

## SEMESTER – I

### Core Paper- I

#### ADVANCED FOOD SCIENCE

**Instructional Hrs. : 90**

**Sub. Code : 15FNPC101**

**Max. Marks : CIA -25; ESE -75**

**Credits: 4**

**Objectives :** To enable the students to gain knowledge on changes in food during cooking and to develop skills in cooking.

#### UNIT I

**17 Hrs.**

**Colloidal system:** Types of colloidal dispersion- Sols, gels, foams, emulsions, true solutions and suspensions- Emulsifying agents, uses of emulsifiers in food industry. **Food additives:** *Classification and uses-* Physiochemical changes in foods in relation to cookery- Browning reaction- Enzymatic and non enzymatic reaction. **Organic foods** – Meaning and advantages.

#### UNIT II

**18 Hrs.**

**Carbohydrates : Starch cookery-** *Sources and uses of starch-* Effect of moist and dry heat on cereal starch- Factors affecting the viscosity of starch pastes. **Cereal cookery-** gluten formation- Factors affecting gluten formation. **Pulse cookery** - Effect of soaking- Decortication- Germination and fermentation on pulses- Effect of cooking and factors affecting cooking quality of pulses.

#### UNIT III

**18 Hrs.**

**Vegetable cookery :** Changes during cooking, effect of prolonged cooking, addition of acid and alkali on pigments. **Fruit cookery :** *Changes during ripening of fruits- Pectic substance in fruits.* **Milk and milk products :** Properties of milk- Effect of heat, acids, enzymes, phenolic compounds and salts on milk - Pasteurization of milk.

#### UNIT IV

**20 Hrs.**

**Fleshy foods : Meat** – Structure, cuts of meat- Post mortem changes, rigor mortis-tenderness and factors affecting tenderness- Methods of cooking and changes of meat on cookery. **Poultry and Fish :** *Selection and methods of cooking.* **Egg :** Selection- Effect of heat-Factors affecting coagulation of egg protein- Cooking egg with and without shell- Egg white foams and factors affecting foam stability- Changes during storage.

## UNIT V

17 Hrs.

**Sugar cookery** : *Sources, uses and properties*- Crystallization- Stages of sugar cookery- Preparation of crystalline and non-crystalline candies with special reference to Indian preparations. **Fats and oil** : Physical and chemical properties- Rancidity-types- Methods of prevention- Smoking point and changes in fat on cooking. **Spices**- Turmeric, chilli. pepper, Cloves- chemical constituents. **Beverages**- Tea, coffee, Cocoa-Chemical constituents- Processing concept.

**Note** : *Italics* denote Topics for Self Study

### REFERENCE BOOKS

1. **Charley. H. & Weanee, C.M.**, *Foods – A Scientific Approach*, Practice Hall, 3<sup>rd</sup> edition, 1997.
2. **Sunetra Roday**, *Food Science and Nutrition*, Oxford University Press, 5<sup>th</sup> Edition, 2009
3. **Lillian Hoagland Meyer**, *Food Chemistry*, CBS Publishers & Distributors, New Delhi, 1<sup>st</sup> Edition, 2004.
4. **Norman Potter & Joseph, H. Hotchkiss**, *Food Science*, CBS publishers and Distributors, New Delhi, 5<sup>th</sup> Edition, 2005.
5. **Paul, P.C. & Palmer, H.H.**, *Foods theory and applications*, John Wiley and sons, New York, 2006.
6. **Samuel, A. Matz.**, *The Chemistry and technology of cereals as food and feed*, CBS Publishers, New Delhi, 2<sup>nd</sup> Edition, 1997.
7. **Shakuntala Manay, N. Shadaksharaswamy**, *Foods – Facts and Principles*, New Age International Publishers, New Delhi, 2<sup>nd</sup> Edition, reprint 2002.
8. **Sri Lakshmi. B**, *Food Science*, New Age International Private Ltd., New Delhi, 2010, 5<sup>th</sup> Edition.
9. **Sumathi R. Mudambi and Shalini M.Rao**, *Food Science*, New Age International (P) Ltd., New Delhi, 2006.
10. **Vijaya Khader**, *Text book of Food Science and Technology*, ICAR, PUSA, New Delhi, 2001.

## **JOURNALS**

1. Journal of Food Science & Technology, AFSTI, Mysore.
2. Indian Food Industry, CFTRI Mysore.
3. Kissan World, Sakthi Sugar Ltd, Chennai.
4. Food Digest, AFSTI, CFTRI, Mysore.

**SEMESTER - I**

**Core Paper – II**

**PHYSIOLOGICAL ASPECTS OF NUTRITION**

**Instructional Hrs. : 90**

**Sub. Code : 15FNPC102**

**Max. Marks : CIA -25; ESE -75**

**Credits: 4**

**Objectives:** To enable the students gain knowledge on blood components, immunological aspects and to understand the physiological aspects of hormones, drugs, etc.

**UNIT I**

**17 Hrs.**

**Blood :** Composition and functions- *Cellular elements of Blood (RBC, WBC, Platelets) – Structure and function-* Hemopoiesis- Metabolism and function- Haemoglobin – Structure and function- Plasma protein – Composition, Functions Changes in various disorders- Blood coagulation and disorders of Blood coagulation.

**UNIT II**

**20 Hrs.**

**Immunity :** Types of Immunity- Cells of immune system- *Immunoglobins-* Antigen – antibody reactions - Immune response – Humoral immunity, cell mediated immunity.

**Immune changes in malnutrition:** Vitamin deficiency, iron deficiency and zinc modulation- Neuro–endocrine control of stress and immunity- Immune mechanisms in infections - Autoimmunity and hyper- sensitivity.

**UNIT III**

**18 Hrs.**

**Enzymes :** *Definition, classification,* action, factors influencing rate of enzyme action- Derivation of Michael's Menton (MM) equation - Role of Enzymes in medical diagnosis- Alkaline phosphatase, creatinine phosphokinase, SGOT, SGPT, Lactate dehydrogenase  
**Function tests :** Gastric function test, liver function test, renal function test and endocrine function test.

**UNIT IV**

**17 Hrs.**

**Water and electrolyte balance :** Total body water, intake versus output of water-*Body fluid compartment- Composition of body fluid-* Measurement of body fluid volumes - Regulation of acid base balance - Electrolyte balance.

**Hunger, Appetite and Satiety:** Obesity and starvation - *Physiological and psychological factors affecting food intake - Circadian rhythm – Meaning.*

**UNIT V**

**18 Hrs.**

**Xenobiotics-***Definition, components*, biotransformation – Phase I and Phase II reactions-  
Biodynamics- Mechanisms of drug action- Factors modifying drug effects- Receptor theories- Drug and nutrient interactions.

**Note :** *Italics denote Topics for Self Study*

**REFERENCE BOOKS**

1. **Jain A.K.** , *Text book of physiology,vol.1*, Avichal Publishing company,3<sup>rd</sup> Edition, 2005.
2. **Ambika Shanmugam**, *Fundamentals of biochemistry for medical students*, Ambika Shanmugam Publishing, 7<sup>th</sup> Edition,2004.
3. **Yadav,P.R.**, *Immunology*, Discovery Publishing House, 3<sup>th</sup> edition, 2004.
4. **Dulsy Fatima and Arumugam**, *Immunology*, Saras Publications, 2005.
5. **Guyton, I.E.**, *Textbook of Medical Physiology*, Saunders, 7<sup>th</sup> Edition, 2009.
6. **Murugesh,N.** *A Concise text book of pharmacology*, Sathya Publishers, 6<sup>th</sup> Edition, 2004.
7. **Saradha Subramaniam, Madhav Ankutty and Singh,H.D.**, *Text book of Human Physiology*, S.Chand and company, 6<sup>th</sup> Edition, 2004.
8. **Satoskar,R.S., R.S.Bhandarkar,S.D., Ainapure,S.S.** *Pharmacology and pharmacotherapeutics*,Popular Prakeshan Publishers, 2003.
9. **Ramakrishnan,S. and Rajeswari**, *Text Book of Clinical ( Medical ) Biochemistry & Immunology*, T.R Publications Private Ltd., 1995.

**SEMESTER-I**  
**Core Paper – III**  
**BIOCHEMISTRY**

**Instructional Hrs. : 90**  
**Max. Marks : CIA -25; ESE -75**

**Sub. Code : 15FNPC103**  
**Credits: 4**

**Objectives :** To review the metabolism of macronutrients, to enable the students to understand the application of biochemistry in the field of Foods and Nutrition and to gain skills in biochemical techniques.

**UNIT I**

**18 Hrs.**

**Metabolism of Carbohydrates :** *Overview of Fate of glucose after absorption-* Glycolysis-TCA Cycle- HMP Shunt and energy production- Glycogenesis- Glycogenolysis- Gluconeogenesis.

