

**SCHEME &SYLLABUS**

**FOR**

**SEMESTER PATTERN**

**IN**

**M.Sc. HOME SCIENCE**

**Food Science and Nutrition**

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**NAGPUR (M.S.)**

**INDIA**

**M.Sc. Semester Pattern in Food Science and Nutrition Subject (Home Science)  
Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur, M.S.India**

| <b>Semester-I</b>   |                     |  |              |                |
|---------------------|---------------------|--|--------------|----------------|
| <b>Paper</b>        | <b>Subject Code</b> | <b>Name of Paper</b>                       | <b>Marks</b> | <b>Credits</b> |
| <b>Paper-I</b>      | <b>1FNT-1</b>       | Advanced Nutritional Biochemistry-I        | <b>100</b>   | <b>25</b>      |
| <b>Paper-II</b>     | <b>1FNT-2</b>       | Advanced Food Science -I                   | <b>100</b>   |                |
| <b>Paper-III</b>    | <b>1FNT-3</b>       | Institutional Food Administration-I        | <b>100</b>   |                |
| <b>Paper-IV</b>     | <b>1FNT-4</b>       | Research Methods and Statistics-I          | <b>100</b>   |                |
| <b>Practicals</b>   |                     |  |              |                |
| <b>Practical-I</b>  | <b>1FNP-1</b>       | Advanced Nutritional Biochemistry-I        | <b>100</b>   |                |
| <b>Practical-II</b> | <b>1FNP-2</b>       | Advanced Nutritional Food Science -I       | <b>100</b>   |                |
| <b>Seminar-I</b>    | <b>1FNS-1</b>       | Current Trends in Food Science & Nutrition | <b>25</b>    |                |
| <b>Semester-II</b>  |                     |  |              |                |
| <b>Paper-I</b>      | <b>2FNT-1</b>       | Advanced Nutritional Biochemistry-II       | <b>100</b>   | <b>25</b>      |
| <b>Paper-II</b>     | <b>2FNT-2</b>       | Advanced Food Science - II                 | <b>100</b>   |                |
| <b>Paper-III</b>    | <b>2FNT-3</b>       | Institutional Food Administration-II       | <b>100</b>   |                |
| <b>Paper-IV</b>     | <b>2FNT-4</b>       | Research Methods and Statistics-II         | <b>100</b>   |                |
| <b>Practicals</b>   |                     |  |              |                |
| <b>Practical-I</b>  | <b>2FNP-1</b>       | Advanced Nutritional Biochemistry-II       | <b>100</b>   |                |
| <b>Practical-II</b> | <b>2FNP-2</b>       | Advanced Food Science -II                  | <b>100</b>   |                |
| <b>Seminar-I</b>    | <b>2FNS-1</b>       | Current Trends in Food Science & Nutrition | <b>25</b>    |                |
| <b>Semester-III</b> |                     |  |              |                |
| <b>Paper-I</b>      | <b>3FNT-1</b>       | Clinical & Therapeutic Nutrition-I         | <b>100</b>   | <b>25</b>      |
| <b>Paper-II</b>     | <b>3FNT-2</b>       | Advanced Nutrition-I                       | <b>100</b>   |                |
| <b>Paper-III</b>    | <b>3FNT-3</b>       | Community Nutrition & Public Health-I      | <b>100</b>   |                |
| <b>Project</b>      | <b>3FNT-4</b>       | Project Design                             | <b>125</b>   |                |
| <b>Practicals</b>   |                     |  |              |                |
| <b>Practical-I</b>  | <b>3FNP-1</b>       | Clinical & Therapeutic Nutrition-I         | <b>100</b>   |                |
| <b>Sessional-I</b>  | <b>3FNS-1</b>       | Advanced Nutrition -I                      | <b>50</b>    |                |
| <b>Sessional-II</b> | <b>3FNS-2</b>       | Community Nutrition & Public Health-I      | <b>50</b>    |                |
| <b>Semester-IV</b>  |                     |  |              |                |
| <b>Paper-I</b>      | <b>4FNT-1</b>       | Clinical & Therapeutic Nutrition-II        | <b>100</b>   | <b>25</b>      |
| <b>Paper-II</b>     | <b>4FNT-2</b>       | Advanced Nutrition-II                      | <b>100</b>   |                |
| <b>Paper-III</b>    | <b>4FNT-3</b>       | Community Nutrition & Public Health-II     | <b>100</b>   |                |
| <b>Project</b>      | <b>4FNT-4</b>       | Research Project                           | <b>125</b>   |                |
| <b>Practicals</b>   |                     |  |              |                |
| <b>Practical-I</b>  | <b>4FNP-1</b>       | Clinical & Therapeutic Nutrition-II        | <b>100</b>   |                |
| <b>Sessional-I</b>  | <b>4FNS-1</b>       | Advanced Nutrition -II                     | <b>50</b>    |                |
| <b>Sessional-II</b> | <b>4FNS-2</b>       | Community Nutrition & Public Health-II     | <b>50</b>    |                |
|                     |                     | <b>Total</b>                               | <b>2500</b>  | <b>100</b>     |

# FOOD SCIENCE AND NUTRITION

1FNT-1

## SEMESTER I

### PAPER I

#### ADVANCED NUTRITIONAL BIOCHEMISTRY-I

**Marks :**        **Theory :80**  
                      **Internal Assessment: 20**  
**Practical : 80**  
                      **Internal Assessment: 20**

#### Objectives

- Augment the biochemistry knowledge acquired at the undergraduate level. Understand the mechanism adopted by the human body for the regulation of metabolic pathway.
- Get an insight to interrelationship between various metabolic pathways.
- Become proficient for specialization in nutrition.
- Understand integration of cellular level metabolic events to nutritional disorders imbalance

#### Contents

##### Unit I

- 1 Carbohydrates: Occurrence, classification, structure, properties and biological importance of carbohydrates. Polysaccharides.
- 2 Proteins : Classification, structure and properties of amino acids, classification and properties of proteins, conformation and structure of proteins-primary, secondary, tertiary and quaternary structure.
- 3 Lipids: Structure, distribution and biological importance of fats and fatty acids. Chemical properties and characterization of fats.Waxes, Cerebrosides, Gangliosides, Phospholipids and Proteolipids.Steroids and Bile salts.Prostaglandins.
- 4 Vitamins: Structure and biochemical properties of water soluble and fat soluble vitamins and their coenzyme activity.
- 5 Hormones: Mechanism of hormone action and its regulation.

## Unit II

- 1 Metabolism: Glycogenesis and Glycogenolysis, Interconversion of Hexoses, Glycolysis and Gluconeogenesis. Cori's cycle, Pyruvate Dehydrogenase complex, Krebs-cycle, Pentosephosphate pathway, Regulation of carbohydrate metabolism.
- 2 Lipids : Biosynthesis of fatty acids,  $\beta$ -Oxidation of fatty acid , Ketone bodies. Synthesis of Phospholipids and glycosphingolipids

## Unit III

- 1 Proteins : General reactions of protein metabolism, essential amino acids. Inborn errors of protein metabolism
- 2 Metabolism of amino acids: Decarboxylation, Transamination, Deamination
- 3 Nucleic acids: Biosynthesis and degradation of purines and pyrimidines and their regulation. Inherited disorders of purine and pyrimidine metabolism.

## Unit IV

- 1 Concept of Gene, DNA synthesis: The enzymes of DNA replication in prokaryotes and eukaryotes, mechanism of replication in bacteria and viruses, reverse transcriptase.
- 2 RNA synthesis: The enzymes of transcription in prokaryotes and eukaryotes, mechanism of transcription in bacteria.
- 3 Protein synthesis : Concept of the genetic code, structure of t-RNA, r-RNA and m-RNA, enzymes of translation in prokaryotes and eukaryotes, mechanism of protein synthesis, post translational processing of proteins.
- 4 Inhibitors of Protein biosynthesis
- 5 DNA recombination concept.

