta.

SPECIALIZATION -I: M.Sc., CLINICAL NUTRITION AND DIETETICS

Semester-3

FN3.4. FOOD, NUTRITION AND DRUG INTERACTIONS

THEORY

- Unit - I Nutrition and Drug interaction: Basic concept xenobiotics and pharmacokinetics. Changes in kinetics and bioavailability.
- Unit - 2 Food and Drug interactions: Effect of food on drug absorption, effect of food on drug transport, food effects on drug metabolism, food effect on drug utilization, food effects on drug excretion, effect of type of feeding and food forms on drug availability.
- Unit - 3 Drugs effect on Nutrient metabolism effect on digestion. Absorption, utilization and excretion.
Nutrient supplements: effects on drug metabolism (Calcium, Iron, Vitamin A and D, Multivitamin , therapeutic and RDI doses) Mutimeneral, Folic acid.
- Unit- 4 Drug and drug interaction: Common Drug Antibiotics, Anti Histamines, Steroids, Aspirin, Hypertension drugs. Hypoglycemic. oral contraceptives, placebos, statins. Anti deplasents. Sedatives - immediate and long term effects.
Risk factors for drug - nutrient interaction: diet. Health problems, Guidelines to help to use drugs wisely, how to lower the risk of drug - Nutrient interactions.

REFERENCES:

1. Hamilton, EMN et al. 1985. Nutrition — Concepts and controversies, 3rd edn. St. Paul, West Publishing Co.
2. Hathcock. J N and J Coon. Eds. 1 978. Nutrition and drug inter-relations. New York: Academic Press..
3. Pike, R L and M L Brown. 1970. Nutrition: An integrated approach. New Delhi: Wiley Eastern Pvt. Ltd.
4. Proudfit, F T and C H Robinson, C H, Normal and therapeutic nutrition, I 3 Edn, Calcutta, Oxford and IBH Publishing Co 1968.
5. Robinson. C.H, Basic nutrition and diet therapy, 5th edn, New York, Macmillan Publishing Co. Inc. 1984.
6. Robinson. Cl-I. Basic Normal and therapeutic nutrition. I 7th edn, New York, Macmillan Publishing Co. Inc. 1986.
7. Shils, M.E, JA Olson and others, Modern nutrition in health and disease, 9th edn, Williams and Wilkins. U.S.A. 1999.
8. Principles of nutrition and dietetics, Bangalore, Bappco publication, 1986.

**SPECIALIZATION -II: M.Sc., FOOD SCIENCE AND QUALITY CONTROL
SEMESTER –3**

3.2: ENTREPRENEURSHIP DEVELOPMENT

THEORY:

- Unit-I Concept of Entrepreneurship and enterprising .Growth of Entrepreneurs and Entrepreneurship, factors determining the growth of entrepreneurship. Role of Entrepreneurship in economic development.
Entrepreneurial culture and spirit: Assessment of Entrepreneurship qualities and personalities, Entrepreneurship skills, creation of different visions-Emerging-Central and secondary visions.
Entrepreneurial motivation: The motivating factors, Entrepreneurial ambitions, compelling factors, facilitating factors and achievement motivation.
- Unit-2: Process of entrepreneurship development: Stages tasks to be performed. The learning required to perform the tasks.
Women Entrepreneur: Concept of women entrepreneurs, contribution of female entrepreneurs to the economy, psycho, socio-economic and demographic profiles of women entrepreneurs in India, problems of women entrepreneurs and role of women entrepreneurs association.
- Unit-3 Entrepreneurial development programs in India: Concept of entrepreneurial development. Need for training and development, phases of entrepreneurial development program, contents of training for entrepreneurial development. Target groups, special agencies and schemes. Institutions conducting entrepreneurial development program and evaluating entrepreneurial development programs.
Development of the business plan: Idea generation and validating the idea. Statement of objectives and description of product/service, clients and scope- Market research and analysis, location choices, operations plan, analysis of risks, organization of the management team and distribution of tasks. Overall schedule of activities leading to start up and the finance management.
- Unit- 4: Negotiations with the family friends, relatives, shareholders and financial institutions- Angel' money.
- : Entrepreneurship support systems: Institution set up DISCS and Industrial estates, SIDCO, SIDO, NSIC, SISI, SISI, SIDCO, SIPCOT, IIC, NAYE, NSIET, NPC, KVIC, TCUC, CTCOT, Commercial banks SHG (Self help groups)
Developing leadership among women entrepreneurs and Networking amongst entrepreneurs.