**UNIT II**

**18 Hrs.**

**Metabolism of Fatty acids :** Biosynthesis of fatty acids- Palmitic acid,  $\beta$ -Oxidation of fatty acids- Biosynthesis and degradation of phospholipids-Lecithin and Cephalin, Biosynthesis and breakdown of Cholesterol and Bile Salts- *Fatty liver and Lipotropic factors.*

**UNIT III**

**18 Hrs.**

**Metabolism of Proteins :** *General pathway of protein and amino acid metabolism-* Transamination - Oxidative deamination- Decarboxylation- Urea Cycle, Biosynthesis of protein- Synthesis and breakdown of haemoglobin and bile pigments.

**UNIT IV**

**17 Hrs.**

**Nucleic Acids :** *Structure, Functions and properties of DNA and RNA,* Isolation of DNA and RNA, types of RNA. **Metabolism of nucleic acids:** Biosynthesis and break down of purine and pyrimidine nucleotides.

**UNIT V**

**19 Hrs.**

**Techniques in Nutritional Biochemistry :** *Separation of sugars and amino acids by paper chromatography* - Electrophoretic separation of proteins. **Colorimetry and spectrophotometry :** Principle, procedure, applications. Microbiological assay of vitamins- Folic acid, Vitamin B12. **Atomic absorption spectroscopy and Flame photometry :** Principle, procedure and applications.

**Note :** *Italics denote Topics for Self Study*

## REFERENCE BOOKS

1. **Ambika Shanmugam**, *Fundamentals of Biochemistry for Medical Students*, Published by the author, 2004.
2. **Chatterjee, M.N., and Rana Shinde**, *Text Book of Medical Biochemistry*, Jaypee Brothers Medical Publishers (p) Ltd., 5<sup>th</sup> Edition, 2005.
3. **Deb, A.C.**, *Fundamentals of Biochemistry*, New central book Agency (P) Ltd, 2002.
4. **Harold Varley**, *Practical Clinical Biochemistry*, CBS Publishers & distributors, 1984.
5. **Leninger, A.L.**, *Biochemistry*, Worth Publishers , New York, 2000.
6. **Powar and Chatwal**, *Biochemistry*, Himalaya Publishing House, 2000.
7. **Robert K. Murray, Daryl K. Granner, Peter A. Mayes and Victor W. Rodwell** *Harper's Biochemistry*, Appleton and Lange Publishers .
8. **Sathyanarayana, U.**, *Biochemistry*, Books and Allied (P) Ltd, Kolkatta, 2003.
9. **Terrance G. Cooper**, *The Tools of Biochemistry*, John Wiley and Sons, 2004.
10. **Victor L. Davidson and Donald B. Sittman**, *Biochemistry*, Lippincott Williams and Wilkins publishers, 1999.

## SEMESTER - I

### Core Paper – IV

#### NUTRITION THROUGH LIFE CYCLE

**Instructional Hrs. : 75**

**Sub. Code : 13FNPC104**

**Max. Marks : CIA -25; ESE -75**

**Credits: 4**

**Objectives :** To enable the students to understand the role of adequate nutrition in stages of life cycle and gain knowledge on fitness assessment and sports nutrition.

#### UNIT I

**17 Hrs.**

Basis for nutrient requirement and computation of RDA and ICMR requirements for Indians-2010.

**Nutrition in Pregnancy :** Stages of gestation- Maternal physiological adjustments- Weight gain during pregnancy and nature of weight gain- Physical activity during pregnancy-Risk factors in pregnancy- Nutritional needs – Macronutrient and micro nutrient needs- RDA- energy cost of pregnancy- *Dietary problems and complications of pregnancy.*

#### UNIT II

**19 Hrs.**

**Nutrition in Lactation :** Physiological adjustments during lactation- Hormonal controls and reflex action- Lactation in relation to growth and health of infants - *Physiology of milk production - Problems of breast feeding-* Nutritional components of colostrum and mature milk- Special foods during lactation- Nutritional requirements during lactation- Energy cost of lactation. **Nutrition for infants :** Rate of growth- Growth and development- Weight as the indicator- Premature infants- Low birth weight- Feeding premature infants- Breast Vs bottle feeding-RDA- Supplementary foods- Weaning foods- Problems of weaning.

#### UNIT III

**16 Hrs.**

**Nutrition for preschool children :** Growth and development – Social, cognitive, emotional, physical, motor and personality development- Food habits- *Nutritional requirements-* Supplemental foods. **Nutrition for School age :** Early and middle childhood- Physiological development- Food habits- Nutritional needs- RDA.

#### UNIT IV

**18 Hrs.**

**Nutrition during adolescence:** Physical growth- Physiological and psychological problems associated with pubertal changes- Nutritional needs- Eating disorders – Anorexia, bulimia,

binge eating- Nutritional problems in adolescent pregnancy and complications. **Nutrition during adulthood** : Nutrition and work efficiency- *Basis for requirements- RDA*. **Nutrition during old age**: Physiological changes in old age- Socio-economic and psychological factors – Nutritional requirements-RDA- Factors affecting food intake.

#### UNIT V

20 Hrs.

**Nutrition for physical activity and exercise**: Body systems involved in physical activity (cardio- respiratory and musculo – skeletal systems)- Physical fitness assessment- Cardio respiratory fitness, assessment of body composition, muscular fitness assessment, flexibility assessment. *Benefits of physical activity*. **Sports nutrition** : Role of carbohydrate, fat and protein as a fuel for exercise- Fluid and electrolyte balance during prolonged sports- Nutritional requirements in sports- Dietary intake before, during and after game.

**Note** : *Italics denote Topics for Self Study*

#### REFERENCE BOOKS

1. **Chernoff, R.**, *Geriatric Nutrition*, ASPEN Publication, 1991.
2. **Hegarty .V.**, *Decisions in Nutrition*, Times mirror Mosby College Publishing,1988.
3. **Morly J.E., Glick.Z & Rubenstein .L.**, *Geriatric Nutrition – A Comprehensive Review*, Raven Press, 1998.
4. **Premalata Mullick**, *Textbook of Home Science*, Kalyani Publishers, 2002.
5. **Shills, E.M., Olson, A.J., and Shike, Lea and Febiger**, *Modern Nutrition in Health and Diseases*, Philadelphia,1999.
6. **Shubangini A.Joshi**, *Nutrition and Dietetics*, Tata McGraw Hill Publishing, New Delhi, , 3<sup>rd</sup> edition, 2010.
7. **Smolin, L.A., and Grosvenor M.B.**, *Nutrition – Science and Application*, Saunders college publishing, 1997.
8. **Srilakshmi,B.**, *Nutrition Science*, New age International (P) Ltd.,3<sup>rd</sup> edition, 2008.
9. **Srilakshmi,B.**, *Dietetics*, New age International (P) Ltd.,5<sup>th</sup> edition, 2005.
10. **Sue Rodwell Williams**, *Nutrition and Diet Therapy*, Mosby College Publishing,1993.
11. **Summer field L.M.**, *Nutrition, Exercise and behaviour; An integrated approach to weight management*, Wadsworth / Thomson Learning, 2001.

**SEMESTER - I**  
**NON MAJOR ELECTIVE PAPER**  
**NUTRITION IN HEALTH AND DISEASE**

**Instructional Hrs. : 45**

**Sub. Code : 13FNPN101**

**Max. Marks : CIA -25; ESE -75**

**Credits: 5**

**Objectives :** To enable the students understand the basic concepts of health and nutrition and to gain knowledge in dietary management of common diseases.

**UNIT I**

**9 Hrs.**

**Health :** Definition, dimension- *Role of macro and micro nutrients*. **Balanced diet:** Definition- Principles of planning diet- Food groups-Basic five - RDA for different age groups and physiological conditions. **Diet therapy :** Definition- Purpose of therapeutic diet- Principles.

**UNIT II**

**9 Hrs.**

**Routine hospital diets :** Regular, light, soft, full and clear liquid diets. **Febrile conditions :** *Causes, Types-Acute and chronic* - Dietary modifications –Typhoid, tuberculosis, cholera and malaria.

**UNIT III**

**9 Hrs.**

**Nutritional deficiency diseases:** PEM- Vitamin- A deficiency and *anaemia* – Signs, symptoms, dietary modifications. **Disorders of GI tract:** Causes, symptoms and dietary management in diarrhoea, constipation, peptic ulcer and gastritis.

**UNIT IV**

**9 Hrs.**

**Obesity :** *Aetiology, assessment, types* and diet therapy. **Under weight :** Causes, symptoms, dietary modifications. **Diabetes mellitus:** Types, symptoms, causes, diagnosis, complications and dietary modifications.

**UNIT V**

**9 Hrs.**

**Cardiovascular disease:** Role of fat in development of atherosclerosis- Definition of Myocardial infarction, Congestive heart failure, Angina pectoris- Causes of CVD- Foods to be included and avoided. **Hypertension :** *Causes, types*, complications and dietary management.