### **IFNP-1 PRACTICALS Marks :80**

- Determination of Calcium in food and serum **Internal Assessment:20**
- Determination of Inorganic Phosphorous in food and serum
- Determination of Ascorbic Acid in food
- Determination of Serum Creatinine (Alkaline Picrate Method)
- Determination of Serum Bilirubin by Malloy And Evlyin Method
- Determination of Serum Chloride by Schales&Schales Method
- Estimation of Hemoglobin by Packed Cell Volume (PCV)
- Glucose Tolerance by Glucose Tolerance Test

## REFERENCES:

1. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2000) : 25<sup>th</sup> Ed. Harpers Biochemistry, Macmillan Worth Publishers.
2. Nelson D.L. and Cox, M.M. (2000) : 3<sup>rd</sup> Ed. Lehninger's Principles of Biochemistry, Macmillan Worth Publishers.
3. Devlin, T.M. (1997) : 4<sup>th</sup> Ed. Text book of Biochemistry with Clinical Correlations, Wiley Liss Inc.
4. Stryer, L. (1998) : 4<sup>th</sup> Ed. Biochemistry, W.H. Freeman and Co.
5. Conn, E.E., Stumpe, P.K. Bruening, G. and Doi, R.H. (2001) : 5<sup>th</sup> Ed. Outlines of Biochemistry, John Wiley and Sons.
6. Voet, D. Voet, J.G and Prat, C.W., (1999) : Fundamentals of biochemistry.
7. Oser, B.L., (1965) : 14<sup>th</sup> Ed. Hawk's Physiological Chemistry, Tata McGraw - Hill Publishing Co. Ltd.
8. Varley, H., Goweklock, A.H. and Bell, M. (1980) : 5<sup>th</sup> Ed. Practical Clinical Biochemistry, Heinemann Medical Books Ltd.
9. Tietz, N.W., (1976) : Fundamentals of Clinical Chemistry, W.B. Saunders Co.
10. Vogel, A.I., (1962) : 3<sup>rd</sup> Ed. A Textbook of Quantitative Inorganic Analysis. The English Language Book Society and Longman.
11. Raghuramulu, N., Madhavan Nair and K. Kalyanasundaram, S. (1983) A manual of Laboratory Techniques NIN, ICMR.
12. King, E.J. and Wootton, I.D.P., (1956) : 3<sup>rd</sup> Ed. Micro-Analysis in Medical Biochemistry, J. and A. Churchill Ltd.
13. Plummer, D.T., (1987): 3<sup>rd</sup> Ed., An Introduction to Practical Biochemistry, McGraw-Hill Book Co.
14. Winton, A.L., and Winton, K.B., (1999) Techniques of Food Analysis Allied Scientific Publishers.

# FOOD SCIENCE AND NUTRITION

1FNT-2

## Semester I PAPER II

### ADVANCED FOOD SCIENCE -I

**Marks: Theory: 80**  
**Internal Assessment: 20**  
**Practical: 80**  
**Internal Assessment: 20**

#### Objective

- To study scientific principles involved in food preparation and evaluation.
- To acquire knowledge regarding processing of foods.
- To understand the principles underlying newer techniques of food preservation and packaging.

#### Contents

##### UNIT I

###### 1. Evaluation of food:

- Sensory assessment of food quality
- Appearance of food – size, shape & colour of foods
- Flavour of foods – odour, sensory organ for detecting odour, Odour stimuli
- Taste of foods – sensory organ for detecting taste, Taste stimuli, Taste sensitivity, Taste interaction
- Mouth feel – pain, hot & cold sensations, tactile sensations
- Texture of foods
- Consistency of foods
- Psychological factors in sensory assessment

###### 2. Sensory testing of foods

- Difference testing
- Acceptance of consumer testing
- Conducting sensory tests – sampling food for sensory testing, preparing samples & presenting for sensory testing and using reference samples.

## **UNIT II**

### **1. Objective Assessment of food quality**

- Rheological characteristics of food
- Objective tests for food

### **2. Physical Properties & physiochemical changes in foods.**

- Water - Types of water in foods – bound & free water
- Water activity and food spoilage
- Colloidal systems and its application to food preparation
- Solutions, sols, gels & suspensions
- Emulsions and foams

### **3. Product Development and Standardization of recipes**

## **UNIT III**

### **1. Functional Role of Sugars in Foods**

- Crystallization of sugar, factors affecting crystallization, Stages of sugar cookery, Caramelization of sugars, Interfering agents & crystal formation, Fudge, Fondant, Caramel & brittles, Sugar Substitutes.

### **4. Food Additives**

Types – Preservatives, antioxidants, emulsifying agents, nutrient supplements, non-nutritive sweeteners, anti-caking agents, sequestrants bleaching agents, Salt substitutes

### **5. Food Preservation-** Low temperature, High temperature.

## **UNIT IV**

### **1. Flours & Starches**

- Composition of cereals, kind of wheat, effects of milling, types of flours, formation of dough from flour & baking quality.
- Development of gluten, factors affecting development of gluten
- Sources of starch & their properties, Gelatinization, Factors affecting gelatinization
- Parboiling of rice and malting of grains, puffed and flake cereals

### **2. Leavening Agents –**

- Types of leavening agents – steam, air, carbon dioxide
- Baking powder, Types of baking powder, Baking soda & sour milk

- Batters & dough, Cakes, Biscuits & Breads – ingredients & their functions and method of preparation

**1 FNP-2 PRACTICALS Marks : 80**

**Internal Assessment: 20**

- 1. Use of measuring techniques and devices, weight and measures of different foods.**
- 2. Sensory Evaluation** - detection of primary flavour and sensitivity, threshold tests- triangle test, paired comparison, scoring test, ranking test.
- 3. Objective methods** – ink print, percent sag, seed displacement.
- 4. Sugar and Jaggery Cookery** – Relative sweetness, solubility and size of sugar, stages of sugar cookery, caramelization, crystallization, factors affecting crystal formation.
- 5. Starches, Vegetable gums and Cereals** – dextrinization, gelatinization, retrogradation, thickening powder. Factors affecting gels. Gluten formation and factors affecting gluten formation.
- 6. Leavened products:** fermentation - use of micro organisms (lactic acid, yeast), steam as an agent, egg as an agent, chemical agents.

**REFERENCES:**

1. Meyer L.J. (1989) : Food Chemistry, CBS Publishers And Distributors, New Delhi.
2. Lee Frank A. (1975) : Basic Food Chemistry. - Westpot Connecticut: AVI Publishers.
3. Manay S. N., (1987) : Foods, Facts And Principles, Wiley Eastern, New Delhi.
4. Swaminathan A (1979) : Food Science And Experimental Foods, Ganesh And Company Madras,
5. Peckham G. and Freehand-Graves, G.H. (1979) : Foundation Of Food Preparation, Mac Millian Company
6. Griswold, R.M. (1979) : The Experimental Study Of Food, Houghton Mifflin Boston.
7. Girdharilal, G.S. Sidappa And G.L. Tandon (1986) : Preservation Of Fruits And Vegetables, (2<sup>nd</sup> Ed), New Delhi: Indian Council Of Agricultural Research.
8. Srilakshmi B. (1996) : Food Science, New Age International (P) Ltd. Publishers, Wiley Eastern Ltd., New Delhi.
9. Potter, N. and Hotchkiss, J.H. (1996) : Food Science, Fifth ed., CBS Publishers and Distributors, New Delhi.



10. Charley M. (1982) : Food Science (2<sup>nd</sup> Ed), John Wiley And Sons.
11. Belle Lowe (1963) : Experimental Cookery, John Wiley And Sons Inc., New York
12. Paul P.C. And Palmer H.H. (1972) : Food Theory And Application John Wiley And Sons, London
13. Bennion, Marion And O. Hughes (1986) : Introductory Foods, Ed: Macmillan N. Y.
14. Mahindru, S.N.: Food Additives, Characteristics, Detection And Estimation, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
15. Acharya, K.T.: A Historical Dictionary Of Indian Foods, Oxford Publishing Co.
16. Belitz, H.D. and Grosch W., (1999) : Food Chemistry, (2<sup>nd</sup>ed), Springer, New York

### ***Journals***

1. Food Technology Abstracts, Central Food Technological Research Institute Mysore.
2. Food Technology, Journal Of The Institute Of Food Technology, Illinois, USA.
3. Food Digest, CFTRI Mysore.
4. Journal of Agriculture and Food Chemistry.
5. Cereal Science.
6. Indian Food Industry AFSTI, CFTRI, Mysore.
7. Journal Of Food Science And Technology CFTRI, Mysore.
8. Indian Food Packer, All Indian Food Preserves Association, Delhi.
9. Journal of Dairy Science. 10. Advances in Food Research.

**Semester I**

**PAPER III**

**INSTITUTIONAL FOOD ADMINISTRATION-I**

**Marks: Theory: 80**

**Internal Assessment: 20**

***Objectives: -***

- To develop a knowledge base in key areas of Institutional Food Administration.
- To provide practical field level experience in Institutional Food Administration.
- To impart necessary expertise to function as a Food Service Manager.
- To equip individual to start their own food service unit leading to entrepreneurship.
- To develop critical abilities and provide basic grounding in research techniques.

