**Department of Home Science**

**Kurukshetra University Kurukshetra**

**Curriculum for M.Sc. Home Science (Food, Nutrition and Dietetics) Under CBCS**

**Scheme of Examination w.e.f. 2017-18**

**Semester-3**

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| **Paper Code** | **Title of Paper** | **Type of Paper** | **Hours/Week** | **Credits** | **Marks**  **(Ext+Int)** | **Total** |
| FND-301 | Clinical Dietetics-I | Core | 4 | 4 | 80+20 | 100 |
| FND-302 | Public Health Nutrition-I | Core | 4 | 4 | 80+20 | 100 |
| FND-303 | Research Methods, Statistics and Computer Applications | Core | 4 | 4 | 80+20 | 100 |
| FND-304 | Food Microbiology | Elective | 4 | 4 | 80+20 | 100 |
| FND-305 | Food Safety & Quality Control |
| FND-306 | Human Physiology |
| FND-307 | Nutrition During Life Cycle | Open**\*** elective | 2 | 2 | 40+10 | 50 |
| FND-308 | Seminar | Core | 1 | 1 | 25 | 25 |
| FND-309 | Clinical Dietetics-I | Core | 8 | 4 | 80+20 | 100 |
| FND-310 | Public Health Nutrition-I | Core | 8 | 4 | 80+20 | 100 |
| **Total** |  |  | **27** |  |  | **675** |

\*will be offered to the students within faculty.

**Semester4**

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| **Paper Code** | **Title of Paper** | **Type of Paper** | **Hours/Week** | **Credits** | **Marks**  **(Ext+Int)** | **Total** |
| FND-401 | Clinical Dietetics-II | Core | 4 | 4 | 80+20 | 100 |
| FND-402 | Public Health Nutrition-II | Core | 4 | 4 | 80+20 | 100 |
| FND-403 | Physical Fitness & Sports Nutrition | Core | 4 | 4 | 80+20 | 100 |
| FND-404 | \*Dissertation | Elective | 4 | 4 | 80+20 | 100 |
| FND-405 | Food Toxicology |
| FND-406 | Food Processing and Technology |
| FND-407 | Clinical Dietetics -II | Core | 8 | 4 | 60 +20+20\*\* | 100 |
| FND-408 | Public Health Nutrition-II | Core | 8 | 4 | 80+20 | 100 |
| **Total** |  |  |  | **24** |  | **600** |

\*Dissertation subject to the condition that the student has obtained 70% or more marks after IInd Semester (M.Sc Ist year).

\*\* Viva-voice of the training of 45 days in hospitals & its report.

**Total Credits =102**

**Total Marks =2550**

**M.Sc. (Food, Nutrition & Dietetics) Under CBCS**

**Semester –III**

**Core**

**Paper -FND-301**

**Clinical Dietetics- I**

Total Marks: 100

External: 80

Internal: 20

Duration of Exam: 3 hrs

**Note:**

* Examiner will set nine questions in all.
* All the questions will carry equal marks.
* Question No.-1 will be compulsory consisting of 5-10 short type questions (having no internal choice) and spread over the entire syllabus.
* Eight questions, two questions from each unit (I, II, III & IV) will be set.
* The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

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| **Objectives:**   * To understand the role of diet in health and disease. * To know about the nutritional problems related to various diseases. * To equip the students about the etiology, clinical aberrations, prevention and nutritional management of various diseases.   **Learning Outcomes:**  This course will enable the students to know about:   * Therapeutic science * Inter relationship between different diseases and their nutritional management. |

**UNIT-I**

**1. Therapeutic modification of the normal diet:**

* Principles of Diet therapy
* Routine Hospital diet
* Diet modifications for therapeutic care
* Enteral and Parenteral nutrition

**2. Nutrition in surgical conditions: pre and post operative.**

**UNIT-II**

**3. Etiology, clinical aberrations, prevention and nutritional management of:**

* Infection
* Fever (Acute and chronic)
* Food Allergy
* Metabolic Stress
* Burns

**UNIT-III**

4. **Nutrition in bone and joint diseases:**

* Arthritis
* Osteoarthritis
* Gout
* Rheumatoid arthritis

1. **Etiology, manifestations and dietary management of:**

* **Gastro intestinal tract disorders**: Peptic ulcer, Diarrhea, Constipation
* **Malabsorption syndrome**: Carbohydrates, Fat and Lactose intolerance, Sprue and Celiac disease.