**Note :** *Italics denote Topics for Self Study*

## **REFERENCE BOOKS**

1. **Sri Lakshmi. B.**, *Dietetics*, New Age International Publishers, New Delhi, 2006.
2. **Maurice E. Shills and Vermon R. Young**, *Modern Nutrition in Health and Disease*, Lea and Febiger, Philadelphia, 1988.
3. **Mahtab S. Bamji., Parlhad Rao, N. and Vinodhini Reddy**, *Textbook of Human Nutrition*, Oxford and PBH Publishing company, New Delhi, 1<sup>st</sup> edition, 2003.
4. **Shubhangini Joshi**, *Text book of Nutrition and Dietetics*, Tata Mc Graw hill publishers, 3<sup>rd</sup> edition, 2010.

## SEMESTER - II

### Core Paper – V

#### RESEARCH METHODOLOGY AND STATISTICS

**Instructional Hrs. : 90**

**Max. Marks : CIA -25; ESE -75**

**Sub. Code: 15FNPC205**

**Credits: 4**

**Objectives:** To enable the students understand the principles and methods of research and to gain skills in applying statistical procedure to analyze numerical data and draw inferences.

#### UNIT I

**16 Hrs.**

**Research :** Meaning, objectives and types of research - Selection and formulation of research problems- Meaning of hypothesis- Types of research design- *Census and sample method*. **Sampling:** Theoretical basis of sampling, random and non- random sampling methods – Sample size- Sampling and non-sampling errors.

#### UNIT II

**17 Hrs.**

**Methods of collecting primary Data:** Questionnaire, preparation of schedules, interview methods, case study method, experimentation method – Sources of secondary data, precautions while using secondary data- Editing and coding the data. **Organization of Data:** Classification – Meaning, objectives and types, formation of discrete and continuous frequency distribution. **Tabulation:** *Role, parts of a table, types of tables, general rules of tabulation.*

#### UNIT III

**17 Hrs.**

**Representation of Data:** Diagrammatic and graphical representation – *Significance of diagrams and graphs*- General rules for constructing diagrams- Types of diagrams- Types of graphs. **Interpretation and report writing:** Meaning, technique and precautions of interpretation- Format, types, steps and stages of research report, precautions and essentials of a good report- Footnotes and bibliographical citations.

#### UNIT IV

**20 Hrs.**

**Measures of Central Tendency :** Mean, median, mode, *their relative advantages and disadvantages*. **Measures of dispersion :** Mean deviation, standard deviation, quartile deviation- Percentile ranks- Co-efficient of variation - Association of attributes- Contingency tables- Correlation - Co-efficient of correlation and its interpretation- Rank correlation- Regression equations and predictions.

## UNIT V

20 Hrs.

**Probability** – *Rules of probability and its applications.*

**Distributions:** Normal, binomial, their properties and importance in statistical studies. **Tests of significance** – Large and small sample tests, ‘t’ test, ‘F’ test, chi-square test and their uses. **Analysis of Variance** – One-way and two-way classifications.

**Note :** *Italics* denote **Topics for Self Study**

### REFERENCE BOOKS

1. **Agarwal, B.L.**, *Basic Statistics*, New Age International (P) Ltd, Publishers, 2003.
2. **Balu, V.**, *Research Methodology and Communication*, Sri Venkateswara Publications, Chennai- 2003.
3. **Ghosh, B.N.**, *Scientific methods and Social research*, Sterling publishers (P) Ltd., 2003.
4. **Gupta, S.P.**, *Statistical Methods*, Sultan chand and son, Edition 44, 2014.
5. **Gurumani, N.**, *An Introduction to Biostatistics*, MJP Publishers, 2004.
6. **Kothari, C.R.**, *Research Methodology – Methods and techniques*, New Age International, 2014.
7. **Pillai, R.S.N. and Bagavathi, V.**, *Statistics*, S.Chand & Company, 2005.
8. **Sundar Rao, P.S.S., and Richard, J.**, *An introduction to Biostatistics*, Prentice hall of India (P) Ltd., 2003.
9. **Tripathi, P.C.**, *A text book of research Methodology in social sciences*, Sultan Chand and Sons, 2003.

**SEMESTER - II**  
**Core Paper – VI**  
**COMMUNITY NUTRITION**

**Instructional Hrs. : 75**

**Sub. Code : 13FNPC206**

**Max. Marks : CIA -25; ESE -75**

**Credits: 4**

**Objectives :** To enable students gain insight into nutritional problems of the community, understand the various nutrition intervention programmes of vulnerable groups in the community & national and international agencies towards nutrition programmes.

**UNIT I**

**15 Hrs.**

*Definition - community, village and block. Nutritional Deficiency Disorders in India :* Causes, Prevalence and Control programmes for malnutrition - PEM, Nutritional anaemia, Iodine deficiency disorders, Fluorosis, dental caries and vitamin A deficiencies.

**UNIT II**

**13 Hrs.**

**Epidemiology of Communicable Diseases:** *Factors responsible for the spread of communicable diseases*, mode of transmission of chicken pox, typhoid fever, malaria, leprosy, Tuberculosis and AIDS Control Programme- Emergency feeding during natural calamities and minimal survival ration.

**UNIT III**

**17 Hrs.**

**Role of International Organizations :***Millennium Development Goals(MDG)*- Food and Agricultural Organization (FAO)- World Health Organization (WHO)- United Nations International children's Emergency Fund (UNICEF) - World Bank.

**National Organizations:** National Institute of Nutrition (NIN)- National Nutrition Monitoring Bureau (NNMB)- Indian Council of Agriculture Research (ICAR)- Indian Council of Medical Research (ICMR)- Central Food Technological Research Institute (CFTRI) -Nutrition Foundation of India (NFI). Nutrition intervention programmes- ICDS, Noon Meal Programme.

**Community Health :** Primary Health Center (PHC) - Concept, organisation, current status in India- Delivery of services at PHC and Taluk level hospitals- Employees State Insurance (ESI)- Immunisation awareness and schedule.

#### UNIT IV

15 Hrs.

**Nutrition Education** : Objectives, definitions, channels and importance of nutrition education to the community- Methods of nutrition education, nutrition education programmes - *Planning, implementation and evaluation of nutrition and health education programmes.*

**Assessment of Nutritional Status:** Direct methods- Anthropometric, clinical and biochemical and indirect methods -Diet Survey and Vital health statistics.

#### UNIT V

15 Hrs.

**Food Security** – Meaning and significance, National Food Security Mission, Food Security Act . **The public distribution system (PDS):** As food security tool, recent development and links in PDS- *National Nutrition policy and National plan of action for nutrition*, Concept of Nutritional Surveillance.

**Note :** *Italics denote Topics for Self Study*

#### REFERENCE BOOKS

1. **Chalkely A.M.** *A Text book for the Health worker*, Published by wiley Eastern Ltd., 1987.
2. **Hojn,C Water Low, Andrew M. Tomkins, Sall M. Grantham, M.C, Anegor** *Protein Energy Malnutrition*, Published by Edward Arnold, 1992.
3. **Jelliff,D. and Pathes**, *Assessment of Nutritional status of Community*, WHO, Geneva, 1989.
4. **Khanna,S.R. and Madhu Saxena**, *Food Standards and safety in Globalized world: The impact of WTO and Codex*, New Century Publications, 2003.
5. **Mahtab S. Bamji. N Parlhed Rao, and Vinodhini Reddy**, *Textbook of Human Nutrition* Oxford and PBH Publishing company, New Delhi, 2003.
6. **Park and Park**, *Textbook of Preventive and social Medicine*, Published by Banarsidas, Jabalpur , 1995.
7. *Proceedings of the Nutrition Society of India*, NIN, Hyderabad, Vol. 35,42,43, 44, 46 and 47,1999
8. **Ramachandran Pillai,P** . *Non-formal education*, Neelkamal Publicatons, 2002.

9. **Srilakshmi, B.** *Nutrition Science*, The New Age International Publications, New Delhi, 3<sup>rd</sup> Edition, 2005.
10. **Swaminathan, M.** *Principles of Nutrition and Dietetics*, Bangalore Press, 2002.
11. **Wal Ruchi Mishra,S.,** *Encyclopedia of Health Nutrition and Family welfare –* Published by sarup and sons, New Delhi, 2000.

## SEMESTER - II

### Core Paper – VII

#### NUTRITION IN DISEASE – I

**Instructional Hrs. : 75**

**Sub. Code : 15FNPC207**

**Max. Marks : CIA -25; ESE -75**

**Credits: 4**

**Objectives :** To enable students understand the etiology of various diseases and to gain knowledge in the dietary modifications in various disease conditions and to develop skills in diet counseling.