REFERENCES:

1. Harish, Economic development and role of Indian women, common wealth publishers, New Delhi-110 002.
2. Jain P.C. Hand book for new Entrepreneurs Oxford University press.
3. Medha Dubhashi, women Entrepreneurs in India, common wealth publishers, New Delhi-112 002
4. Rush, H.A. Economic development & Role of Indian women, common wealth publisher, New Delhi-112 002.
5. Uddin Entrepreneurship development in India, Sami, University press.
6. Indian journal of Nutrition and Dietetics.
7. NIN Journals
8. Current Science
9. Journal of Medical microbiology
10. American journal of clinical nutrition.
11. Food Industry journals
12. JADA 90 OLD JOURNALS ONLY)
13. Journal of Food Technology and food abstracts
14. 14. Journal of Nutrition
15. Food patterns
16. Foods digest.

SPECIALIZATION -II: M.Sc., FOOD SCIENCE AND QUALITY CONTROL
SEMESTER –3
FN3.3A FOOD MICROBIOLOGY, SAFETY AND STANDARDS

- Unit:1 Basic principles of food spoilage: Growth, properties. reproduction. physiological characteristics of Fungi. Mold. Yeast. Lactic acid bacteria
Factors affecting growth of microorganism in food, intrinsic and extrinsic factors
Preservation by Drying, Radiation and Freezing.
- Unit2: Food Safety: Risks Associated with food: Chemical. Physical. Microbiological
Spoilage of canned foods. cereal foods. meat, egg. fish and Poultry products.
fruits & vegetables. wines, beer. Fermented foods
Food Poisoning (Staphylococcus. Bacillus. Listeria. Salmonella
- Unit3. Sanitation: Principles Design Chemicals Pest management
- Unit4: Food safety programs - prerequisites .GMP GAP/ GHP/ Sanitation Standard
Operating Procedure HACCP . Indian and Global food safety process

Reference :

1. Food Microbiology M.R.Adams
2. Basic Food Microbiology J.Banart
3. Modern Food Microbiology James Nd. Jay
4. Microbial Food Poisoning R. Hey
5. Practical Food Microbiology & Technology Mountv & Gould
6. Fermentation Fechnology- Singli & Pandit

SPECIALIZATION -II: M.Sc., FOOD SCIENCE AND QUALITY CONTROL
SEMESTER –3
FN 3.4(A) FOOD PACKAGING TECHNOLOGY

- Unit:1** Packaging Materials : Definition, importance and scope of packaging of foods
Origin of packaging materials, types, properties, advantages & disadvantages of packaging materials
- Unit:2.** Types of packaging material and their testing: Forms of packaging – box, bottle, tetra, pouch, shrink, vacuum, gas, CAP, MAP, aseptic etc. WVTR, GTR, bursting strength, tensile strength, tearing strength, drop test, puncture test, impact test etc.
- Unit:3.** Packaging Requirements : Packaging requirements and their selection for raw and processed foods
- 3.1 Meat, fish, poultry, eggs
 - 3.2 Milk and dairy products
 - 3.3 Fruits and vegetables
 - 3.4 Cereal grains and baked food products
 - 3.5 Beverages
 - 3.6 Snacks
 - 3.7 Package labeling – functions and regulations
- Unit:4.** Advances in food packaging
- Modified Atmospheric Packaging: Introduction, MAP gases, packaging materials , Historical development
- Active packaging: Introduction types of active packaging (Oxygen scavengers, Carbon dioxide scavengers/ emitters, Ethylene scavengers, Ethanol emitters, Preservative releasers, Moisture absorbers, Flavour/odour adsorbers, Temperature control packaging , Food safety, consumer acceptability and regulatory issues