**UNIT-IV**

1. **Etiology, manifestation and dietary management in disorders of**

* **Liver:** Jaundice, Infective hepatitis, Cirrhosis, Hepatic failure
* **Pancreas:** Pancreatitis – Acute and Chronic
* **Gallbladder**: Gallstones

**References:**

1. Diet Therapy- Williams

2. Nutrition and Physical fitness: Bogert, L.J.

3. Human Nutrition Mc Durtt, Maxine

4. Applied Nutrition – Rajalakshmi, R.

5. Hand book of diet therapy: Dorothea, Turner.

6. Human Nutrition and dietetics- Davidson, S. Passmore, R. Brock- J.F. and Turswell A.S.

7. Clinical Dietetics and Nutrition - Antia, F.P.

8. Modern Nutrition in health and disease by Goodhearth R., S. Shills.

**M.Sc. (Food, Nutrition & Dietetics) Under CBCS**

**Semester –III**

**Core**

**Paper -FND-302**

**Public Health Nutrition- I**

Total Marks: 100

External: 80

Internal: 20

Duration of Exam: 3 hrs

**Note:**

* Examiner will set nine questions in all.
* All the questions will carry equal marks.
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* Eight questions, two questions from each unit (I, II, III & IV) will be set.
* The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

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| **Objectives:**   * To understandprevalence, etiology, biochemical and clinical manifestation and preventive measures for different community diseases. * Develop a holistic knowledge base and understanding of the nature of important nutritional problems and their prevention and control for the disadvantaged and upper socio economic strata in society.   **Learning Outcomes:**  This course will enable the students to know about:   * Causes/determinants and consequences of nutrition problems in society. |

**UNIT-I**

1. **Prevalence, etiology, biochemical and clinical manifestation and preventive measures for:**

- Protein calories Malnutrition

- Beri-beri

Scurvy

**UNIT-II**

1. **Prevalence, etiology, biochemical and clinical manifestation and preventive measures for:**

- Vitamin A deficiency

- Iodine deficiency

- Pellagra

**UNIT-III**

1. **Prevalence, etiology, biochemical and clinical manifestation and preventive measures for:**

-Nutritional Anemia

- Fluorine Deficiency and Toxicity

**Unit-IV**

1. **Prevalence, etiology, biochemical and clinical manifestation and preventive measures for:**

-Rickets

- Osteomalacia

- Osteoporosis

**References:**

1. Nutritional evaluation of food processing, Roberts Haris John willy & Sons, N.Y. London.
2. Nutrition and Physical Fitness: Bogrert, L.J.
3. Nutrition in India: V.N.
4. Human Nutrition- M.C. Durtt, Maxine
5. Applied Nutrition- Rajalakshmi-R.
6. Biology of nutrition – Elements 1972, Platinum Press
7. Nutritional Evaluation of Food

**M.Sc. (Food, Nutrition & Dietetics) Under CBCS**

**Semester –III**

**Core**

**Paper -FND-303**

**Research Methods, Statistics and Computer Applications**

Total Marks: 100

External: 80

Internal: 20

Duration of Exam: 3 hrs

**Note:**

* Examiner will set nine questions in all.
* All the questions will carry equal marks.
* Question No.-1 will be compulsory consisting of 5-10 short type questions (having no internal choice) and spread over the entire syllabus.
* Eight questions, two questions from each unit (I, II, III & IV) will be set.
* The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

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| **Objectives:**   * To understand the significance of statistics 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 apply statistical techniques to research data for analyzing and interpreting data meaningfully   **Learning Outcomes:**   * This course will enable the students to understand the different research methods and their implication to different kind of research. * Provide a deeper knowledge about the statistical skills to interpret the data and get the research outcomes. * Equip the students about the role of computer softwares in research and statistical analysis of data. |

**Note: Students should be given hands on experiences to use appropriate software package for selected statistical analyses**

**UNIT-I**

1. **Role of Statistics and research in Home Science discipline:**

Objective of research: Explanation, Control and Prediction

1. **Nature and types of Research**: Historical, Descriptive, Social Research, Experimental, Field studies, Case study.
2. **Definition and Identification of a Research Problem**:

- Selection of research problems

- Justification

- Hypothesis

**4.** C**oncept and types of variable** : Dependent, independent, random, discrete, continuous,

qualitative and quantitative.