#### UNIT I

**14Hrs.**

**Therapeutic Diets :** *Principles and objectives of diet therapy*- Types of hospital diets- Enteral and Parenteral Nutrition. Nutritional care of surgery patients - General, head and neck surgery, gastro intestinal surgery. Types of dietitians- Role of dietitian in the hospital and community- Patient care- diet planning and use of exchange list in nutrient calculation- Diet counseling and patient education. Functions of Indian Dietetic Association.

#### UNIT II

**16 Hrs.**

**Gastro Intestinal Diseases :** Diseases of Oesophagus - Achalasia, Esophagitis and Hiatal hernia. Disease of Stomach -Indigestion, hypochlorhydria, acute and chronic gastritis and peptic ulcer. Disease of Intestine - Flatulence, constipation – Atonic, spastic and obstructive, *diarrhoea - Acute ,chronic and steatorrhoea.*

Inflammatory Diseases - Diverticulosis, diverticulitis, ulcerative colitis, malabsorption syndrome – sprue.

#### UNIT III

**15 Hrs.**

**Diabetes Mellitus :** *Epidemiology / incidence- Classification and symptoms*- Metabolic changes – long term and short term complications- Clinical findings- diagnostic tests- Glycemic index of foods- Types of insulin- Dietary modifications in energy, carbohydrate, fat, protein, fibre and micronutrients.

#### UNIT IV

**14 Hrs.**

**Disease of the Heart and Circulatory system :** Acute and chronic cardiac disorders- *Risk factors of cardiac diseases*- Dietary management in hypertension, atherosclerosis, congestive heart failure, hyperlipoproteinemia and hypercholesterolemia- Free radical formation and role of antioxidants in scavenging free radicals . Nutritional considerations in feeding

mentally and physically handicapped –Cleft lip and Palate, Down’s syndrome and Cerebral palsy.

## **UNIT V**

**16 Hrs.**

**Nutrition in Cancer** :Epidemiological studies- Reproduction of the normal cells- Classification of neoplasm- Principles of cancer pathogenesis,-Causes of cancer cell development- Metabolic and nutritional alterations in malignancy- Bodies defense system- Cancer therapy and nutrition - *Role of nutraceuticals and functional foods.*

**.Note : *Italics* denote Topics for Self Study**

### **REFERENCE BOOKS**

1. **Staci Nix**, *William’s Basic Nutrition diet therapy*, Mosby, Elsevier, 12<sup>th</sup> Edition, 2005.
2. **Kathleen, L.M., and Sylvia Escott Stamp**, *Krause’s Food and Nutrition*, Elsevier, 12<sup>th</sup> Edition, 2008.
3. **Garrow J.S. and James W.P.T.**, *Human Nutrition and Dietetics*, Churchill Livingstone – Edinburgh London Madrid, Melbourne, 9<sup>th</sup> Edition, 1996.
4. **Maurice E. Shills and Vermon R. Young**, *Modern Nutrition in Health and Disease*, Lea and Febiger, Philadelphia, 11<sup>th</sup> Edition, 2012.
5. **Sri Lakshmi. B.**, *Dietetics*, New Age International Publishers, New Delhi, 7<sup>th</sup> Edition, 2014.
6. **Shubhangini A. Joshi**, *Nutrition and Dietetics*, Tata McGraw Hill Publishing Company, New Delhi, 2003.
7. **Sue Rodwell Williams.**, *Nutrition and Diet therapy*; Times Mirror Mosby Publishing House, Toronto, Boston, 10<sup>th</sup> Edition, 1997.

**SEMESTER - II**  
**Core Paper – VIII**

**MACRONUTRIENTS**

**Instructional Hrs. : 75**

**Sub. Code : 13FNPC208**

**Max. Marks : CIA -25; ESE -75**

**Credits: 4**

**Objectives :** To review the role of macronutrients in health, to enable the students gain recent knowledge about macro nutrients and their interrelationships.

**UNIT I**

**16Hrs.**

**Energy :** *Historical background*- Energy content of food and its determination- Components and determination of energy expenditure - Basal metabolism, physical activity and regulatory thermogenesis- Energy calculation and ICMR requirements- factors influencing the energy requirements.

**UNIT II**

**14 Hrs.**

**Carbohydrates :** Classification, digestion, absorption and utilization of carbohydrates, *nutritional importance of carbohydrate* . **Dietary fiber :** Types, sources, composition, properties, role of dietary fiber in therapeutic nutrition- CVD, Diabetes, Obesity and Cancer. Effect of fiber in the absorption of different nutrients, Effect of over consumption of fiber.

**UNIT III**

**16 Hrs.**

**Fats and Lipids :** Classification of lipids and fatty acids and role of lipids, essential fatty acids, phospholipids and cholesterol, digestion and absorption of fats, transport of lipid in blood, lipotropic factors, deposition of fats in the body- *Effect of deficiency and toxicity of essential fatty acids*.

**UNIT IV**

**14 Hrs.**

**Protein :** *Classification, function, digestion, absorption, and utilization, sources*, computation of protein requirements through factorial method and balance study- ICMR requirements- Evaluation of protein quality –PER, NPU, BV and Chemical score - Role of animal proteins and novel proteins in combating malnutrition. **Amino Acid :** Classification and function

## UNIT V

15 Hrs.

*Inter relationship of carbohydrate, lipid and protein metabolism.*

**Hormonal control of nutrient metabolism** – Effect of Insulin, Glucagon, Epinephrine, Norepinephrine and growth hormone on Protein, carbohydrate and fat metabolism.

**Nutrition and Alcoholism** : Effect of alcohol on digestion, absorption and metabolism of nutrients.

**Note :** *Italics denote Topics for Self Study*

### REFERENCE BOOKS

1. **Bodwell C.E., John W., and Erdman, J.R.,** *Nutrient Interactions*, Marcel Dekker, Inc, New York, 1988.
2. **Helen A. Guthrie,** *Introductory Nutrition*, 7<sup>th</sup> edition Time Mirror / Mosby College Publishing, 1989.
3. **James L. Groff Sareen S. Gropper,** *Advanced Nutrition and Human Metabolism*, 3<sup>rd</sup> edition, Wads Worth Thomson Learning, U.S., 3<sup>rd</sup> Edition, 2000.
4. **Mangala Kango,** *Normal Nutrition, Fundamental and Management*, RBSA Publishing, 2003.
5. **Prakasam Reddy,** *Fundamentals of medical Physiology*, PARAS publishing, 3<sup>rd</sup> Edition, 2003.
6. **Robert S. Goodhart, Maurice E. Shils,** *Modern Nutrition in health and disease*, Lea & Febiger, Philadelphia, 6<sup>th</sup> Edition, 1980.
7. **Srilakshmi B.,** *Nutrition Science* revised second edition, New age international publishers, 2006.
8. **Sue Rodwell Williams,** *Nutrition and diet therapy*, 6<sup>th</sup> edition, Time Mirror / Mosby College Publishing, 1989.
9. **Swaminathan, M.,** *Advanced text book on Food and Nutrition*, Volume 1, BAPPCO, Bangalore, 2<sup>nd</sup> Edition, 1988.
10. **Vincent Hegarty,** *Decisions in Nutrition*, Time Mirror / Mosby College Publishing, 1988.

## **JOURNALS**

1. Journal of Human Nutrition and Dietetics, British Dietetic Association, Blackwell Science.
2. Food and Nutrition Bulletin, United Nations University Press.
3. Proceeding of the Nutrition Society of India, National Institute of Nutrition, Hyderabad.
4. Journal of Food, Nutrition and Dietetics, Vellalar College for Women, Erode.

**SEMESTER - II**  
**Core Practical – I**  
**FOOD ANALYSIS**

**Instructional Hrs.: 45 (Sem I) + 90(Sem II )=135**

**Sub. Code : 13FNPCP01**

**Max. Marks : CIA -40; ESE -60**

**Credits: 4**

**Objectives:** To enable the students to develop practical skills in food analysis and to apply the technique in research activities.

1. Estimation of Energy value of foods by Bomb Calorimeter.
2. Estimation of Moisture content of foods.
3. Estimation of Fibre by Acid –Alkali method.
4. Estimation of Ash content in foods.
5. Estimation of Calcium by Titermetric method.
6. Estimation of Iron by Wong’s method.
7. Estimation of Phosphorus by Fiske and Subba Row method.
8. Estimation of Protein by Micro Kjeldhal method.
9. Estimation of Protein by Lowry’s method.
10. Estimation of Fat by Soxhlet method.
11. Estimation of Carotene by Calorimetric method.
12. Estimation of Thiamine by Fluorimetric method.
13. Estimation of Riboflavin by Fluorimetric method.
14. Estimation of Vitamin-C by Dye method.
15. Determination of Saponification Number of Oil.
16. Determination of Iodine Number of Oil by Hanes method.
17. Determination of Acid Number of Oil.
18. Estimation of Lipid content in EggYolk .