**Contents**

**UNIT I**

**1. Food Service Systems and their Development**

- History and Development, Factors Affecting Development of Food Service System

**2. Types of Food Service System**

- Commercial and Non-commercial

**3. Management**

- Approaches to the Food Service Management
- Principles, Functions
- Tools of Management

**UNIT II**

**1. Layout and Design**

- Definition of layout and design, Factors affecting layout and design, Determining Work Centers, Principles of Kitchen layout
- Work flow, Work simplification

## **2. Equipment**

- Classification of equipment, Factors affecting selection of equipment, Purchase and Installation, General care and Maintenance of equipment, Cleaning systems

## **UNIT III**

### **1. Purchasing Receiving and Storage**

- Purchasing Activity, Methods of Buying & Receiving
- Methods of Delivery, Delivery Procedure and Receiving Procedure
- Types of Storage, Storekeeping and Store Records, Maintenance of Food Quality in Storage

## **UNIT IV**

### **1. Entrepreneurship in Food Service Management**

- Perspective of Entrepreneurship
- Defining – Entrepreneurship, Entrepreneur
- Characteristics of successful Entrepreneurs

### **2. Approaches to Entrepreneurship Development**

## **Internal Assessment**

1. Analysis of Equipment used in Quantity Cookery in Food Service Establishment
2. Cost Analysis of Processed Foods used in Food Service Establishment

## **References**

1. West B.B. Wood L. (1988): Food Service in Institutions, John Wiley & Sons, New York.

2. SethiMohini (2007): Catering Management & Integrated Approach, Wiley Publication.
3. Verghese Brian: Professional Food And Beverage Management, MacMillan India Ltd.
4. Green Erric (1986): Profitable Food And Beverage Management Operations, John Williams Company
5. JagmohanNegi: Managing Hotels And Restaurants, Authors Press, Delhi.
6. T. Ramaswamy: Principles of Management, Himalaya Publication.
7. Peter F. Drucker: The Practice of Management, Allied Publishers limited.

**Marks : Theory : 80**

**Internal Assessment : 20**

### **Objectives**

- To understand the significance and research methodology in Home Science research.
- To understand the types, tools and methods of research and develop the ability to construct data gathering instruments appropriate to the research design.
- To understand and apply the appropriate technique for the measurement scale and design.

### **Contents**

#### **UNIT I**

- 1. Definition of Research and Scope of Research in Home Science.**
- 2. Anthropological and Epidemiological Research.**
- 3. Selection of research problem:** Need, Relevance and Feasibility.

#### **UNIT II**

- 1.Problem analysis -** Definition and stating hypothesis/objectives.
- 2.Literature search:** Referencing, abstracting, computer search, bibliography.
- 3.Selection of research design:** Purpose, internal and external validity.
- 4.Basic principles of research design:**
  - Fundamental, applied and action, exploratory and experimental survey and case study, ex-post facto, Longitudinal and cross sectional, co - relational.

## **UNIT III**

**Sampling :** Objectives of sampling, principles, limitations of sampling, types of errors in sampling, major types of sampling, choice of sampling technique, characteristics of good sample, sample size.

### **Data gathering instruments:**

- Primary and secondary data, schedule, questionnaire, observation and case study, scaling methods
- Validity, reliability, sensitivity and specificity of research tools.
- Importance and relevance of pilot study.

## **UNIT IV**

### **1. Scientific writing as a means of communication.**

- Different forms of scientific writing.
- Articles in Journals, Research notes and reports, Review articles, Monographs, Dissertations, Bibliographies

### **2. How to formulate outlines.**

The reasons for preparing outlines

- As a guide for plan writing.
- As a skeleton for the manuscript. Kinds of outline
  - Topic outlines.
  - Conceptual outlines.
  - Sentence outlines.
  - Combination of topic and sentence outlines.

### **3. Drafting Titles, Subtitles, Tables, Illustrations.**

- Tables as systematic means of presenting data in rows and columns and lucid way of indicating relationships and results.
- Formatting tables; Title, Body stab, Stab column, Column Head, Spanner Head Box Head.
- Appendices: use and guidelines.

## **REFERENCES:**

1. Best J. W. (1983) : Research Education, Prentice Hall, New Delhi..
2. Dody, J. T. (1967): An Introduction To Social Research, AppletonCenter.
3. Philips, B.S.( 1977): Social Research Strategy And Tactics, Mae Millan.
4. Devdas R.P. (197 1): JamdnppiOf Research Methodology, Shri Ramakrishna Mission Vidyayala.
5. Young, P.V. And Schmid, C.F. (1968) : Scientific Social Survey And Research, Prentice Hall, New Delhi.
6. Shukla, M.C. And Gulshan S.S. (1970): Statistics Theory And Practice, S. Chand New Delhi.
7. Gupta S.P. (1970): Statistical Methods, S. Chand Company, New Delhi.
8. Garrett, H. : Statistics In Education And Psychology.
9. Sinha S.L. L Statistics In Psychology And Education, Anmol Publications Pvt. Ltd., New Delhi.
10. Daryab Singh Principles of Statistics, Atlantic Publishers & Distributors.
11. Bernard Ostle Statistics in Research.
12. M.H.Gopal : Introduction to Research Methodology for Social Sciences.
13. C.R. Kothari : Research Methodology (Methods & Techniques)
14. Fredrick, Lamson, Whitney: The Elements of Research.
15. Good, Carter, Scales and Douglas: Methods of Research.

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### **Semester - I**

#### **Current Trends and Issues in Food Science and Nutrition Marks : 25 Sessional PAPER - 1FNS-3**

Current Trends and issues will have seminar presentation and carry Internal Marks.

**FOOD SCIENCE AND NUTRITION****SEMESTER II****PAPER I****ADVANCED NUTRITIONAL BIOCHEMISTRY-II**

**Marks :**      **Theory : 80**  
                  **Internal Assessment: 20**  
                  **Practical: 80**  
                  **Internal Assessment: 20**

**Objectives**

- Augment the biochemistry knowledge acquired at the undergraduate level. Understand the mechanism adopted by the human body for the regulation of metabolic pathway.
- Get an insight to interrelationship between various metabolic pathways.
- Become proficient for specialization in nutrition.
- Understand integration of cellular level metabolic events to nutritional disorders imbalance

**Contents****Unit I**

- 1 The concept of pH, dissociation and ionization of acids and bases, pKa, buffers and buffering mechanism, Henderson Hasselbalch equation
- 2 Chromatography: Principles and application of adsorption, partition and ion-exchange chromatography, gel filtration, affinity and high performance liquid chromatography.
- 3 Molecular weight determination of macromolecules (in particular proteins) by gel filtration chromatography, gel electrophoresis and ultracentrifugation.
- 4 Spectrophotometry: Beer-Lamberts law, extinction coefficient and its importance, design of colorimeter, spectrometer and spectrophotometer.
- 5 Principles of atomic absorption spectrophotometry and its application in Nutritional Biochemistry.



## Unit II

- 1 Mechanism of enzymes action: Multienzymes system, Mechanism of action and regulation of pyruvate dehydrogenase and fatty acid synthetase complex, Coenzyme action.
- 2 Enzyme regulation: General mechanisms of enzyme regulation, Allosteric enzymes, sigmoidal kinetics and their physiological significance, Symmetric and sequential modes for action of allosteric enzymes.
- 3 Enzymes in differential diagnosis of diseases and their clinical significance.

## Unit III

- 1 Modes of Hormones action and role in metabolism: Hormones of Pancreas, Pituitary, Adrenal, Thyroid, Sex hormones.
- 2 Bioenergetics: Electron Transport Chain, oxidative Phosphorylation and synthesis of ATP.

## Unit IV

- 1 Composition and function of blood, plasma and blood corpuscles, functions of plasma proteins, structure and function of haemoglobin, abnormal haemoglobins,
- 2 Blood coagulation – mechanism and regulation. Blood groups.
- 3 Regulation of water and electrolyte balance, role of kidneys and hormones in their maintenance. Hydrogen ion homeostasis, acid-base balance- metabolic and respiratory acidosis and alkalosis.