**UNIT-II**

1. **Sampling:** Meaning, importance and types:

Random (simple, systemic, stratified, cluster, two stages and multi stage)

Non-random (incidental, purposive, quota, snow ball).

1. **Data gathering Instruments**: Interview, Observation, Questionnaire, Rating scale, Reliability and validity of measuring instruments.
2. **Analysis of data and research report**

**UNIT-III**

1. **Statistics:** Meaning, frequency, frequency distribution and its type.
2. Parametric and Non parametric test.
3. Normal distribution
4. **Measure of central tendency:** Mean, medium, mode.
5. **Measure of dispersion:** Range, mean deviation, standard deviation, skewnes and kurtosis.

**UNIT-IV**

1. **Chi** – square test
2. **T-test:** Single mean, independent mean, paired mean.
3. Correlation and coefficient of correlation
4. **Analysis of variance :** One way and two way classification
5. Software related to Home Science

**References:**

1. S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics

2. S.C. Gupta: Fundamentals of statistics

3. G. Udny Yule, N.M.G. Kendall: An Introduction to the theory of Statistics

4. Croxton, F.C. and Cowden, D. J. Applied General Statistics, Prentics hall Inc. 1955

5. Garrett. H. Statistical in Psychology and Education. Oxford book Co.1960.

6. R.P. Hooda: Introduction to statistics. The MacMillon Co.

7. Scotharman, W. A. Textbook of Statistics, (Revised edition) 1973.

8. Kerlinge, Foundations of Behavioral Research

9. Sneedecer G. W. Statistical Methods. Applied Pacific Private Ltd., 1961.

**M.Sc. (Food, Nutrition & Dietetics) Under CBCS**

**Semester –III**

**Elective**

**Paper -FND-304**

**Food Microbiology**

Total Marks: 100

External: 80

Internal: 20

Duration of Exam: 3 hrs

**Note:**

* Examiner will set nine questions in all.
* All the questions will carry equal marks.
* Question No.-1 will be compulsory consisting of 5-10 short type questions (having no internal choice) and spread over the entire syllabus.
* Eight questions, two questions from each unit (I, II, III & IV) will be set.
* The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

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| **Objectives:**   * To gain deeper knowledge about role of microorganism in human environment. * To understand the importance of microorganism in food spoilage. * To learn advance techniques in food preservations. * To know about the food borne disease and their prevention.     **Learning Outcomes:**  In this course students will be able to:   * Acquire an insight into interrelationship among microorganism with human body. * Understand the mechanism adopted by the human to eradicate food borne spoilage, diseases and their prevention. |

**UNIT-I**

1. **Introduction to Food Microbiology.**
2. **Microbial growth and methods of measurement of growth.**
3. **Factors affecting the growth of microorganisms in food:** intrinsic (nutrient content, pH and buffering capacity, redox potential, antimicrobial constituents, water activity), extrinsic (relative humidity, temperature, gaseous atmosphere).

**UNIT-II**

1. **Nutritional requirements, nutritional types, culture media and its types for micro organism.**
2. **Sources of contamination and microbial spoilage of**: milk and milk products, eggs and poultry, fish and other sea foods, Cereal and cereal products , meat and meat products, Vegetables and fruits, canned foods.
3. **Food Preservation**: Physical method- Drying, Freeze drying, Cold storage, Heat treatment, Irradiation, High pressure processing.

**UNIT-III**

1. **Role of microorganisms in fermented foods**: Bread, Vinegar, Yoghurt, Cheese Fermented milks, Bear, Wine.
2. **Food borne diseases**: symptoms and methods of prevention and control of following food borne diseases:
   * **Bractical agents:** *Salmonella, Staphylococcus, Clostridium,, E. coli*,
   * **Vibrio Fungal agents**: *Aspergillus, Fusarium, penicillium*.
   * **Viruses:** *Polio, Hepatitis*.
   * **Protozoa**: *Giardia, Entamoeba*

**UNIT – IV**

1. **Microorganisms as food:** single cell proteins, Mushrooms.
2. **Microbiological criteria for food testing and Quality control.** The HACCPsystem and food safety used in controlling microbiological hazards.