## SEMESTER II

### Skill Based Subject I

#### ADVANCED MULTI-SKILL DEVELOPMENT PAPER

**Instructional Hrs: 45**

**Sub Code:13FNPS201**

**Max. Marks: 100 (CIA : 40 + Online :60)**

**Credits: 5**

**AIM** : To equip the students with knowledge on all topics as desirable from the point of view of brilliant success in the competitive examinations.

**OBJECTIVE:** To familiarize the students with various types of tests that are employed by the diverse examining bodies and to develop diet counseling skills.

**UNIT I:** **9 hrs**

**Communication:** Question tags - Gerund and Infinitives - Spotting the errors – Synonyms – Antonyms - One word substitution – Sentence completion –Prepositions – Articles.

**General Awareness and Scientific Aptitude:** Socio - Economic - Banking –Basic Sciences

**People and Environment**

**Politics and Current Affairs**

**Higher Education**

**Information and Communication Technology**

**Teaching Aptitude**

**Research Aptitude**

**UNIT II:** **9 hrs**

**Logical Reasoning :** Syllogism – Statement Conclusions – Statement Arguments – Statement Assumptions – Statement Courses of Action – Inference – Cause and Effect – Visual Reasoning – Direction Sense Test – Blood Relation – Coding and Decoding – Deductive Reasoning.

**UNIT III:** **9 hrs**

**Numerical Reasoning and Quantitative Aptitude:** Age – speed – Heights and Distance – Time and Distance - Ratio and Proportion – Percentage – Fraction – Profit and Loss – Interest – Average – Calendar – Clocks– Probability – Series – Venn Diagram - Data Interpretation.

**UNIT IV:****9 hrs**

**Self Introduction**-Presentation Skills-Presentation through Power point-Soft Skills-Interpersonal Skills-Employability Skills Training-*Resume Preparation*-Preparation for interview. **Abstract writing**- presentation of case study-data compilation-Skills in diet counseling.

**UNIT V:****9 hrs**

Group Discussion-Importance-Types of GD –GD Skills- GD Etiquette(do's and don'ts)- Essential elements of a GD- *Movements and gestures to be avoided in a GD*- Online Services- Reservation-Banking-Purchases-Passport application.

**Note : *Italics* denote Topics for Self Study**

**BOOKS FOR REFERENCE:**

1. **Agarwal.R.S**, *Quantitative Aptitude*, S. Chand and Company, Reprint 2012.
2. **Chopra.J.K**, *Bank Probationary Officers' Examination*, Unique Publishers, 2010.
3. **Datason. R.P, Manish Arora and Gulati.SW.L**, *Clerical Cadre Recruitment in State Bank of India*, Newlight Publishers, 2013.
4. **Davinder Kaur Bright**, *Railway Recruitment Board*, Bright Publications, 2010.
5. **Lal, Jain and Vashishtha, K.C**, *UGC NET/JRF/SET Teaching and Research Aptitude*, Upkar Prakashan Publishers, 2012.
6. **Pratyogita Darpan**, *UGC NET/JRF/SET Teaching and Research Aptitude*, Upkar Prakashan Publishers, 2012
7. **Sharma.J.K**, *IBPS Recruitment of Bank Clerical Cadre Examination*, Unique Publishers, 2013.
8. **Tara Chand**, *General Studies for Civil Services Preliminary Examinations*, Paper – I, Tata Mc Graw Hill Education Private Ltd, 2013.
9. **Hari Mohan Prasad and Uma Rani Sinha**. 2011. *Objective English for Competitive Examinations*. New Delhi: Tata McGraw Hill Education Private Ltd.
10. **Jain T.S**. *Upkar's SBI Clerical Cadre Recruitment Examination*. Agra: Upkar Prakashan

**SEMESTER - III**  
**Core Paper – IX**  
**MICRONUTRIENTS**

**Instructional Hrs. : 90**

**Sub. Code : 15FNPC309**

**Max. Marks : CIA -25; ESE -75**

**Credits: 4**

**Objectives:** To enable the students to acquire knowledge in the role of micronutrients in health and disease and understand the recent advance in the study of micronutrients and their interrelationships.

**UNIT I**

**18 Hrs.**

**Fat soluble Vitamins :** A, D, E and K: *History, Chemistry*, Functions, absorption, Transport, Utilisation and storage, dietary sources, Assessment of vitamin nutriture - Conversion of carotene into vitamin A - Recommended intake, Deficiency and diagnosis, hypervitaminosis.

**UNIT II**

**18 Hrs.**

**Water Soluble Vitamins :** Thiamine, Riboflavin, niacin, folic acid, pyridoxine, pantothenic acid, vitamin B<sub>12</sub>, biotin and ascorbic acid: History, Chemistry, Sources, Functions, absorption, biochemical utilization, storage, transport, *recommended intake, deficiency and toxicity.*

**UNIT III**

**18 Hrs.**

**Calcium:** Absorption, distribution, utilization- Bone mass- measurement- effect of diet and immobilization- Blood calcium, Calcium balance, requirements, sources, deficiency and excess. **Phosphorus:** Concentration in the body, *calcium–phosphorus ratio, phosphorus absorption and utilization, deficiency and toxicity.* **Sodium, Potassium, Magnesium and Sulphur:** Distribution, absorption, utilization, role in human nutrition, deficiency and toxicity.

**UNIT IV**

**20 Hrs.**

**Trace Elements :** Concept, mode of action. **Iron :** Absorption, Utilization, storage, output and iron balance- *Deficiency and toxicity of iron-* Methods of assessing nutritional status and availability of dietary iron. **Iodine and Fluorine:** History, Physiological functions, sources, deficiency and toxicity- Uses of Fluoride in prevention of dental caries- Historical background, physiological functions, sources, deficiency and toxicity of zinc, copper, selenium, chromium.

## UNIT V

16 Hrs.

**Vitamin like molecules** : Choline, carnitine, Inositol, Taurine, Chemistry, deficiency, functions and dietary considerations. *Pseudo Vitamins* : *Flavonoid, Pangamate, laetrile.*

Interdependence between micronutrients: Vitamin A and Zinc - Vitamin D with calcium and Phosphorus- Vitamin E with Vitamin K, Vitamin A and Selenium – Iron with Vitamin C.

**Note** : *Italics* denote Topics for Self Study

### REFERENCE BOOKS

1. **Carolyn D. Berdanier**, *Advanced Nutrition – Micronutrients*, CRC Publications, 1994.
2. **Michael J.Gibney, Hester,H.V and Frans,J.K.** *Introduction to Human Nutrition*, Blackwell Publishing, 1<sup>st</sup> Edition,2003.
3. **James L.Groff and Sareen S. Gropper**, *Advanced Nutrition and Human Metabolism*, Thomson Wordsworth Learning 2000.
4. **Mahtab S. Bamji, Pralhad Rao,N. and Vinodini Reddy**, *Text Book of Human Nutrition*, Oxford & IBH Publishing Co, Pvt.Ltd.,2003.
5. **Poonam Johri**, *Vitamins*, Food and Nutrition Series Sonali Publications, 2004.
6. **Samuel Delvin**, *Vitamins, minerals and hormones*, IVY Publishing House, 2003.
7. **Sue Rodwell Williams and Eleanor D. Schlenker** , *Essentials of Nutrition and Diet Therapy*, Elsevier Health Sciences, 8<sup>th</sup> Edition, 200
8. **Swaminathan, M.** *Advanced Text Book on food and Nutrition*, Vol. I & II, BAPPCO, 2004.

### JOURNALS

1. Food and Nutrition Bulletin, United nations University Press.
2. Journal of Human Nutrition and Dietetics, British Dietetic Association.
3. Proceedings of the nutrition Society of India, National Institute of nutrition, Hyderabad.
4. Indian Journal of nutrition and Dietetics, Avinashilingam Institute for Home Science and Higher Education for women, Coimbatore.
5. Journal of Food, Nutrition and Dietetics, Vellalar College for Women, Erode.

SEMESTER - III  
**Core Paper – X**  
**FOOD BIOTECHNOLOGY**

**Instructional Hrs. : 75**

**Sub. Code : 13FNPC310**

**Max. Marks : CIA -25; ESE -75**

**Credits: 4**

**Objectives :** To enable the students become aware of the current trends in food biotechnology and gain knowledge on application of enzyme technology in food industry and research.

**UNIT I**

**13 Hrs.**

**Biology of Industrial Micro-organism:** Industrial Microorganism – Cell growth and metabolism, primary and secondary metabolites – Vitamin- B<sub>12</sub>, citric acid and Penicillin.