References:

- 1- Walter Soroka, Fundamentals of packaging technology, 2009. 4th ed. Institute of Packaging Professionals, USA
- 2- Robertson, G.L. Food Packaging: Principles and Practice, 2005. 2nd ed. CRC Press, London, UK.
- 3- Han, J.H., Innovation in Food Packaging, 2005. Elsevier Academic Press, London, UK
- 4- Lee, D.S., Yam, K.L., and Piergiovanni, L., Food Packaging Science and Technology, 2008. CRC Press, London, UK.
- 5- Coles, R., McDowell, D., and Kirwan, M.J., Food Packaging Technology, 2003. Blackwell Publishing Ltd., Oxford, UK.

FN 2.5. (OP). HUMAN NUTRITION

Theory

UNIT I:

- Introduction to Terminologies: Food, Nutrition, Nutrient, Empty Calories, Health, Malnutrition, Food groups, Balanced Diet.
- Basis for computing nutrient requirements: latest concepts in dietary recommendations for entire life span, RDA- ICMR and WHO: their uses and limitations.

UNIT II:

- Carbohydrates: Definition, Composition, Classification, Food Sources, Functions in human body, Recommended Daily Allowance in India (RDA), Importance of fibre.
- Fats And Oils: Definition, Composition, Saturated and Unsaturated fatty acids, Cholesterol (a brief note), Food sources, requirements and biological functions.
- Protein: Definition, Composition, Essential and Non-essential amino acids, Protein Quality, Concept of Supplementary value of Protein, Food Source, Effect of deficiency, Functions.

UNIT III:

- Vitamins: Definition, Classification
- Fat Soluble Vitamins (A,D,E,K) – Functions, Food Sources, RDA, Name of the deficiency disease and symptoms.
- Water Soluble Vitamins (B complex and C): Functions, Sources, RDA, Deficiency diseases and its symptoms.

UNIT IV:

- Macro minerals: Calcium, Phosphorous, Sodium, Potassium, chloride - sources, biological functions, factors affecting availability.
- Micro minerals and their importance: - Cobalt, Copper, Zinc, Iron, Molybdenum, Selenium, Chromium, Iodine and fluorine in human nutrition – assessment of requirements of micro and macro minerals. Nutrition and programmes by government for different nutrient deficiency diseases.
- Assessment of nutritional status

References

1. Hand Book of Food and Nutrition- Dr. M.S. Swaminathan
2. Nutrition and Dietetics - Shubhangi Joshi
3. Fundamentals of Food and Nutrition- Sumati R. Mudambi and M.V, Rajgopal
4. Therapeutic Nutrition- Prondfit and RobinsonNormal
5. Nutritive value of Indian Food - Dr. C Gopalan
6. Vitamin and minerals requirements in human nutrition, Report of Joint FAO/WHO Expert Consultation on Human vitamin and mineral requirements. WHO, Geneva, 2000.

FN3.5 (OP): FOOD STANDARDS AND QUALITY MEASURES

UNIT-I

- Sensory Evaluation of foods: Requirement for conducting sensory tests, Types of test, limitation of sensory evaluation.
- Objective methods of evaluation.
- Improvised instruments used for Indian recipes.

UNIT-II

- Principles of quality control: Raw material process control and Product inspection.
- Food adulteration and hygiene: definition, Common adulterants in different foods, method of detecting adulterated foods.

UNIT-III

- Food additives: Definitions, Types, Action.
- Leavening agents: Definitions, Classifications.
- Colour of foods: Natural colours, certified artificial colours, Non-certified colors, Use and Optimum levels.
- Standards for labeling of processed foods: Milk and milk products, Fruits and Vegetables, Beverages and Fleshy foods.

UNIT-IV

- Food Laws, Consumerism: Definition, Consumer protection, Consumer Education, Legal modes of protection and Machinery for redressal of consumer grievances.