**References:**

1. General Microbiology – Powar
2. Good Microbiology – Frazier and Westhoff
3. Microbiology – Prescott, Harley, Klein
4. Food Microbiology – Adams
5. An Introduction of Microbiology \_ P. Tauro
6. General Microbiology – Stanier
7. Food Microbiology – James M. H Jay
8. Food Hygiene, microbiology & HACCP – 3rd edition – S.J. Forsythe & P.R.Hayes

**M.Sc. (Food, Nutrition & Dietetics) Under CBCS**

**Semester –III**

**Core**

**Paper -FND-305**

**Food Safety & Quality Control**

Total Marks: 100

External: 80

Internal: 20

Duration of Exam: 3 hrs

**Note:**

* Examiner will set nine questions in all.
* All the questions will carry equal marks.
* Question No.-1 will be compulsory consisting of 5-10 short type questions (having no internal choice) and spread over the entire syllabus.
* Eight questions, two questions from each unit (I, II, III & IV) will be set.
* The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

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| **Objectives:**   * To equip the students about, food safety. * To understand the different types of food processing in food industries. * To learn about various food laws and standards related to quality management of food.   **Learning Outcomes:**  After successful completion of this course, students will be able to know about:   * Food safety standards. * Different types of food processing. * Implications of food laws to assure food safety. |

**UNIT-I**

1. **Introduction to food safety**: definition, food safety issues, factors affecting food safety, importance of safe foods.
2. **Shelf life of Food Products**: factors affecting shelf life and methods to check the shelf life.
3. **Food additives**: meaning, various types of additives and their numbering: food colour. preservatives, antimicrobial substances, flavoring, emulsifying, stabilizing agents, anti caking, anti foaming, glazing, acid regulator, chelating agent.
4. **Food contaminants of natural origin**: seafood toxins, toxic aminoacids and lathyrism, goitrogens, haemagglutinins, phytates, cyanogenic glycosides.

**UNIT-II**

1. **Recent concerns on food safety**: Genetically modified foods, Nano particles in foods
2. **Food processing**: types of processing methods, effect of processing treatments

– Processing of application of heat, processing by removal of heat, ambient temperature processing. Minimal processing.

**UNIT-III**

1. **Food laws and regulations**: national food legislation, other food legislations/authorities and their role- essential commodities act, 1955, standard of weight and measures act, 1976, export ( quality control and inspection) act, 1963, voluntary based product certifications (ISI mark of BIS and agmark), international, FSSAI.
2. **Organization and agreements**: Food and agricultural organization (FAO), world health organization(WHO), codex alimentarius, codex India, joint FAO/WHO expert committee on food additives ( JECFA), world trade organization(WTO), sanitary and phytosanitary measures(SPS), international organization for standardization(ISO).

**UNIT-IV**

1. **Food safety and quality management systems**: General principle of food safety risk management, hazard analysis critical control point system (HACCP), quality management system,
2. **Latest Trends in different types in Food Packaging:** Meaning, Functions and types of Food Packaging Materials, Active packaging, Intelligent packaging, Modified atmosphere packaging, Gas flushed packaging, Vacuumpackaging
3. **Food labeling.** Definition and mandatory labeling requirements.

**References:**

1. WHO, 1998 world health report life in the 21st centuries. Report of the director general who Geneva.
2. FAO food and nutrition paper manual of food quality control – part 14/1 (1979), to 14/8 (1986) FAO of the United Nations.
3. Curricula on food safety. Directorate general of health services. Ministry of health and family welfare. Government of India. Nirman Bhavan, New Delhi.
4. Graham, H.D. 1980: the safety of foods, AVI publishing company Inc. Westport.

**M.Sc. (Food, Nutrition & Dietetics) Under CBCS**

**Semester –III**

**Elective**

**Paper -FND-306**

**Human Physiology**

Total Marks: 100

External: 80

Internal: 20

Duration of Exam: 3 hrs

**Note:**

* Examiner will set nine questions in all.
* All the questions will carry equal marks.
* Question No.-1 will be compulsory consisting of 5-10 short type questions (having no internal choice) and spread over the entire syllabus.
* Eight questions, two questions from each unit (I, II, III & IV) will be set.
* The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

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| **Objectives:**  This course will enable students to:   * Advance their understanding of some of the relevant issues and topics of Human Physiology. * Understand the integrated function of all systems and the grounding of nutritional science in physiology. * Understand alteration of structure and function in various organs and systems in disease conditions.   **Learning Outcomes:**   * After studying this subject students will be able to apply the knowledge of general and altered physiology to the field of nutrition such as by designing appropriate diets etc. |

**UNIT-I**

1. **Digestive System**- Different parts of digestive system, Secretory and digestive functions of the salivary glands, stomach, pancreas, liver and intestines, mechanism of absorption of carbohydrates, proteins and fats.
2. **Cardiovascular system**- Structure and function of the heart, ECG, cardiac cycle, cardiac output, heart sounds, regulation of heart rate, blood pressure Factors affecting it and hypertension.