### **2FNP-1 PRACTICALS Marks : 80**

- Determination of Cholesterol in Blood **Internal Assessment: 20**
- Determination of Serum Acid Phosphatase Activity By Guttman & Guttman Method
- Determination of Alkaline Phosphatase
- Estimation of Total Serum Protein And A/G Ratio By Biuret Method
- Estimation of Serum Amylase activity in The Given Serum Sample
- Determination of Total Lipids By Sulphophospho vanillin Method
- Determination of Serum Triglyceride
- Determination of Blood Urea by Nesslerisation Method
- Determination of Uric Acid

## REFERENCES:

1. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2000) : 25<sup>th</sup> Ed. Harpers Biochemistry, Macmillan Worth Publishers.
2. Nelson D.L. and Cox, M.M. (2000) : 3<sup>rd</sup> Ed. Lehninger's Principles of Biochemistry, Macmillan Worth Publishers.
3. Devlin, T.M. (1997) : 4<sup>th</sup> Ed. Text book of Biochemistry with Clinical Correlations, Wiley Liss Inc.
4. Stryer, L. (1998) : 4<sup>th</sup> Ed. Biochemistry, W.H. Freeman and Co.
5. Conn, E.E., Stumpt. P.K. Bruening, G. and Doi, R.H. (2001) : 5<sup>th</sup> Ed. Outlines of Biochemistry, John Wiley and Sons.
6. Voet, D. Voet, J..G and Prat, C.W., (1999) : Fundamentals of biochemistry.
7. Oser, B.L., (1965) : 14<sup>th</sup> Ed. Hawk's Physiological Chemistry, Tata McGraw - Hill Publishing Co. Ltd.
8. Varley, H., Goweklock, A.H. and Bell, M. (1980) : 5<sup>th</sup> Ed. Practical Clinical Biochemistry, Heinemann Medical Books Ltd.
9. Tietz, N.W., (1976) : Fundamentals of Clinical Chemistry, W.B. Saunders Co.
10. Vogel, A.I., (1962) : 3<sup>rd</sup> Ed. A Textbook of Quantitative Inorganic Analysis. The English Language Book Society and Longman.
11. Raghuramulu, N., Madhavan Nair and K. Kalyanasundaram, S. (1983) A manual of Laboratory Techniques NIN, ICMR.
12. King, E.J. and Wootton, I.D.P., (1956) : 3<sup>rd</sup> Ed. Micro-Analysis in Medical Biochemistry, J. and A. Churchill Ltd.
13. Plummer, D.T., (1987): 3<sup>rd</sup> Ed., An Introduction to Practical Biochemistry, McGraw-Hill Book Co.
14. Winton, A.L., and Winton, K.B., (1999) Techniques of Food Analysis Allied Scientific Publishers.

**FOOD SCIENCE AND NUTRITION****Semester II  
PAPER II  
ADVANCED FOOD SCIENCE- II**

**Marks: Theory: 80**  
**Internal Assessment: 20**  
**Practical: 80**  
**Internal Assessment: 20**

**Objective**

- To study scientific principles involved in food preparation and evaluation.
- To acquire knowledge regarding processing of foods.
- To understand the principles underlying newer techniques of food preservation and packaging.

**Contents****UNIT I****1. Pulses**

- Composition, methods of processing & cooking, effects of soaking, germination & fermentation, Toxic constituents

**2. Oilseeds and Nuts**

- Composition, oil extraction & by products, Toxic constituents

**3. Fats & Oils**

- Composition of food fats, Modification of natural oils – Hydrogenation, Properties of fats and oils, Deterioration of fats & antioxidants, fat substitutes

**UNIT II****1. Milk & Milk Products**

- Composition of milk, Types of milk, Processing of milk – Pasteurization, Homogenization, Ultra Heat Treatment System (UHTS), Effect of heat & acid on milk protein
- Composition & processing of curd, cheese, paneer, Concentrated and dried milk products

**2. Vegetables and fruits**

- Structure of vegetables & fruits, Colour pigments & textural changes during ripening & processing, Recent advances in processing of vegetables & fruits.
- Browning reactions – enzymatic & non-enzymatic, prevention

### UNIT III

#### 1. Eggs

- Structure & composition, Quality evaluation of eggs, Changes during storage, Factors affecting coagulation of egg protein, Uses of eggs as binding, foaming & emulsifying agents, Methods of cooking eggs

#### 2. Meat, Poultry and Fish

- Structure & Composition, Ripening of meat, Tenderizing of meat, Changes on cooking meat by dry & moist heat methods, Curing & smoking of meat
- Types of fish, Composition, Criteria for fish selection, Changes during heat treatment, Fish products – fish meal, fish protein concentrate, fish oils

### UNIT IV

#### 1. Fermented Foods

- Cereal based, pulse based, fruit-vegetable based

#### 2. Beverages

- Processing of Beverages – Tea, Coffee, Malted and Ready To Serve Beverage

#### 3. Convenience foods

- Types, techniques of instant mixes, extruded snacks

#### 4. Packaging

- Importance, functions & types of packaging material.

### **2FNP-2**PRACTICALS**Marks :80**

#### **Internal Assessment: 20**

- **Jams and Jellies** – pectin contents of fruits, role of acid, pectin and sugar in jam and jelly formation. Use of gums as emulsifiers/stabilizers.
- **Fats and Oils** :Flash point, melting point and smoking point. Role of fats and oil in cookery as : shortening agent, frying medium. Factors affecting fat absorption. Fat crystals. Plasticity of fat. Permanent and semi permanent emulsions.
- **Milk and milk products**: scalding, denaturation. Effect of acid, salt, alkali, sugar, heat, enzymes, polyphenols on milk, khoa, curd, paneer, cheese(ripened and unripened).

- **Egg:** - Structure, assessing egg quality, use of egg in cookery-emulsions, air incorporation, thickening, binding, gelling. Method of egg cookery and effect of heat. Egg white foams and factors affecting foams.
- **Pulses:**-Effect of various cooking and processing methods on various characteristics, functional properties of pulses and their products.
- **Meat and poultry:** Methods affecting tenderness of meat, effect of various methods of cooking and ingredients on colour, volume, texture, aroma, and water holding capacity.
- **Fish and Sea food:** Effect of different cooking methods on various fish and sea foods.
- **Gelatin:** Gelatin, gel strength and factors affecting gelatin. Ability to foam.
- **Fruits and Vegetables:** Pigments: effects of cooking, metal ions, pH. Effect of various cooking processes on different characteristics of vegetables. Prevention of enzymatic browning.
- **Beverages:** Factors affecting quality of beverages.

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16. Belitz, H.D. and Grosch W., (1999) : Food Chemistry, (2<sup>nd</sup>ed), Springer, New York

### ***Journals***

1. Food Technology Abstracts, Central Food Technological Research Institute Mysore.
2. Food Technology, Journal Of The Institute Of FoodTechnology, Illinois, USA.
3. Food Digest, CFTRI Mysore.
4. Journal of Agriculture and Food Chemistry.
5. Cereal Science.
6. Indian Food Industry AFSTI, CFTRI, Mysore.
7. Journal Of Food Science And Technology CFTRI, Mysore.
8. Indian Food Packer, All Indian Food Preserves Association, Delhi.
9. Journal of Dairy Science.10. Advances in Food Research.

**FOOD SCIENCE AND NUTRITION****Semester II****PAPER III****INSTITUTIONAL FOOD ADMINISTRATION- II**

**Marks: Theory: 80**

**Internal Assessment: 20**

**Objectives: -**

- To develop a knowledge base in key areas of Institutional Food Administration.
- To provide practical field level experience in Institutional Food Administration.
- To impart necessary expertise to function as a Food Service Manager.
- To equip individual to start their own food service unit leading to entrepreneurship.
- To develop critical abilities and provide basic grounding in research techniques.

**Contents****UNIT I****1. Food Management**

- Importance of Menu Planning in Food Service Organization, Types of menu, Principles of Menu Planning, Writing the menu, Construction and Evaluation of Menu

**2. Food Production System**

- Standardization of recipe
- Principles involved in construction of recipes in large Scale Cooking
- Utilization of left over foods

**UNIT II****1. Food Service**

- Types of food services in a Food Service Establishment
- Types of food service in a Restaurant- silver service, plate service, cafeteria service, buffet service.

- Centralized and Decentralized system of service

### **UNIT III**

#### **1. Personnel Management**

- Approaches to Staff Management

#### **2. Staff Recruitment**

- Sources of recruitment, Selection, Induction, Staff Training, Supervision, Performance Appraisal, Motivation, Wages and other compensations, Labor laws and other legal aspects

### **UNIT IV**

#### **1. Cost Accounting**

- Budget, Types of Budget, Purchase Records, Receiving Records, Storage Records, Production Records, Service Records, Income and Expenditure Record

#### **2. Reviewing Actual Performance Reports**

- Daily Food Cost Report, Cumulative Food Cost Report, Daily Cumulative Food Cost Report, Profit and Loss Statement

#### **3. Cost Control**

- Factors affecting cost control, Importance of Costing, Components of Costing, Breakeven Analysis, Determining Selling Price of Food, Checklist for Cost Control

#### **4. Sanitation and Safety**

- Standards, Policies and Schedules, Sanitation in Food Services, Sanitation and Public Health, Plant Sanitation and Safety

### **Internal Assessment**

1. Visit to commercial and non-commercial Food Service Institution to assess the following: -
  - a) Organization



- b) Physical plant and layout
- c) Food service equipment
- d) Sanitation and Hygiene
- e) Buying and accounting procedure

At least two (02) under each category

## **References**

8. West B.B. Wood L. (1988): Food Service in Institutions, John Wiley & Sons, New York.
9. SethiMohini (2007): Catering Management & Integrated Approach, Wiley Publication.
10. Verghese Brian: Professional Food And Beverage Management, MacMillan India Ltd.
11. Green Erric (1986): Profitable Food And Beverage Management Operations, John Williams Company
12. JagmohanNegi: Managing Hotels And Restaurants, Authors Press, Delhi.
13. T. Ramaswamy: Principles of Management, Himalaya Publication.
14. Peter F. Drucker: The Practice of Management, Allied Publishers limited.