References :

1. Food chemistry by H.D. Belitz,
2. Food Additives - R.J. Taylor
3. Enzymes in food processing by G.G. Brich, N. Blakerbrough & K.J. Parker
4. Natural colour for food & other uses - J.N. Counsell.
5. Marketing Managements - Concepts and practice - by T.N. Chhabra & S.K.Grover.
6. Food Science, Chemistry and Experimental foods by M. Swaminathan.
7. Food Science by Sri Lakshmi .B.

SPECIALIZATION -I: FOR CN AND FSQC (common paper)

SEMESTER - 4

FN 4.1/FIRST PAPER: INSTITUTIONAL FOOD SERVICE MANAGEMENT

THEORY

- Unit-1: Introduction to food service Industry: Management and types of food service establishment, Principles and functions of food service management, Need and importance, Tools of management, Management of resources, Types-Hotels and Restaurants, Hotels /Motels, Restaurants, Cafes, Clubs, Wine bars, specialty restaurants , fast foods, street foods, take-away etc.
- Welfare and Industrial: Residential establishments-Schools, Colleges, Hostels, Old people house, hospitals, nursing homes, Industrial canteens temple feeding and management, Transport- Railway, Airlines and Sea.
- Unit - II: Infrastructure and equipment: Building plans cum out lays of work places, kitchen spaces, storage spaces, and service area. Equipment: Classification of equipment, selection of equipment, Design, Installation, operation and maintenance, Food service operations and types of food services, Systems of services, Mechanics of waiter services, self services, Vending and mobile catering.
- Food service systems: Introduction, standards of hygiene, Cook chill system and benefits. Cook freeze system and benefits, sous vide, Computers in services, Introduction and catering controls.
- Unit III Food safety in public catering: Health and hygiene of personnel, Laws governing food service in public catering, Sanitation of food service in public catering, Food safety in hotels, restaurants, street foods industry and canteens, hospitals, hostels, airlines, railways, temple and mass feeding programmes, Laboratory support services in food safety. Food borne diseases and importance of surveillance, Food safety awareness programmes to food handlers and consumers, Role of media in food safety education.
- Unit-IV Financial and personnel Management: Definition and scope of financial management, Cost concept, cost control and pricing, Book keeping and accounting
- Personnel Management: Recruitment, selection and induction, job analysis, description, Monitoring work employee facilities and benefits, in service training skills required to operate and manage food service system.

REFERENCES;

1. Ronald kinton and victor cesarani (1992), 'the theory of catering', Bulter and Tanner Ltd,, France and London.
2. Mohiniseti and surjeet Mohan (1993), catering management An integrated approach, second edition, wiley esteem limited, New Delhi.
3. Ramesh VBhat and R.Nagesswara Rao(1996), Food safety, Bappco (ltd), Mysore, Banglore.
4. Ramesh, V,Bhat, and R.Nagesswara Rao(1992), Food safety in public catering,NIN,1CM R, Hyderahad.

SPECIALIZATION -I: M.Sc., CLINICAL NUTRITION AND DIETETICS
FN4.2/ SECOND PAPER: NUTRITION AND HEALTH INTERVENTION
PROGRAMME

THEORY:

- Unit 1: Nutrition and health scenario in India: Historical prospective Agricultural production and policies, Distribution and per-capita availability. Health and nutrition policies.
- Unit2: Nutrition programmes: Government and non government for men, women, children elderly and family: ICDS midway meal, Indira kranti padakam
- Unit 3: Government programmes and policies for control of Malnutrition, Vitamin A prophylaxis, Anemia ,Iodine deficiency disorders(IDD), Fluorosis and other deficiency disorders.
- Unit 4: Nutrition during emergencies: Natural / Manmade disasters resulting in emergency situations, Famine, drought, flood, earthquake, cyclone, war, civil, Causes of malnutrition in emergency situations. Management of nutritional problems developing social responding system.