**Blood formation, compostition, blood clotting and haemostasis**- formation and functions

of plasma proteins, erythropoesis, blood groups, histocompatibility and blood indices.

**Immune system**- cell mediated and humoral immunity. Activation of WBCs and production

of antibodies and role in inflammation and defense.

**UNIT-II**

1. **Respiratory system**- Structure of respiratory organs, uptake and delivery of respiratory gases and regulation of breathing, Laryngitis, pharyngitis bronchitis, asthma in brief.
2. **Reproductive system**- Structure and function of testis and ovaries, Menstrual cycle, puberty, menopause, breast and cervical cancer, menstrual disorders, infertility, ultra sound imaging in brief.

**UNIT-III**

1. **Excretory System**- Structure and function of kidneys, mechanism of urine formation and the role of the kidneys in water and electrolyte balance, renal stone, albuminurea, haematourea, oedema, uremia, incontinence, in brief.
2. **Sensory System**- General senses (types, structure and functions). Special senses (olfaction, vision, gestation, equilibrium and hearing).

**UNIT-IV**

1. **Endocrine System**- structure, functions and the different syndromes resulting from hypo or hyperactivity of the following glands: Thyroid, parathyroid, adrenal cortex, adrenal medulla, endocrine pancreas, pituitary.
2. **Nervous system**- Main divisions, structure and function of various parts of brain: brain stem, cerebral cortex, cerebellum and diencephalon, structure and function of spinal cord, cerebrospinal fluid, cranial and spinal nerves, introduction to autonomic nervous system, neuralgia, sciatica, coma, poliomyelitis, EEC, CT in brief.

**References:**

1. Stand, F.L. Modern Physiology the Macmillan Company Latest Ed.
2. Guyton, A.C. Text Book of Medical Physiology W.S. Saunders
3. Davidson, B. and Smith E., Text book of Physiology and Biochemistry,

1972 (8th Ed.).

1. Human Physiology – A.J. Vander
2. Principles of Anatomy and Physiology – Anagnastakes.
3. Text Book of Physiology – Patton
4. Bloom W. & Favcott. D.W.A. – Text Book of Histology, W.B. Saunders and Company
5. Martini: Fundamentals of Anatomy and Physiology (6th & 7th Ed

**M.Sc. (Food, Nutrition & Dietetics) Under CBCS**

**Semester –III**

**Elective**

**Paper -FND-307**

**Nutrition During Life Cycle**

Total Marks: 100

External: 80

Internal: 20

Duration of Exam: 3 hrs

**Note:**

* Examiner will set nine questions in all.
* All the questions will carry equal marks.
* Question No.-1 will be compulsory consisting of 5-10 short type questions (having no internal choice) and spread over the entire syllabus.
* Eight questions, two questions from each unit (I, II, III & IV) will be set.
* The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

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| **Objectives:**  This course will enable students to:   * To impart knowledge on the importance of nutrition during life span. * To enlighten on the dietary modification.   **Learning Outcomes:**   * To prove the basic knowledge about role of nutrition in different disease. |

**UNIT-I**

1. Meal Planning.
2. Concept of balanced diet.
3. Principles of meal planning, factors affecting it.

**UNIT-II**

1. **Principles of meal planning for**- infancy, children 3 to 5 years old school going children, adolescents and adults.
2. **Principles of meal planning for** -Pregnant women and lactating mother.