**M.Sc. Home Science**  
**Semester II**  
**PAPER – IV**  
**RESEARCH METHODS AND STATISTICS-II**

**Marks : Theory : 80**  
**Internal Assessment : 20**

**Objectives**

- To understand the significance and research methodology in Home Science research.
- To understand the types, tools and methods of research and develop the ability to construct data gathering instruments appropriate to the research design.
- To understand and apply the appropriate technique for the measurement scale and design.

**Contents**

**UNIT I**

**1. Meaning and Scope of Statistics in Home Science :**

- Concept of statistics.
- Scope of statistics.

**2. Descriptive statistics :** Classification, tabulation, frequency distribution, diagrammatic and graphic representation of data.

**3. Measure of central tendencies :** Mean, Median, Mode.

**4. Concept of deviations :** Range, Quartile deviation, Mean deviation, Standard deviation.

**5. Concept of normal distribution curve and probability :** use of normal distribution curve, skewness and kurtosis.

## **UNIT II**

### **Elements of testing a Hypothesis :**

- Concept of null hypothesis.
- Meaning of level of significance. Type I and Type II errors.
- Students 't' test for small samples for testing differences in proportion for means and differences in means.
- Large sample test (C.R. test) for testing significance of difference between mean of two groups.
- Analysis of variance (one way ANOVA, two way ANOVA).
- Correlation coefficient, Product moment method, rank difference method for small samples and scattered diagram method for large sample.
- Regression analysis and prediction: Simple and multiple regression.

## **UNIT III**

### **Non parametric tests for testing null hypothesis :**

- Application of Chi square test on :
  - equal probability type
  - normal distribution type
  - 2 x 2 contingency tables type
  - $\chi^2$  test of independence.
- Participatory rapid assessment.
- Participatory learning assessment.

## **UNIT IV**

### **1. The writing process**

- Getting started.
- Use out line as a starting device
- Drafting
- Reflecting, Re-reading – Checking organization, Checking headings, Checking content, Checking clarity, Checking Grammar.

## **2. Parts of Dissertation/ Research Report/article**

- Abstract
- Introduction
- Review of Literature
- Materials and Methods
- Results and Discussion
- Summary and Conclusion
- Bibliography
- Recommendation

## **3. Computer Applications in Data analysis**

- Use of MS-Office for Research, MS Word, MS Excel, MS Power Point
- Graphic representation
- Use of SPSS for data Analysis

## **REFERENCES:**

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17. Dody, J. T. (1967): An Introduction To Social Research, AppletonCenter.
18. Philips, B.S.( 1977): Social Research Strategy And Tactics, Mae Millan.
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22. Gupta S.P. (1970): Statistical Methods, S. Chand Company, New Delhi.

23. Garrett, H. : Statistics In Education And Psychology.
  24. Sinha S.L. L Statistics In Psychology And Education, Anmol Publications Pvt. Ltd., New Delhi.
  25. Daryab Singh Principles of Statistics, Atlantic Publishers & Distributors.
  26. Bernard Ostle Statistics in Research.
  27. M.H.Gopal : Introduction to Research Methodology for Social Sciences.
  28. C.R. Kothari : Research Methodology (Methods & Techniques)
  29. Fredrick, Lamson, Whiteney: The Elements of Research.
  30. Good, Carter, Scales and Douglas: Methods of Research.
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## **Semester – II**

**Current Trends and Issues in Food Science and Nutrition – Marks : 25**

**Sessional**

**PAPER – 2 FNS-3**

Current Trends and issues will have seminar presentation and carry Internal marks

**FOOD SCIENCE AND NUTRITION****SEMESTER III****PAPER I****CLINICAL AND THERAPEUTIC NUTRITION - I**

**Marks: Theory: 80**

**Internal Assessment : 20**

**Practical: 80**

**Internal Assessment: 20**

**Objectives**

**The course will enable students to:**

- Understand the etiology, physiologic and metabolic anomalies of acute and chronic diseases and patient needs.
- Know the effect of various diseases on nutritional status and nutritional and dietary requirements.
- Be able to recommend and provide appropriate nutritional care for prevention/and treatment of the various diseases.
- Provide practical laboratory training in the preparation of special diets.
- Provide exposure to actual hospital situation; Study the types of cases admitted, their biochemical, clinical and dietary history.

**Contents****UNIT I****1. Definitions, Classifications of Dietitian in Health Care**

- Dietetics - the Science & Art of human nutrition care
- Role & responsibilities of dietitian in health care
- Adaptation of therapeutic diets
- Therapeutic diets - Types of dietary adaptations for therapeutic needs, Normal nutrition - a base of therapeutic diet, Constructing therapeutic diets
- Routine hospital diets
  - Normal / General diets, Liquid diets, Soft diets, Bland diets

**2. Nutritional Screening and Assessment of Nutritional Status of Hospitalized and Outdoor Patients**

- Identification of high risk patients
- Assessment of patient needs based on interpretation of patient data: - clinical, biophysical, personal

### **3. Newer Trends in Delivery of Nutritional Care and Dietary Counseling**

- Nutritional care plan - Development of a plan, Implementation of nutritional care, Evaluation of nutritional care, Nutritional care record
- Care Management Strategies - Care management, Patient- focused care
- Counseling for change - Stages of change, Activities that facilitate change, Intervention model, Resistance behaviours & potential strategies to modify them

### **4. Diet, Nutrient and Drug Interaction**

- Effect of drugs on ingestion, digestion, absorption and metabolism of nutrients.
- Effect of foods, nutrients and nutritional status on drug dosage and efficacy.

### **5. Nutritional Care in Weight Management**

- Weight imbalance – Prevalence, Components of body weight, Guidelines for calculating ideal body weight
- **Obesity**– Etiology, Classification, Energy balance, Metabolic aberrations & clinical manifestations, Consequences/risk factors, Dietary modifications, Lifestyle modifications, Pharmaceutical management, Surgical management, Preventive aspects
- **Underweight** – Etiology, Metabolic aberrations & clinical manifestations, Dietary management

## **UNIT II**

### **1. Nutrition in Eating Disorders**

- **Anorexia Nervosa & Bulimia Nervosa** – Diagnostic criteria, Epidemiology, Pathophysiological consequences of eating disorders, Clinical characteristics & medical complications, Psychological management, Nutritional assessment, Nutrition management, Nutrition education

### **2. Nutrition Therapy for Upper Gastro Intestinal Tract Disorders**

Etiology, signs & symptoms, complications, Nutritional care & medical management for upper gastro intestinal tract disorders:

- **Disorders of Oesophagus** – Oesophagitis, Hiatal Hernia, Cancer of oesophagus
- **Disorders of Stomach** – Indigestion, Dyspepsia, Gastritis, Peptic Ulcer and Duodenal Ulcer, Dumping Syndrome

### **3. Nutrition Therapy for Lower Gastro Intestinal Tract Disorders**

Etiology, signs & symptoms, complications, Nutritional care & medical management for lower gastro intestinal tract disorders:

- **Disorders of Small Intestine and Colon** - Intestinal Gas and Flatulence, Constipation, Diarrhoea, Steatorrhoea, Celiac Disease, Irritable Bowel Syndrome, Diverticular Disease
  - Inflammatory Bowel Disease: Ulcerative Colitis, Crohn's Disease
  - Haemorrhoides / Piles, Fissures, Fistula

### **UNIT III**

#### **1. Nutritional Therapy for Liver, Biliary System and Exocrine Pancreas Disorders**

##### **Liver Diseases**

- Physiology and functions of the liver, Liver function tests
- Diseases of the liver:
  - Hepatitis - types, etiology, symptoms, complications,
  - Cirrhosis - types, etiology, symptoms, complications, metabolic consequences of alcohol consumption,
  - Hepatic Coma - stages, etiology, symptoms & complications