REFERENCES

1. Journal of food science and Nutrition
2. Proceedings of Nutrition society of India,
3. Nutrition News
4. Government policy plans by Government of India
5. Journal of Nutrition and dietetics

SPECIALIZATION -I: M.Sc., CLINICAL NUTRITION AND DIETETICS
FN4.3/ THIRD PAPER: ADVANCED STUDIES IN NUTRITION

THEORY

- Unit- 1 Carbohydrates: Functions, Storage, effect of excess/low intake of carbohydrates, dietary carbohydrates and oral diseases.
- Unit- 2 Lipids: Lipids and fatty acid requirements, functions, storage, lipid transformation in the liver, lipotropic factors, role of essential fatty acids, prostaglandins, deposition of fat in the body, effects of deficiency and excess of fats.
- Unit-3 Proteins and amino acids: Review of functions, sources, protein turnover, synthesis and stores, proteins as a source of energy, protein requirements through factorial method and balance study.
Amino acids: Requirements, amino acid pattern, essential amino acids, amino acid balance and imbalance, toxicity, evaluation of dietary protein quality, effects of protein deficiency, role of novel proteins and vegetable protein mixtures in combating protein malnutrition.
- Unit-4 Energy Balance: Energy content of food, energy measurement - direct and indirect calorimetric, energy utilization in cells, basal metabolism, Physical activity, specific dynamic action of food, energy requirements, energy balance and body weights.

REFERENCES

1. Berry. Ed. P. Ottaway, 1993. The Technology of vitamins in food. NZ: Blackie Academic & Professional..
2. David A Bender, Introduction to Nutrition & Metabolism, Second Edition
3. Erric Conn. Paul K. Stumpt, George Bruening and Roy.M. Doi 1987. "Outlines of Biochemistry 5/E". Canada: John Wiley & Sons.
4. Garrow Ed. Sanal. J. James W.P.T, 1993. Human nutrition & dietetics. U.K: Churchill livingstone publication
5. Henrietta Fleck, 1981. Introduction to Nutrition 4th edition Published by New York: Mcmillan Co.. INC.
6. Kenneth. Ed. T. Smith, 1988. Trace minerals in foods. New York: Marcel dekker, I tic.
7. Mullar .H.G. G.Tobin, 1980. Nutrition and food processing. East part connetict.: Avi publishing company INC
8. Hamintion — Glopper. Biochemistry of human Nutrition,. S.T.pauly MN: West publishing company.

SPECIALIZATION -II: M.Sc., FOOD SCIENCE AND QUALITY CONTROL

4.2(A)/ SECOND PAPER: BAKING SCIENCE AND TECHNOLOGY

- Unit-I: Baking: Definition, need and importance of baking general methods and principles, Prospects of bakery products, recent developments, status of bakery industry in India, Need of the baking industry.
Bakery equipment: Selection of equipment-mixtures, agitators, Accessory equipment – dough cutters, rollers, moulders, sheeters, proofing equipments, Oven – types of ovens, care and maintenance of equipment.
- Unit – II: Raw materials: Selection of ingredients, receiving storage, hygiene, sanitation and safety measurement techniques. How quantities of raw materials are measured for standardization of different products.

Flour milling: Milling process – Wheat cleaning, washing, and conditioning the break system, break scalping, purification, reduction system, conveying, flour treatment and flour bleaching.
- Unit3. Baking quality of wheat flour: Flour testing-moisture content, ash, protein content, protein quality, grade colour, degree of bleach, diastatic activity-maltose figure, dough testing by various instruments – flour strength, water absorption, colour, flavor, enzyme activity, yeast activity, rope test and baking test.
- Unit-4: Breads: Types bread, methods of making bread unit operations involved in bread making. Method of making muffins, buns, pan cakes, puffs, samosas.
Biscuits : Classification of biscuits, methods of preparation of biscuits. Faults checking of biscuits.

Cakes: Classification and types of cakes-cake baking technology, icing/frosting technology, standard icing formulae, pie dough technology pie crust technology, cookie technology, sweet dough technology, typical formulae, pastry – factors influencing pastry quality and factors influencing soaking of pastry.