**UNIT-III**

1. **Introduction to therapeutic nutrition**. Therapeutic adaption of the normal diets: soft and fluid diet. Planning of diet in following conditions:
   * + Obesity
     + Diarrhea
     + Constipation

**UNIT-IV**

1. **Introduction to therapeutic nutrition**. Therapeutic adaption of the normal diets: soft and fluid diet.Planning of diet in following conditions:

* Typhoid fever
* Diabetes
* High Blood Pressure

**References:**

1. Diet Therapy- Williams

3. Human Nutrition Mc Durtt, Maxine

4. Applied Nutrition – Rajalakshmi, R.

5. Hand book of diet therapy: Dorothea, Turner.

6. Human Nutrition and dietetics- Davidson, S. Passmore, R. Brock- J.F. and Turswell A.S.

7. Clinical Dietetics and Nutrition - Antia, F.P.

8. Modern Nutrition in health and disease by Goodhearth R., S. Shills.

**M.Sc. (Food, Nutrition & Dietetics) Under CBCS**

**Semester –III**

**Core**

**Paper- FND-309(Practical)**

**Clinical Dietetics- I**

* Planning, Calculation, Preparation, serving and evaluation of therapeutic diets for diseases covered in theory.
* Market survey of commercial nutritional supplements and nutritional support substrate.
* Preparation of diet counseling aids for common disorder.

**M.Sc. (Food, Nutrition & Dietetics) Under CBCS**

**Semester –III**

**Core**

**Paper- FND-310(Practical)**

**Public Health Nutrition- I**

* Development of Low cost nutritious recipes based on locally available food and better quality.
* Development of low cost nutritive recipes suitable for various vulnerable groups.
* Field experience in operational public nutrition programmes: nutrition rehabilitation centers, fortification programmes and cost analysis.

**M.Sc. (Food, Nutrition & Dietetics) Under CBCS**

**Semester –IV**

**Core**

**Paper –FND-401**

**Clinical Dietetics–II**

Total Marks: 100

External: 80

Internal: 20

Duration of Exam: 3 hrs

**Note:**

* Examiner will set nine questions in all.
* All the questions will carry equal marks.
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* Eight questions, two questions from each unit (I, II, III & IV) will be set.
* The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

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| **Objectives:**   * To understand the etiology, physiology and metabolic anomalies of acute and chronic diseases and patients need. * To know the effect of the various diseases on nutritional status and nutritional and dietary requirements.   **Learning Outcomes:**  After successful completion of this course students will be able to:   * Recommend and provide appropriate nutritional care for prevention/ and treatment of the various diseases. |

**UNIT-I**

**1. Etiology, manifestations and dietary management of Renal Disorders**:

* Glomerulonephritis
* Nephrotic syndrome
* Acute renal failure
* Chronic renal failure
* Renal stones

**UNIT-II**

**2. Nutrition Therapy management in:**

* AIDS
* Cancer

1. **Nutrition management in special conditions**:

* Space travel
* High altitude/ Low temperature
* Heavy manual labour in tropical climate

**UNIT-III**

1. **Etiology, metabolic and clinical aberrations, complications, prevention and**

**nutritional management of:**

* Weight imbalances (over and under nutrition)
* Diabetes mellitus
* Cardiovascular disorders: Hypertension, Atheroscelerosis, Coronary

heart disease

**UNIT-IV**

1. **Chronic alcoholism:**

* Effect of Alcohol on digestion and absorption
* Alcohol nutrient interaction
* Dietary management

1. **Introduction, clinical features, dietary management of:**

* Inborn errors of metabolism**:** Phenylketonuria, Galactosemia, Alkaptonuria

**References:**

1. Mal-Nutrition and the Eye: Donala Sterart Mclaren, Academic Press, New York and

London.

1. Diabetes Mellitus: Williames and Wikins Co., USA
2. Nutrition and Physical fitness: Bogert, L.J.
3. Human Nutrition Mc Durtt, Maxine
4. Applied Nutrition – Rajalakshmi, R.
5. Hand boom of diet therapy: Dorothea, Turner.
6. Human Nutrition and dietetics- Davidson, S. Passmore, R. Brock- J.F. and

Turswell A.S.

1. Clinical Dietetics and Nutrition - Anita, F.P.
2. Food Science and Technology: Pyke, Maonus.
3. Modern Nutrition in health and disease by Goodhearth R.S. Shills.