Medical nutritional management of liver diseases

##### **Gall Bladder Diseases**

- Physiology and functions of Gall Bladder, Gall bladder function tests,
- Disorders of Gall Bladder: Cholelithiasis, Cholecystitis, Acute Cholangitis, Cholestasis

Medical nutritional management of gall bladder diseases

##### **Pancreatic Disorders**

- Physiology and functions of exocrine Pancreas, Pancreatic function tests
- Pancreatitis (Acute & Chronic)

Medical nutritional management of pancreatic disorders

#### **2. Nutritional Support**

- Recent advances in techniques and feeding substrates
- Special feeding methods:
  - Enteral Nutrition: Enteral access/feeding routes, Types of formulas, Formula composition, Administration methods/delivery methods, Monitoring & complications



- Parenteral Nutrition: Type of access, Parenteral nutrition solutions/composition, Administration methods, Monitoring & complications

## **UNIT IV**

### **1. Hypertension and Coronary Heart Diseases**

- **Hypertension**
  - Definition, Classification, Pathophysiology, Causes, Symptoms & Complications
  - Management - Dietary management, Medication, Lifestyle modification
- **Coronary Heart Diseases (CHD)**
  - Common Disorders of CHD - Dyslipidemias, Atherosclerosis, Angina Pectoris, Myocardial Infarction (MI), Congestive Cardiac Failure (CCF), Rheumatic Heart Disease (RHD)
  - Pathophysiology, Etiology/Risk Factors for CHD, Clinical Determination
  - Dietary factors - Fatty acids, Amount of fat, Dietary cholesterol, Fiber, Antioxidants, Calcium.
  - Management of CHD - MNT, Lifestyle changes, Surgical management

### **2. Nutritional Management in Nervous System Disorders**

- Alzheimer's disease
  - Parkinson's disease
- Etiology, Clinical features and MNT

**3FNP-1**

## **PRACTICALS**

**Marks : 80**

### **1. Standards for hospital diets :**

**Internal Assessment: 20**

- Food exchange list for use in special diets using common Indian foods.
- Interpretation of diets in common household measures, standardization of measures.
- Determination of raw and cooked weights in selected breakfast, lunch, snacks and dinner recipes, calculation of exchanges in the recipes.

### **2. Market survey of commercial nutritional supplements and nutritional support substrates**

### **3. Commonly used tests for diagnosis of various diseases - system-wise.**

- Interpretation of patient data and diagnostic tests and drawing up of patient diet prescription using a case study approach.
- Follow up – acceptability of diet prescription, compliance, discharge diet plan.

### **4. Visit to hospital to observe the following :**

- Tray service
- Trolley service
- Centralized food service
- Decentralized food service

**REFERENCE:**

1. Mahan L.K., Sylvia Escott-Stump(2000) : Krause's Food Nutrition and Diet Therapy 10<sup>th</sup> Edition, W.B. Saunders Company London.
2. B. Srilakshmi, (2007) : Dietetics, published by K.K. Gupta For Newage International Pvt. Ltd. New Delhi.
3. Sue Rodwell Williams, (1993) : Nutrition, Diet Therapy, (7<sup>th</sup> Ed) : W.B. Saunders Company London.
4. Antia F.P. And Philip Abraham (2001) Clinical Nutrition and Dietetics, Oxford Publishing Company.
5. Gopalan C., Ram Sastri B.V. And BalSubramaniam S.C., (2006) Nutritive Value of Indian Foods, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research.
6. Raheena M. Begum (1989) : A Text Book of Foods Nutrition And Dietetics, Wiley Eastern Ltd., New Delhi.
7. Passmore P. And M.A. East Wood : Human Nutrition And Dietetics, Churchill Living Stone.
8. WohlShils And Goodheart : Modern Nutrition In Health And Disease, McLaren And Ubrman, Philadelphia.
9. Robinson Ch., M.B. Lawlea, W.L., Chenoweth, And A.E., Carwick : Normal And Therapeutic Nutrition, Macmillan Publishing Company.
10. Benion M. : Clinical Nutrition, Harper And Row Publishing M.Y.

**Journals:**

1. Indian Journal of Nutrition and Dietetics, SriAvinashilingamHomeScienceCollege, Coimbatore.
2. Journal of American Dietetics Association
3. World Review of Nutrition and Dietetics, Kargar.
4. Applied Nutrition, Indian Dietetics Association.
5. American Journals of Clinical Nutrition. The Clinical Division of American Institute of Nutrition.

6. European Journal of Clinical Nutrition.

7. Nutritional Reviews.

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**FOOD SCIENCE AND NUTRITION****Semester III****PAPER II****ADVANCED NUTRITION- I****Marks: Theory : 80****Internal Assessment : 20****Sessional : 50****Objectives****This course is designed to:**

- Provide in-depth knowledge of the physiological and metabolic role of various nutrients and their interaction in human nutrition.
- Enable students to understand the basis of human nutritional requirements and recommendations through the life cycle.
- Enable students to understand the pharmacological actions of nutrients and their implications.
- Nutritional problems / nutrition related diseases prevalent among the affluent and the less privileged groups with reference to their incidence, etiology and public health significance.
- Biochemical and clinical manifestations, preventive and therapeutic measures of the nutritional problems.
- Familiarize students with the recent advances in nutrition.

**Contents****UNIT I****1. Body Composition**

- Levels of body composition
- Body composition measurement techniques
  - Compartmental Models of body composition
  - Direct methods & Indirect methods - Circumference measurements, Skinfold thickness, Anthropometric indices, Body volume determination/Underwater weighting (UWW), Isotope dilution method, Bioelectrical impedance analysis

(BIA), Dual energy X-ray absorptiometry, (DEXA), Near-infrared interactance, Total body potassium (TBK), Total body protein (TBP), Air displacement plethysmography (ADP), Total body electrical conductivity (TOBEC), Total body electrical conductivity, Imaging techniques: Magnetic resonance imaging (MRI), Computed tomography (CT scan), Ultrasound measurements

- Significance of body composition measurement

## **UNIT II**

### **1. Energy Metabolism**

- Basic Concept of Energy
- Regulation of food intake, Factors influencing food intake
- Energy Intake - Energy from glucose, protein and fat
- Components of energy requirement
- Factors affecting energy expenditure & requirement
- Methods of estimation of energy expenditure & requirement
- Energy requirements & dietary energy recommendations - Energy requirements in infants, children, adolescents, adults, pregnancy, lactation, elderly, physically active group, disease & trauma
- Energy imbalance - Consequences of energy imbalance. Indices for measurement of energy imbalance

## **UNIT III**

### **1. Carbohydrates**

- Classification
- Functions
- Sources
- Digestive fate of dietary carbohydrates
- Absorption and metabolic utilization of carbohydrates
- Regulation of blood glucose concentration
- Dietary management of blood glucose concentration- Glycemic index, Fructose
- Non glycaemic carbohydrates - Dietary fiber, Resistance starch, Fructo oligosaccharides
- **Inborn Errors of Metabolism** - Galactosemia, Glycogen storage diseases,

## UNIT IV

### 1. Protein

- Classification - proteins, amino acids
- Functions
- Sources
- Nutritional significance of dietary amino acids
- Digestion, absorption and transport
- Protein synthesis, degradation and turnover
- Factors influencing protein & amino acid requirements
- Protein and amino acid requirements for various age and physiological groups
- Concept of protein quality, methods of measuring protein quality
- Improvement of protein quality of diets.
- **Inborn Errors of Metabolism** - Phenylketonuria, Maple syrup urine disease (MSUD)

**3FNS-1**

**SESSIONALS**

**Marks : 50**

### Objectives

#### **The aim of the course is to**

- Familiarize students with basic techniques used in Studies and Research in Nutritional Sciences
- Acquaint student with the methods of estimating nutrient requirements
- Orient students towards planning of metabolic studies

### Contents

- 1. Estimation of body composition using different methods**– 1] Body Composition Analyser 2] Skin Fold measurement
- 2. Calculation of Energy requirements**
  - To calculate BMR using different formulas
  - To calculate energy expenditure based on physical activities using different methods –  
1] Factorial Approach 2] Satyanarayana method
- 3. Evaluation of protein quality of dishes**
  - To calculate chemical score & Net Dietary Protein Calorie Percent [NDP Cal %] of dishes

## REFERENCES

1. Michael J. Gibney, Hester V Vorster and Frans J Kok (2003) Introduction to Human Nutrition. Blackwell publishing Oxford, U.K.
2. Kathleen Mahan and Sylvia Escort – Stump (2000) : Food, Nutrition & Diet Therapy 11<sup>th</sup> Edition, W.B. Saunder's Company London.
3. Roach Benyan (2003) Metabolism and Nutrition Elsevier Science Ltd. Philadelphia. U.S.A.
4. Susan G. Dudek (2007) Nutrition Essentials for Nursing Practice, LippincotWilleams d Wilkias, Philadelphea.
5. Z.S.C.Okoye: Biochemical Aspects of Nutrition, Prentice - Hall of India Private Limited, New Delhi.
6. S.P.Singh: A Text Book of Biochemistry, Published by S.K.Jain, CBS publishers, New Delhi,
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10. Matab S. Bamji, N. PrahladRao, Vinodini Reddy (1996): Text Book of Human Nutrition, Oxford & IBM Publishing Co. Pvt. Ltd., New Delhi.
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20. Yadav : Instrumental Methods of Chemical Analysis, Campus India Publications.
21. Berdanier, C.D. and Haargrove., J.L. (ed) (996) : Nutrients and Gene Expression, Clinical Aspects, Boca Raton, FL CRC Press.
22. Baeurle, P.A. (ed) (1994) : Inducible Gem Expression. Part 1, Environmental stresses and Nutrients, Boston, Birkhauser.
23. Chandra, R.K. (ed) (1992): Nutrition and Immunology, ARTS Biomedical St. John's Newfoundland.