REFERENCES

1. Joseph Amendola, Nicole Rees, Understanding baking: the art and science of baking
2. [E. J. Pylar](#), [L. A. Gorton](#) - [Baking science & technology: volume I : fundamentals & ingredients](#)
3. [Neelam Khetarpaul](#) - 2005 [Bakery Science and Cereal Technology](#)

SPECIALIZATION -II: M.Sc., FOOD SCIENCE AND QUALITY CONTROL

4.3(A)/ THIRD PAPER: FOOD TOXICOLOGY

- Unit-1: Principles of Toxicology: Classification of toxic agents; characteristics of exposure; evaluation of toxicity. LD50 and TD50; spectrum of undesirable effects; interaction and tolerance; biotransformation and mechanisms of toxicity.
- Unit-2: Natural Toxins in Food: Determination of toxicants in foods; classification and toxicity of natural occurring toxins; natural toxins in animal foodstuffs (meat and seafood); natural toxins in plant foodstuffs; fungal toxins occurring in foods (mycotoxins); micro-organisms and food; sites of action and their toxicity mechanisms.
- Unit-3: Food Allergies and Sensitivities: Natural sources and chemistry of food allergens; true/untrue food allergies; handle of food allergies; food sensitivities (anaphylactoid reactions, metabolic food disorders and idiosyncratic reactions); issues related to sulfites in foods.
- Unit-4: Environmental Contaminants and Drug Residues in Food Fungicide and pesticide residues in foods; heavy metal and their health impacts; abusive use of veterinary drugs (e.g. Malachite Green in fish and β - agonists in pork); other contaminants in food.
Food Additives and Toxicants formed during Food Processing Safety of food additives; toxicological evaluation of food additives; food processing generated toxicants: nitroso-compounds, heterocyclic amines, etc.
Dietary Supplements and Toxicity related to Dose Common dietary supplements; relevance of the dose; possible toxic effects.

Reference books

11. Food Toxicology - William Helferich, Carl K. Winter 2001
12. Handbook of Food Toxicology - Deshpande – 2002
13. Food toxicology: a perspective on the relative risks- Steven L. Taylor, Richard A. Scanlan, Institute of Food Technologists – 1989
14. Introduction to Food Toxicology- Takayuki Shibamoto, Leonard F. Bjeldanes - 2009

IST SEMESTER
PRACTICALS FOR THE EXAMINATIONS TO BE CONDUCTED AT THE END OF IST
SEMESTER

Practical I Nutritional Through Life Cycle and Dietetics

I.

1. Food Exchange list
2. Standardization of Dietary Assessment Vessels/cups
3. Planning and preparation of suitable diets to pregnant women.
4. Planning and preparation of suitable diets to lactating women.
5. Planning and preparation of suitable diets to infants.
6. Planning and preparation of suitable diets to pre-schools.
7. Planning and preparation of suitable diets to school going children.
8. Planning and Preparation of suitable diets to adolescents.
9. Planning and Preparation of diets to adults and elderly.
10. Planning and Preparation of diets to athletes and industrial workers.

II

Preparation of diets

- Clear fluid and full fluid
- Mechanical soft diet & dental soft diets
- High fiber diets
- Low residue diets
- High protein diets
- Low protein diets
- Low fat
- Low sodium
- Sodium restricted
- Calcium restricted