**Plant tissue culture:** Media and culture techniques, Basic requirements for tissue culture laboratory- *Food applications of tissue culture.*

**UNIT II**

**16 Hrs.**

**Recombinant DNA Technology:** Gene cloning – Definition, Tools – Plasmids, Cosmids, Bacteriophages and shuttle vectors. Enzymes- Restriction enzymes, Ligases, Reverse transcriptase and Polymerase. Steps in Gene Cloning, Application of gene cloning - Production of health care products – Insulin, human growth hormone, vaccines and monoclonal antibodies. **Nutrigenomics:** Definition and Concept. *Genetically modified foods – Flavr savr Tomato and Golden rice – pros and cons.*

**UNIT III**

**13 Hrs.**

**Food Fermentation:** Batch and continuous process – Fermenter design –Types of fermenter, stages of fermentation – Downstream processing- Alcoholic beverages, cheese making, bread making, *fermented soya based foods-Tempeh, Soy sauce, meat fermentations and vinegar.*

**UNIT IV**

**15 Hrs.**

**Enzyme Technology in Food Industry:** Microbial production and applications of enzymes- Amylase, protease, lipase and pectinase- *New developments in the applications of lactic acid bacteria in the food industry.*

**Immobilization of enzymes:** Methods of immobilization –uses of immobilized enzymes in food industry- Development of novel sweeteners.

## UNIT V

18 Hrs.

**Environmental Biotechnology:** Food Waste treatment –Nature of impurities– Biodegradation- Types of treatment systems -Anaerobic waste treatment- Aerobic waste treatment- Bio-polymers- Bio-insecticides- Bio-technology in agro – biomass utilization- *Biofuels - Ethanol and biogas production.* **Microbial biomass production:** Single Cell Protein - Algal and fungal SCP and their uses.

**Note :** *Italics denote Topics for Self Study*

## REFERENCE BOOKS

1. **Caside L.E.**, *Industrial Microbiology*, New Age International Publishers, New Delhi, 1999.
2. **Chatwal G.R.**, *Textbook of Biotechnology*, Anmol Publishers (P) Ltd., New Delhi, 2003.
3. **Dubey, R.C., and Maheswari, D.K.**, *A textbook of Microbiology*, S.Chand & Company Ltd., New Delhi, 2000.
4. **Dubey, R.C.**, *A textbook of bio-technology*, S.Chand & Company Ltd., New Delhi, 2005.
5. **Frazier and West Hoff**, *Food Microbiology*, Tata McGraw Hill Publishing Company, New Delhi 1995.
6. **Gupta P.K.**, *Elements of Biotechnology*, Rostogi and Co, Meerat, 1996.
7. **Ignacimuthu, S.J.**, *Basic Biotechnology*, Tata McGraw hill publishing Company., New Delhi, 1995.
8. **Kumaresan, V.**, *Bio Technology*, Saras Publications Kanyakumari, 2005.
9. **Sriram Sridhar**, *Enzyme Biotechnology*, Dominant Publishers, New Delhi 2005
10. **Singh B.D**, *Biotechnology*, Kalyani Publishers, Varanashi, 2005.
11. **Bhatia S.C**, *Handbook of Food Processing Technology*, Vol.3, Atlantic Publishers, Delhi, 2008.

**SEMESTER - III**  
**Core Paper – XI**  
**NUTRITION IN DISEASE-II**

**Instructional Hrs. :75**

**Sub. Code : 13FNPC311**

**Max. Marks : CIA -25; ESE -75**

**Credits: 4**

**Objectives:** To enable the students understand the etiology of various diseases, gain knowledge in dietary management of various disease conditions and to develop skills in diet counseling.

**UNIT I**

**18 Hrs.**

Etiological factors, types, and dietary modification in *Fevers and infection*, Injury and Burns, Allergy, Dental diseases and Surgery.

**UNIT II**

**18 Hrs.**

**Nutrition Imbalances:** Obesity – *Types, causes, assessment, grades*, theories, complications, thermogenesis and dietary modifications. **Under weight:** Etiological factors and dietary modifications. **Psychiatric disorders:** Anorexia nervosa, bulimia – etiological factors and dietary modifications.

**UNIT III**

**17 Hrs.**

**Diseases of Liver, Gall Bladder and Biliary disease:** Types- Etiology, Symptoms and dietary modification in Jaundice, Hepatitis, Cirrhosis, Cholecystitis and Cholelithiasis- *liver transplantation*.

**UNIT IV**

**17 Hrs.**

**Diseases of the kidney and urinary tract:** Types- Etiology, Symptoms, and dietary modification in Nephritis, Nephrosis, Acute and Chronic renal failure, *renal stones*, dialysis, kidney transplants – Etiology, symptoms and dietary modifications.

**UNIT V**

**20 Hrs.**

**Disorders of the brain and nervous system:** Stroke, epilepsy, Parkinson's disease and multiple sclerosis – symptoms, causes and dietary modifications. **Disorders of the skeletal system:** Osteoporosis, *Arthritis – Types, causes and dietary modifications*.

**HIV Infection and AIDS** : Epidemiology, Stages of HIV infection, Transmission of HIV, Pathophysiology, Clinical Manifestations, Alteration of Immunity in AIDS, Dietary management and Prevention.

**Note : *Italics* denote Topics for Self Study**

## **REFERENCE BOOKS**

1. **Antia, F.P.**, *Clinical Dietetics and Nutrition*, Oxford University, Mumbai, 1989.
2. **Briny Thomas & Allen R.J.L.**, *Manual of Dietetic Practice*, Blackwell Scientific publications, Oxford London 1989.
3. **Cornine H. Robinson, Marilyn R. Lawles, Wanda L., Chenweth, and Garwin**, *Normal and therapeutic Nutrition*, Marmillam USA, 7<sup>th</sup> Edition, 1986.
4. **Davidson, S.S., Passmore, P., and Branch J.F.**, *Human Nutrition and Dietetics*, 9<sup>th</sup> edition, F & S Lingstons, Ltd, Edinburgh and London, 1993.
5. **Gail M. Wilkes**, *Cancer and HIV Clinical Nutrition*, All India Publishers & Distributors, Chennai, 2<sup>nd</sup> edition, 2000.
6. **Garrow, J.S., and James W.P.T**, *Human Nutrition and Dietetics*, Churchill Living stone New York, 9<sup>th</sup> Edition, 1993.
7. **Maurice, E. Shills, James, A. Olsen, and Mosheshihe**, *Modern Nutrition on Health and Disease*, Vol 1 & Lea & Pediger, philadelphia , 2<sup>nd</sup> and 8<sup>th</sup> Edition, 1994
8. **Samiran Panda, Anindya Chatterjee, Abu S. Abdul – Quader**, *Living with the AIDS Virus, The epidemic and the response in India*, SAGE Publications, New Delhi, 2002.
9. **Shubhangini A. Joshi**, *Nutrition and Dietetics*, Tata McGraw Hill Publishers Company Limited New Delhi , 3<sup>rd</sup> Edition, 2010.
10. **Sue Rod Williams**, *Nutrition and Diet therapy*, Times Mirror/ Mobsy College publishing St. Laws, Toronto, Boston, 1989.

## SEMESTER - III

### Core Paper – XII

#### FOOD PRODUCT DEVELOPMENT AND QUALITY CONTROL

**Instructional Hrs. :75**

**Sub. Code : 15FNPC312**

**Max. Marks : CIA -25; ESE -75**

**Credits: 4**

**Objectives :**To enable the students gain knowledge on product development, food Safety, food laws, quality control techniques & common food Standards and to guide them for self employment

#### UNIT I

**18 Hrs.**

**Product development:** Meaning, stages of product development- idea, developmental and commercialization, Criteria for development of new food. **Types of new foods:** Fortified foods, enriched foods and convenience foods. **Food quality:** Subjective and objective evaluation of food- *Strategic consideration behind new food development.*

#### UNIT II

**20 Hrs.**

**Quality control:** Objectives, importance, functions of quality control, stages of quality control in food industry. **Government regulations in quality control:** FAO/WHO Codex Alimentarius commission, PFA, AGMARK, BIS, FPO, fair average quality (FAQ) specification for food grains, ISO 9000 series. **HACCP:** Background, current status, structured approach, principles, benefits and limitation- *Consumer Protection Act (CPA)*, Recent food laws (Role of FSSAI).

#### UNIT III

**18 Hrs.**

**Role of Central and State Government in imparting quality control:** WHO assisted activities – Role of central and state food laboratories - *Qualification and duties of public analyst and food inspector.* **Patent** – definition, requirements, patent laws in India, administrator, need for patent system, advantages, and precautions to be taken by applicants, patent procedures, Non-patentable.