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1. American journal of Clinical Nutrition. American Society For Clinical Nutrition, Bethesda, USA.
2. World review of Nutrition And Dietetics. A.Karger AG 4011 BaselSwitzerland.
3. All WHO and FAO Monographs.
4. Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.
5. The Journal of Nutrition. The American Institute of Nutrition, BethesdaMeryland.
6. Nutrition Reviews. The Nutrition Foundation, Inc., New York.
7. Indian Journal of Nutrition & Dietetics, ShriAvinashlingamHomeScienceCollege, Coimbatore.
8. Proceedings of Nutrition Society of India, Nutrition Society of India, NIN, Hyderabad.



## **Semester III**

### **PAPER III**

#### **COMMUNITY NUTRITION AND PUBLIC HEALTH-I**

**Marks: Theory: 80**

**Internal Assessment: 20**

**Sessional : 50**

#### **Objectives**

- Develop a holistic knowledge base and understanding of nature of important nutrition problems and their prevention and control for the disadvantaged and upper socio-economic strata in society.
- Understand the causes / determinants and consequence of nutrition problems in society.
- Be familiar with various approaches to nutrition and health interventions, programmes and policies.

#### **Contents**

##### **UNIT I**

##### **1. Demographic profile & Vital Statistics**

###### **Demographic profile**

- Population trends in India, Density of population, Age structure, Sex ratio, Family size, Literacy and Education, Life expectancy.

##### **2. Vital Statistics**

- Infant Mortality (IMR), Birth rate (CBR), Fertility rate, Material mortality rate (MMR), Under 5 mortality rate (U5MR)

##### **UNIT II**

##### **1. Food production & Sufficiency**

- Food production, post harvest technology, food grain storage, food losses.
- Food sufficiency, Food requirements verses food availability. Food & Nutritional Security

##### **2. Food Security Programmes**

- Public Distribution System (PDS), Antyodaya Anna Yojana (AAY), Annapurna Scheme, Food for Work Programme.

##### **UNIT III**

## **1. Nutrition Policy and Programme**

- National Nutrition Policy – Aims and objectives
- Short and long term policies and implementation.
- Anganwadi- its management, its role in implementation of nutrition policy programme.
- Functions of Primary Health Centre.

## **2. Nutrition Programme**

- Supplementary feeding programmes (Mid day Meal Programme), Special Nutrition Programme, PradhanMantriGramodayaYojana (PMGY), BalwadiFeeding Programme, Composite Nutrition Programme, Applied Nutrition Programme.

## **UNIT IV**

### **1. Assessment of Nutritional Status**

Methods of Nutritional assessment, nutritional anthropometry, growth standards, dietary and clinical assessment, biochemical and radiological assessment

### **2. Nutrition monitoring – objectives, agencies engaged in nutrition monitoring**

**3. Nutritional surveillance – need for nutritional surveillance, key indicators of nutritional surveillance programme.**

**3FNS-2**

**SESSIONAL**

**Marks : 50**

1. Visit to communities and socio-economic survey.
2. Anthropometric Survey - Techniques of measurements, validity and reliability.
3. Clinical Assessment.
4. Dietary Survey - 24 hour recall, food frequency and weighing of food.

## **REFERENCES:**

1. Park, K. : “Preventive and Social medicine”, BanarsidasBahnot publishers, Jabalpur.
2. Jellife D.B. (1965): "Infant Nutrition in Tropics and Sub-tropics", WHO, Geneva
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4. Proceedings of Nutrition Society of India, NIN, Hyderabad.
5. Technical Reports of WHO.
6. Technical Reports of ICMR, New Delhi.

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**SEMESTER – III**

**Project Design**

**Subject Code: 3FNPD-1**

Marks : 125 Internal

**FOOD SCIENCE AND NUTRITION****SEMESTER IV****PAPER I****CLINICAL AND THERAPEUTIC NUTRITION - II**

**Marks: Theory: 80**  
**Internal Assessment : 20**  
**Practical: 80**  
**Internal Assessment: 20**

**Objectives****The course will enable students to:**

- Understand the etiology, physiologic and metabolic anomalies of acute and chronic diseases and patient needs.
- Know the effect of various diseases on nutritional status and nutritional and dietary requirements.
- Be able to recommend and provide appropriate nutritional care for prevention/and treatment of the various diseases.
- Provide practical laboratory training in the preparation of special diets.
- Provide exposure to actual hospital situation; Study the types of cases admitted, their biochemical, clinical and dietary history.

**Contents****UNIT I****3. Nutrition Therapy of Metabolic Disorders****Diabetes Mellitus**

- Prevalence, Etiology, Symptoms, Types
- Factors affecting normal blood glucose levels, Impaired glucose homeostasis, Diagnostic and screening criteria for diabetes, Complications of diabetes - macro-vascular and micro-vascular
- Management of Diabetes
  - Meal planning approaches, Food exchange list, Glycemic index of foods, Sweeteners and sugar substitutes
  - Medications - Oral hypoglycemic drugs, Insulin
  - Lifestyle modification

## **UNIT II**

### **1. Nutritional Management of Renal Diseases**

- Physiology & functions of kidney, Kidney function tests
- Diseases of kidney - Glomerulonephritis, Nephrotic Syndrome, Acute Renal Failure (ARF), Chronic Renal Failure (CRF)
  - End Stage Renal Disease (ESRD)
    - Dialysis - Hemodialysis, Peritoneal dialysis
    - Kidney Transplant
  - Nephrolithiasis/Renal Calculi
- Etiology, Clinical signs & symptoms and medical nutrition therapy of renal diseases
- Use of sodium, potassium and phosphorus exchange lists in diet planning.
- Psychological support and Lifestyle changes
- Prevention of kidney diseases

## **UNIT III**

### **1. Nutrition and Cancer**

- Development & Characteristics of cancer
- Etiology of cancer
- Metabolic alterations during cancer - Cancer cachexia, Energy metabolism, Other metabolic abnormalities, Sensory changes
- Cancer therapy - Chemotherapy, Radiation therapy, Surgery
- Nutritional considerations - Oral nutritional management, Enteral tube feeding, Total parenteral nutrition

### **2. Nutritional Management in Pulmonary Disorders**

- Nutrition & Pulmonary System
- Chronic Obstructive Pulmonary Disease (COPD)
  - Bronchitis (Acute and Chronic)Etiology, Clinical features and MNT

## **UNIT IV**

- **Nutrition During Stress - The Stress Response**
- **Surgery**
  - Physiological response to surgery, Preoperative & postoperative nutritional care in minor & major surgery, Determination of nutritional support, MNT during surgery

- **Burns**
  - Classification of burns, Complications of burns, Calculations for nutrient requirements, Dietary management & mode of nutrition support for burns, Non dietary treatment and wound management of burns
- **Trauma**
  - Physiological response to injury, Metabolic response to injury, Hormonal response to injury, Dietary management in trauma
- **Sepsis**
  - Systemic metabolic responses, Catabolic responses, Dietary management of Sepsis with or without Multiple Organ Dysfunction Syndrome (MODS)

## 2. Gout

Pathophysiology, Etiology, Clinical features and MNT

## 3. Nutritional Management in Nervous System Disorders

- Alzheimer's disease
- Parkinson's disease

Etiology, Pathophysiology, Clinical features and MNT

## 4. Nutrition for Bone Health

- Bone Mass – Measurement of bone mineral density (BMD), Peak bone mass (PBM)
- Nutrition & bone - Calcium, phosphate & vitamin D
- Osteoporosis - Prevalence, types, etiology, Pathophysiology & MNT

**4FNP-1**

**PRACTICALS**

**Marks : 80**

**Internal Assessment: 20**

## 5. Commonly used tests for diagnosis of various diseases - system-wise.

- Interpretation of patient data and diagnostic tests and drawing up of patient diet prescription using a case study approach.
- Follow up – acceptability of diet prescription, compliance, discharge diet plan.