**I SEMESTER
PRACTICALS FOR THE EXAMINATIONS TO BE CONDUCTED AT THE END OF IST
SEMESTER**

Practical I

Part- A Experimental foods

1. Standardization of raw materials
2. Starch- experiments to be demonstrated properties of starch and factors affecting gelation.
3. Comparison of properties of different sources of starch. Eg. Viscosity, gelation retrogradation.
4. Testing of wheat flour for baking quality. Preparation of breads, biscuits and cakes- subjective and objective evolution.
5. Pulses: - Methods of cooking, affect of soaking, germination, fermentation, cooking medium, P^H and salts on cooking.
6. Demonstration of the affect of different leavening agents in Indian food preparation.
7. Vegetables and fruits: Effect of acid, alkali, metals and cooking on colour, texture, flavour and palatability.
8. Browning reactions in fruits and vegetables and preventive methods.
9. Milk: Physico- chemical properties, effect of cooking, effect of acid and enzymes on milk Proteins. Preparation and evolution of cream. Preparation and evaluation of cheese, curds, ice creams.
10. Egg: experiments with eggs to study the properties of coagulation, egg as clarifying and foaming agent. Effect of quality of eggs on these properties, egg as emulsifying agents- preparation and evolution of mayonnaise.
11. Meat Methods of cooking, factors effecting texture of meat.
12. Fats and Oils: Smoking point, absorption test, shortening effect of fat in food preparation.
13. Sugar: Experiments on boiling and melting point of sugar, stages of sugar cookery. Crystallization of sugar and effect of temperature concentration and acids. Experiments on Indian sweet making.

Part – B Food Chemistry

1. Estimation of vitamin C
2. Calcium
3. Iodine number
4. Free fatty acid number
5. Saponification number
6. Peroxide value of fresh and heated oils
7. Determination of fat in milk.
8. Estimation of protein by Kjeldahl's method

**I SEMESTER
PRACTICALS FOR THE EXAMINATIONS TO BE CONDUCTED AT THE END OF
SEMESTER**

Practical II- Applied Physiology

1. Blood: Composition-plasma, blood cells, blood clotting process.
2. Blood Analysis Enumeration of RBC and WBC.
3. Blood Hemoglobin
4. Blood Glucose
5. Serum Albumin and globulin
6. Serum Calcium
7. Serum Urea
8. Urine Analysis Qualitative Sugar, Albumin and Microscopy

III SEMESTER
PRACTICALS FOR THE EXAMINATIONS TO BE CONDUCTED AT THE END OF
IIIRD SEMESTER

Practical I (common) Functional Foods

1. Market research analysis of functional foods and bakery products.
2. Product development by using any techniques
3. Development of a questionnaire for market survey.
4. Market survey of locally available foods
5. Selection and formulation of the product
6. Raw material testing
7. Preparation of the product - First trial
8. Preparation of the product - Second trial
9. Preparation of the product - Actual
10. Testing of the developed product
11. Selection and screening of panel for sensory evaluation
12. Training of panel for sensory evaluation
13. Conducting sensory tests and preparation of score cards
14. Ranking, rating, description and sensitivity tests and preparation of score cards
15. Product development evaluation with trained, semi trained and consumer panel members.
16. Shelf life studies on developed product.

III SEMESTER
PRACTICALS FOR THE EXAMINATIONS TO BE CONDUCTED AT THE END OF
IIIRD SEMESTER

Practical II (CN) Diet therapy and counseling

1. Preparing: Equipment and educational material using in counseling and Assessment surveys.
2. Visit to general and specialized hospitals to observe and take case studies & history
3. Planning, calculation, preparation and counseling Sessions for;
 - Obesity
 - GIT disorders
 - Liver and Gall bladder and pancreas disorders
 - Cardio Vascular Diseases
 - Diabetes
 - Renal disorders
4. Monitoring and Evaluation of counseling Sessions for above conditions.

Food, Nutrition and Drug Interaction

1. Market survey to see the composition of different drugs.
2. Market survey to list the nutrient supplements.
3. Visit to hospitals to observe drug allergy and drug administration and parental feeding etc.

SPECIALIZATION -II (FSQC)
Effective for the students admitted from the year 2013 -2014
III SEMESTER

**PRACTICALS FOR THE EXAMINATIONS TO BE CONDUCTED AT THE END OF
IIIRD SEMESTER**

Practical II (QC) Food microbiology and Packaging technology

I

1. Market survey to study nutritional labeling of various foods (Health foods) Visits to various food quality control labs to observe the procedures followed in quality regulations
2. Analysis of food adulterants
3. Tests for food additives
4. Microbial analysis of foods

II

1. Visit to packaging industry
2. Identification of different types of packaging and packaging materials
3. Determination of wax weight
4. Determination of tearing strength of paper
5. Measurement of thickness of packaging materials
6. Introducing the students with the latest trends in packaging consulting the web sites and magazines