#### UNIT IV

**18 Hrs.**

**Food standards:** Cereals & its products - Bread, biscuits, cakes, pasta products.

**Fruit products :** Jam, juices, squashes, ketchup, sauce. **Oils & fats:** Coconut oil, groundnut oil, palm oil, sunflower oil, vanaspathi. **Milk & its products:** Skimmed milk powder, partly

skimmed milk powder, condensed sweetened milk. *Other products: Coffee, tea, sugar, honey and toffees.*

## UNIT V

16 Hrs.

**Food safety:** Meaning of food safety. **Food hazards:** Physical, Chemical, Biological hazards associated with foods, types - Effect of processing and storage on microbial safety. **Types of food toxicants:** Endogenous, natural, synthetic toxicants - *Adulterants.*

**Note:** *Italics* denote Topics for Self Study

## REFERENCE BOOKS

1. **BIS standards.**
2. **Khurana,A.D., Text book of food safety,** Mohit Publications, Edition 1, 2010.
3. **Dev Raj, Rakesh Sharma and Joshi,V.K.,** *Quality control for value addition in Food Processing,* New Delhi Publishing Agency, 2011.
4. **Sathe,A.Y.,** *A first course in food analysis,* New Age Publications, 1999.
5. **Swaminathan,M.,** *Food Science, Chemistry & Experimental foods,* Bappco Publishers.
6. **Singh,S.P., Julie Funk, Tripathi,S.C., Nanda Joshi.,** Food Safety quality *Assurance and Global trade,* International book distributors, 1<sup>st</sup> Edition, 2009.

## JOURNALS

1. Indian food Industry. CFTRI, Mysore.
2. Processed food Industry, Compu type media, Viba press Pvt Ltd, New Delhi.
3. FSSAI Manual 2011

**SEMESTER - III**  
**Skill Based Subject – Paper -II**  
**BAKERY**

**Instructional Hrs. : 45**

**Sub. Code : 13FNPS302**

**Max. Marks : CIA -25; ESE -75**

**Credits: 5**

**Objectives :** To enable the students understand basic concepts of baking and acquaint with the role of various major and minor ingredients in bakery products and to motivate them to setup bakery units.

**UNIT I**

**10 Hrs.**

**Baking:** Principles of Baking, Baking process – Selection of ingredients, mixing, fermentation, dividing, intermediate proofing, moulding, panning, proofing and baking. Types of flour used for baking – Bread flour, biscuit flour, cake flour, self raising flour and all purpose flour. *Leavening agents: Types and their role.*

**UNIT II**

**9 Hrs.**

**Bread making:** Raw materials and their role, Steps and methods of bread making- Faults and Remedies- *Preparation of white bread, rolls, bun, dough nuts and Pizza.*

**UNIT III**

**9 Hrs.**

**Cake making:** Ingredients and their role, methods, Faults and Remedies, characteristics of cake and balancing cake formula- Types of cakes– Recipes- Toppings and Fillings for cakes. *Icings: Types and differences.*

**UNIT IV**

**8 Hrs.**

**Cookies and Biscuits:** Types and Differences- Methods of mixing, Faults and their causes.

**Pastry:** Types – short crust, puff, flaky and choux, methods of preparation- *Pie fillings.*

**UNIT V**

**9 Hrs.**

**Bakery unit:** Plan layout, requirements, list of major and *minor equipments used in bakery-* Types of oven- Budget, cost control and marketing. Hygiene and Sanitation in bakery units.

**Note: *Italics* denote Topics for Self Study**

## REFERENCE BOOKS

1. **Dubey, S.C.** , *Basic Baking*, Dangi publishers, 1993.
2. **Shakuntala Manay, N. and Shadaksharaswamy, M.**, *Food Facts and Principles*, New Age International (P) Ltd; 2001.
3. **Sushma Kashyap and Vinita Narula**, *Basic food preparation*, Orient Longman publishers, 1992.
4. **Vijaya Khader**, *Text book of Food science and technology*, ICMR, New Delhi, 2001.

## SEMESTER III

### Skill Based Subject: Paper -III

#### FOOD PRESERVATION

**Instructional Hrs. : 45**

**Sub. Code :13FNPS303**

**Max. Marks : CIA -25; ESE -75**

**Credits: 5**

**Objectives:** To enable the students

1. Understand the principles and concepts of food preservation.
2. Gain knowledge on various methods of food preservation.
3. Apply the preservation techniques in the field of Research and self employment.

#### UNIT I

**9 Hrs.**

Need for food preservation. Classification of foods by spoilage. Methods of preservation : **Preservation by using high concentration of sugar** – preparation of jams, jellies, squashes, marmalades, preserves, candies and syrups.

*Preservation by addition of salt – Pickling methods- Sweet and Hot pickles.*

#### UNIT II

**9 Hrs.**

**Preservation by use of heat** – Principles.

**Canning** of fruits and vegetables– steps, advantages and disadvantages.

*Sun drying and dehydration techniques- Types of driers*-Preparation of papads, instant mixes, preparation of egg powder and milk powder by spray drying and Drum drying -Preparation of preserved products – bars, leather, butter, slices, chunks and tit bits. Preparation of tomato puree and tomato paste. Potato wafers and chips.

#### UNIT III

**9 Hrs.**

**Preservation by use of low temperature** – Principles, refrigeration, types of refrigeration and characteristics of refrigerant.

**Freezing** – principles, methods of freezing, freeze drying, *advantages and disadvantages.*

#### UNIT IV

**9 Hrs.**

**Food Fermentations**-*Vinegar production*, cheese production, soy sauce, tempeh, Miso.

**Preservation with chemicals**-Class I and class II preservatives- applications.

## UNIT V

9 Hrs.

**Preservation by radiation** –sources – electro magnetic, corpuscular radiation, UV rays and ionizing radiation, Units, advantages and disadvantages of irradiation.

**IMF and Hurdle technologies** – principles, IMF fruit and vegetable products. *Application of High Hydrostatic Pressure in food preservation.*

**Note :** *Italics denote Topics for Self Study.*

## REFERENCE BOOKS

1. **Sivasankar,B.,** *Food processing and preservation*, publisher Prentice hall of India (pvt) Ltd, 2003.
2. **Sudesh Jood and Neelam Khetarpaul,** *Food preservation*, Agrotech publishing academy, 2002.
3. **Frazier and West Hoff,** *Food Microbiology*, Tata McGraw Hill Publishing Company, New Delhi 1995.
4. **Subbulakshmi,G., & Shoba.A.Udipi,** *Food processing and preservation*, New Age Publishers, 2001.

## JOURNALS

1. Indian Food Industry.
2. Processed Food Industry.

**SEMESTER - III**  
**Core Practical – II**  
**QUALITY CONTROL**

**Instructional Hrs. : 45**

**Sub. Code : 13FNPCP02**

**Max. Marks : CIA -40; ESE -60**

**Credits: 4**

**Objectives:** To enable the students to gain practical skill in Food Quality and to apply the techniques in research and work field.

1. Estimation of titrable acidity.
2. Estimation of total solids
3. Estimation of specific gravity in foods.
4. Analysis of pectin in foods.
5. Estimation of lactose in milk.
6. Estimation of tannins in tea.
7. Test for rancidity in oils – Kries test
8. Food adulteration – Tests to detect adulteration
9. Determination of gluten content of flour
10. Determination of bulk density, true density and porosity
11. Determination of physical dimensions of grain – length, breadth, thickness and sphericity
12. Preparation and inoculation of growth media – Inoculation and incubation – counting of microbes.

**Includes Internship in food industry for one week.**

40 CIA marks given as

- 20 for practical : Average of two tests -10 marks  
Model practical exam -10 marks
- 20 for internship : Internship report -10 marks  
Viva-Voce -10 marks

## SEMESTER - IV

### Core Paper – XIII

#### FOOD PROCESSING AND PACKAGING

**Instructional Hrs. : 90**

**Sub. Code : 15FNPC413**

**Max. Marks : CIA -25; ESE -75**

**Credits: 4**

**Objectives:** To enable students learn different food processing and packaging Techniques and to apply them in the field of research.

#### **UNIT I**

**17 Hrs.**

Basic principles of food processing, concepts of food processing- Puffing, popping, flaking, parching and extrusion - Basic Unit operations - *Effect of food processing on nutritive value of foods.* **Rice** : Production, milling of rice, parboiling methods- CFTRI hot soaking process, pressure parboiling, chromate soaking process, high temperature short time process - Advantages and disadvantages of parboiling - Byproducts of rice milling and their utilization.

#### **UNIT II**

**20 Hrs.**

**Wheat** : *Structure, Milling - cleaning, conditioning and milling*, manufacture of breakfast cereals and extruded products, pasta, noodle and macaroni products. **Millets**: Milling of major and minor millets - ragi, bajra, sorghum, maize, kodo, proso, Barnyard, and Italian millets, malting. **Pulses** : Structure, milling and processing of Soya bean and Bengal gram.

#### **UNIT III**

**17 Hrs.**

**Nuts and oil seeds** : Types of oil seeds and nuts, processing – Mechanical and solvent extraction –Manufacturing of soy concentrates and isolates - Hydrogenation of fats, - Packaging of edible oils. **Milk and its products** : Manufacturing of cheese, cream, butter, khoa, *Market forms of milk-Pasteurized milk ,standardized milk, Toned milk, Double toned milk and skimmed milk.*

#### **UNIT IV**

**20 Hrs.**

**Meat** : *Smoking and curing of meat*, grading and packaging. **Poultry** : Preparing for consumption and packaging. **Fish** : Effect of handling practices, freezing, storage and packaging. **Egg** : Storage, manufacturing and packaging of egg powder.