## 6. Preparation of diet counseling aids for common disorders.

## 7. Planning and preparation of diets for patients with common multiple disorders and complications and discharge diet plans.

**8. Six-week internship in 500 bedded hospital providing hospital diets under the care of registered dietitian.**

**REFERENCE:**

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12. B. Srilakshmi, (2007) : Dietetics, published by K.K. Gupta For Newage International Pvt. Ltd. New Delhi.
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**Journals:**

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9. Journal of American Dietetics Association
10. World Review of Nutrition and Dietetics, Kargar.
11. Applied Nutrition, Indian Dietetics Association.
12. American Journals of Clinical Nutrition. The Clinical Division of American Institute of Nutrition.
13. European Journal of Clinical Nutrition.
14. Nutritional Reviews.

**FOOD SCIENCE AND NUTRITION****Semester IV****PAPER II****ADVANCED NUTRITION- II**

**Marks: Theory: 80**  
**Internal Assessment : 20**  
**Sessional: 50**

**Objectives****This course is designed to:**

- Provide in-depth knowledge of the physiological and metabolic role of various nutrients and their interaction in human nutrition.
- Enable students to understand the basis of human nutritional requirements and recommendations through the life cycle.
- Enable students to understand the pharmacological actions of nutrients and their implications.
- Nutritional problems / nutrition related diseases prevalent among the affluent and the less privileged groups with reference to their incidence, etiology and public health significance.
- Biochemical and clinical manifestations, preventive and therapeutic measures of the nutritional problems.
- Familiarize students with the recent advances in nutrition.

**Contents****UNIT I****1. Lipids**

- Classification - fats and fatty acids
- Functions
- Sources
- Digestion, absorption, transport and storage of fat in the body
- Nutritional and metabolic effects of dietary fatty acids
- Effect of diet on serum lipids and lipoproteins
- Nutritional requirements of fats/oils & fatty acids for various age and physiological groups

**2. Nutrition Regulation of Gene Expression**

- Regulation of gene expression - Role of nutrients

**UNIT II****1. Water, Electrolyte and Acid Base Balance**



- **Water**
  - Functions
  - Distribution
  - Compartments of body water
  - Factors influencing water distribution
  - Water balance - water intake and elimination, Regulation of water balance
  - Water requirements
  - Disturbances in fluid balance
- **Electrolytes**
  - Sodium, Potassium and Chloride
    - Functions
    - Sources
    - Absorption, transport and excretion
    - Recommended intake
- **Acid - Base Balance**
  - Acid generation
  - Regulation of acid - base balance
  - Disorders of acid - base imbalance

## 2. Nutritional Requirements in Special Conditions

- High Altitudes, Cold and hot environments, Space mission

## UNIT III

### 1. Vitamins

- **Fat Soluble Vitamins**
  - **Vitamin A, Vitamin D, Vitamin E & Vitamin K**
    - Absorption, transport, storage & excretion
    - Bioavailability
    - Functions
    - Food sources
    - Deficiency
    - Toxicity
    - Requirements and recommended dietary allowances
    - Assessment of vitamin Status
    - Interaction with other nutrients
- **Water Soluble Vitamins**
  - **Thiamin (B<sub>1</sub>), Riboflavin (B<sub>2</sub>), Niacin (B<sub>3</sub>), Pyridoxine (B<sub>6</sub>), Folic Acid (B<sub>9</sub>), Cynocobalamin (B<sub>12</sub>), Pantothenic Acid, Biotin & Vitamin C (ascorbic acid)**
    - Absorption, transport, storage & elimination
    - Bioavailability
    - Functions
    - Food sources

- Deficiency
- Toxicity
- Requirements and recommended dietary allowances
- Assessment of vitamin Status
- Interaction with other nutrients

## **UNIT IV**

### **1. Minerals**

- **Macro Minerals**

- **Calcium, Phosphorus & Magnesium**

- Absorption, transport, storage & excretion
- Bioavailability
- Functions
- Food sources
- Deficiency
- Toxicity
- Requirements and recommended dietary allowances
- Assessment of vitamin Status
- Interaction with other nutrients

- **Micro Minerals/Trace Elements**

- **Iron, Zinc, Copper & Fluorine**

- Absorption, transport, storage & excretion
- Bioavailability
- Functions
- Food sources
- Deficiency
- Toxicity
- Requirements and recommended dietary allowances
- Assessment of vitamin Status
- Interaction with other nutrients

- **Micro Minerals/Ultra Trace Elements**

- **Iodine, Selenium, Manganese, Chromium, Molybdenum, Boron & Cobalt**

- Absorption, transport, storage & excretion
- Bioavailability
- Functions
- Food sources
- Deficiency
- Toxicity
- Requirements and recommended dietary allowances
- Assessment of vitamin Status
- Interaction with other nutrients

### **2. Nutritional Requirements of Sports Persons**

- Sports specific requirements of nutrients, Pre game and post game meals, Commercial sports specific supplements, Sports drinks, Ergogenic aids

### 3. Potential Health Benefits of Food Components other than nutrients

- Polyphenols, Phytoestrogens, Probiotics, Prebiotics and Symbiotics
- Non nutritive food components with Health Benefits
  - Tannins, Phytates, Lectins and Saponins

**4FNS-1**

**SESSIONALS**

**Marks : 50**

### Objectives

#### The aim of the course is to

- Familiarize students with basic techniques used in Studies and Research in Nutritional Sciences
- Acquaint student with the methods of estimating nutrient requirements
- Orient students towards planning of metabolic studies

### Contents

#### 4. Assessment of proximate components of foods

- Moisture, Fat, Protein, Ash, Crude fiber & Carbohydrate
- Preparations of Ash solutions for estimations of Minerals (Ca, P, Na, K, Fe).

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**FOOD SCIENCE AND NUTRITION****Semester IV****PAPER III****COMMUNITY NUTRITION AND PUBLIC HEALTH – II**

**Marks: Theory: 80**

**Internal Assessment: 20**

**Sessionals : 50**

**Objectives**

- Develop a holistic knowledge base and understanding of nature of important nutrition problems and their prevention and control for the disadvantaged and upper socio-economic strata in society.
- Understand the causes / determinants and consequence of nutrition problems in society.
- Be familiar with various approaches to nutrition and health interventions, programmes and policies.

**Contents****UNIT I**

1. **Nutrition and Infection** –Introduction to immune system,Types of immunity. Vicious cycle of malnutrition & infection, immune response to infection, effects of malnutrition on immunity.
2. **HIV** – Causes, Effects, Prevention.

**UNIT II****Nutrition Education**

1. Scope of nutrition education, steps in planning, conducting & evaluating nutrition and health education programme.
2. Methods of imparting nutrition education – design messages, mass media, traditional methods.
3. Monitoring and evaluation of effectiveness of nutrition and health education programmes.

**UNIT III**

- 1. Problems in Human Nutrition** – Protein energy malnutrition, obesity, underweight, Anemia, vitamin A deficiency, Iodine deficiency disorders, Rickets, Osteomalacia and osteoporosis, Fluorosis.
- 2. Strategies to combat Nutritional Deficiencies** – Food fortification, Food enrichment, Nutrition and health education, vitamin A prophylaxis programme, prophylaxis against nutritional anaemias, control of Iodine deficiency disorders.

#### **UNIT IV**

##### **1. Natural /manmade disasters resulting in emergency situation**

- Famine, draught, flood, earthquake, cyclone, war and political emergencies.

##### **2. Assessment and Surveillance of nutritional status in emergency affected population**

- Indicators of malnutrition, clinical signs for screening acute malnutrition.

##### **3. Nutritional relief and rehabilitation**

- Assessment of food needs
- Mass & supplementary feeding
- Local foods in rehabilitation
- Scarcity ratio.

**4 FNS-2**

**SESSIONAL**

**Marks : 50**

1. KAP Survey to assess perceptions of people.
2. Visit to ongoing Public Health nutrition Programmes, Day Care Centres.
3. Planning low cost nutrition recipes for beneficiaries of Supplementary Feeding Programme,
4. Designing and implementation of Nutrition and Health Programme for community.

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#### **Semester IV**

#### **Research Project (viva voce)**

#### **Code- 4FNRP- I**

Marks : 125

Note :- See the Guidelines in Appendix B in the Directions.