## UNIT V

16 Hrs.

**Packaging and Labelling:** Definition, Types of packaging and their applications- metals-glass-papers-plastics-retortable packages- films-laminates-edible films-wooden- shrink packaging and modified atmosphere packaging, advantages and disadvantages. **Labelling:** *Definition, advantages, disadvantages, types- nutrition labelling and mandatory labeling, functions- Labelling regulations- health claims.*

**Note :** *Italics denote Topics for Self Study*

### REFERENCE BOOKS

1. **Subbulakshmi,G., Shobha.A.L,** *Food Processing and Preservation* , New age international publishing, 2001.
2. **Charls L. Cutting,** *Fish – Processing and Preservation*, Agrobios ( India) Jodhpur, 2002.
3. **Mahindru,S.N.,** *Milk and milk products*, A.R.H Publishing Corporation, 2009.
4. **Peter S. Murano,** *Understanding Food science and Technology*, Thomson Wadsworth, 2003.
5. **Siva Shankar, B.,** *Food Processing and preservation*, Prentice hall of India, 2003.
6. **Raghurent Chintamani,** *Advances in Agro Industry and Food processing*, Dominant publishers and distributors, 1999.
7. **Samuel, A. Matz,** *The Chemistry and Technology of cereals of food and feed*, CBS publishers and distributors, Second edition 1996.
8. **Shakuntala Manay, N., and Shadaksharaswamy M.,** *Foods; Facts and Principles*, New age International (P) Ltd., Publishers, 2010.
9. **Sukumar D.,** *Outlines of Dairy Technology*, Oxford University press, 2000
10. **Vijaya Khader.,** *Text book of food science and Technology*, ICMR., NewDelhi 2001.

### JOURNALS

1. Journal of Food Science and Technology, AFSTI, Mysore.
2. Indian Food Industry, CFTRI, Mysore.
3. Kissan World, Sakthi Sugar Ltd. Chennai.
4. Food Digest, CFTRI, Mysore.

**SEMESTER - IV**  
**Core Practical – III**  
**CLINICAL NUTRITION TECHNIQUES**

**Instructional Hrs. : 90**

**Sub. Code : 13FNPCP03**

**Max. Marks : CIA -40; ESE -60**

**Credits: 4**

**Objectives:** To enable the students to gain practical skills in clinical nutrition techniques and to apply them in research and work field.

**QUANTATIVE ANALYSIS OF BLOOD**

1. Estimation of blood glucose by Glucose oxidase method
2. Estimation of blood haemoglobin and Iron by Wong's method.
3. Estimation of blood Haemoglobin by Cyanmethaemoglobin method .
4. Estimation of blood Cholesterol by Zake's method.
5. Estimation of Serum Albumin/ Globulin ratio by Salt precipitation method.
6. Estimation of Serum Phospholipid by Fiske and Subba Row method.
7. Estimation of Serum Protein by Lowry's method.

**QUANTATIVE ANALYSIS OF URINE**

8. Estimation of Urinary Creatinine by Alkaline Picrate method.
9. Estimation of Urinary Urea by Diacetyl monoxime method.
10. Estimation of Urinary Calcium by Clark and Collip method.
11. Estimation of Urinary Phosphorus by Fiske and Subbarow.
12. Estimation of Urinary Ascorbic acid by Harris and Ray method.
13. Estimation of Urinary nitrogen by Micro Kjeldhal method.

**Demonstration Experiments**

1. Estimation of Blood pyruvic acid
2. Estimation of Serum Alkaline Phosphatase
3. Isolation of nucleic acids
4. Animal study-Thiamine depletion- Repletion study

## Self Learning Paper

### NUTRACEUTICALS AND FUNCTIONAL FOODS

Sub. Code : 13FNPSL02

Max. Marks : 100

Credits: 5

**Objectives:** To enable the students understand the health benefits of functional foods and gain knowledge on classification and role of nutraceuticals.

#### UNIT I

**Functional foods and nutraceuticals** : Definition of functional foods and nutraceuticals– Review of the history of functional foods – Categories of different functional ingredients and their functions.

#### UNIT II

**Classification of nutraceuticals** : Classification, dietary fiber, sugar alcohols, peptides and proteins, PUFA , glycosides, isoprenoids, vitamins, phenols, lecithin and choline, minerals and their role in health and diseases.

#### UNIT III

**Probiotics** : Definition and historical perspective- Important probiotic strains- Health benefits – Properties and application of probiotics. **Prebiotics** : Concept, types, general properties of oligosaccharides and its health benefits- Dietary fiber and Lactose derivatives.

#### UNIT IV

**Phytosterols and stanols:** Health benefits – Mode of action – Safety aspects – Beneficial effects of Benecol- Role of phytosterols and stanols in designing functional foods.

#### UNIT V

**Antioxidants** : Vitamin A,E,C and Selenium - Food sources, properties, role of antioxidants in cancer and heart disease- Olive oil, Garlic, Spices and other herbs as functional foods and their health benefits.

## REFERENCE BOOKS

1. **Mary, K.Schmidl and Theodore, P. Labuza**, *Essentials of functional foods*, Culinary and hospitality Industry Publisher,2000
2. **Paresh, C. Dutta**, *Phytosterol as functional food components and nutraceuticals*, Marcel dekker inc, Newyork, 2004
3. **Robert E.C. Wildman**,*Hand Book of Nutraceuticals and Functional Foods*, I Edition, Taylor and Francis Publishers, 2000
- 4.**Johnson,I and Williams,G**, *Phytochemical functional foods* ,Wood house publishing,2003.
- 5.**Arnoldi**, *Functional foods, cardiovascular disease and diabetes*, Wood House Publishing, 2004.

## JOURNALS

1. Indian food industry, CFTRI, Mysore.
2. Food Digest, CFTRI, Mysore.

## **M.Sc. FOODS AND NUTRITION EVALUATION TECHNIQUES**

**For Core theory, Skill based subjects and Non – Major Elective papers - Maximum marks - 100**

**Continuous Internal Assessment – 25%**  
**End Semester Examination – 75%**

**There is no Separate Passing Minimum for Internal Assessment**  
**Passing Minimum for End Semester Examination is 38 Marks**

**CIA: 25 marks –**                      2 tests for 30 marks each

Average of two tests	10 marks
Model exam	10 marks
Assignment	5 marks

**End Semester Examination – 75 marks**

Single valuation with 50% External examiners

and 50% Internal examiners

**For Advanced Multi-Skill Paper : Maximum marks - 100**

100% Internal : 20 marks for each unit

60% for Online exam (I, II and III units)

40% for written matter (IV and V unit)

**Dissertation evaluation : Maximum marks - 200**

80% for dissertation valuation and  
20% for viva voce examination

**50% of marks by external examiner and  
50% of marks by internal examiner**

**DEPARTMENT OF FOODS AND NUTRITION**

**M. Sc. Foods and Nutrition**

**Question Paper Pattern**

**CORE PAPERS**

Duration: 3.00 hrs

**Marks:75**

**Section – A**

**(10 × 1 = 10 marks)**

Multiple Choice Questions - 10 (Two from each unit)

(Q. No. 1 -10 )

**Section – B**

**( 5 × 5 = 25 marks)**

Answer all the Questions (Either or pattern)

One Question from each unit

(Q. No. 11 – 15)

**Section – C**

**(5 × 8 = 40 marks)**

Answer all the Questions (Either or pattern)

One Question from each unit

(Q. No. 16 – 20)

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**SKILL BASED SUBJECTS**

**Five Questions out of Eight**

**(5 ×15 = 75 marks)**

At least one question from each unit

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**NON MAJOR ELECTIVE**

**Five Questions out of Eight**

**(5 ×15 = 75 marks)**

At least one question from each unit

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**SELF LEARNING PAPERS**

**Five Questions out of Eight**

**(5 ×20 = 100 marks)**

At least one question from each unit

**VELLALAR COLLEGE FOR WOMEN (AUTONOMOUS),  
ERODE- 638012.**

**Question Paper Pattern for M.Sc., (Foods and Nutrition)**

**Core Practicals**

**Pattern For Practicals**

**Maximum Marks - 100 Marks**

**External -60 Marks**

Practicals (90% of the Maximum Marks) : 55 Marks

Record Notebook (10% of the Maximum Marks) : 05 Marks

Passing Minimum for External Examination is 30 Marks

**Internal – 40 Marks**

Average of Two Practical CIA tests :20

Model Practical exam :20

Passing Minimum for Internal Assessment is 20 marks.