**M.Sc. (Food, Nutrition & Dietetics) Under CBCS**

**Semester –IV**

**Core**

**Paper –FND-402**

**Public Health Nutrition-II**

Total Marks: 100

External: 80

Internal: 20

Duration of Exam: 3 hrs

**Note:**

* Examiner will set nine questions in all.
* All the questions will carry equal marks.
* Question No.-1 will be compulsory consisting of 5-10 short type questions (having no internal choice) and spread over the entire syllabus.
* Eight questions, two questions from each unit (I, II, III & IV) will be set.
* The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

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| **Objectives:**   * Orient the students with all the important state of the art methodologies applied in nutritional assessment and surveillance of human groups. * To develop specific skills to apply the most widely used nutritional assessment methods.   **Learning Outcomes:**  After successful completion of this course students will be able to:   * Familiar with various approaches to nutrition and health interventions, programmes and policies. |

**UNIT-I**

1. Food production & conservation. Factors affecting per capita food availability and consumption: poverty, family planning, social & cultural values, education.
2. Nutrition surveillance and planning

**Unit II**

1. National nutrition Policy.
2. Assessment of Nutritional status of the Community

- Clinical

- Biochemical

- Anthropometric measurements

- Dietary surveys

**Unit III**

1. Nutritional Programmes for improvement of Nutritional status:

- Nutrient Deficiency control programmes.

- Supplementary Feeding programmes.

-Food Security Programmes

-Self Employment and Wage Employment Schemes.

**Unit IV**

**6.** Nutrition Education:

-Methods

- Planning and execution

- Evaluation and follow up

**References:**

1 Nutritional evaluation of food processing, Roberts Haris John willy & Sons, N.Y. London.

2 Nutrition and Physical Fitness: Bogrert, L.J.

3 Nutrition in India: V.N.

4 Human Nutrition- M.C. Durtt, Maxine

5 Applied Nutrition- Rajalakshmi-R.

6 Biology of nutrition – Elements 1972, Platinum Press

7 Nutritional Evaluation of Food

**M.Sc. (Food, Nutrition & Dietetics) Under CBCS**

**Semester –IV**

**Core**

**Paper -FND-403**

**Physical Fitness and Sports Nutrition**

Total Marks: 100

External: 80

Internal: 20

Duration of Exam: 3 hrs

**Note:**

* Examiner will set nine questions in all.
* All the questions will carry equal marks.
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* Eight questions, two questions from each unit (I, II, III & IV) will be set.
* The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

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| **Objectives:**   * To understand the component of health and fitness. * To make nutritional dietary and physical activity recommendations to achieve fitness and well being. * To develop ability to evaluate fitness well being.   **Learning Outcomes:**  After successful completion of this course students will be able to know about:   * Physical fitness and wellness * Type of nutrient to support physical activity. * Sports specific diets. |

**UNIT-I**

1. **Physical Fitness and health status**: Definition, concept, goal, assessment criteria and management
2. **Healthy life style**: Strategies, factors that promote life style changes.
3. **Self management skills to attain physical fitness.**

**UNIT-II**

1. **Body composition:** in exercise and sport
2. **Physical Activity**: need, principles of physical activity
3. **Energy input and output**: Different energy systems for endurance and

power activity. Fuels and nutrients to support physical activity.

**Unit-III**

1. **Nutrition in Sports**: Sports specific requirement, Diet manipulation, Pre-game, during and post-game meals.
2. **Diets for athletes with high energy requirements**: Stress, Fracture and Injury.
3. **Water and electrolyte balance**: Losses and their replenishment during exercise and

sports events, effect of dehydration, sports drinks**.**

**Unit-IV**

1. **Special Nutrition considerations** **for**: Female, Older and Disabled athletes.
2. **Nutrition education of athletes and coaches**.
3. **Alternative system for health and fitness like**: Yoga, Meditation, Vegan and Traditional

Diets.

**References:**

1. Ira Walinaky, (1998) Nutrition in Exercise and sport
2. Charles B. Corbin, Ruth Lindsey and grey walk (2000) Concepts of fitness and wellness.
3. Robert A. Robergers and Scott O. Roberts (2000) exercise physiology.

**M.Sc. (Food, Nutrition & Dietetics) Under CBCS**

**Semester –IV**

**Elective**

**Paper -FND-405**

**Food Toxicology**

Total Marks: 100

External: 80

Internal: 20

Duration of Exam: 3 hrs

**Note:**

* Examiner will set nine questions in all.
* All the questions will carry equal marks.
* Question No.-1 will be compulsory consisting of 5-10 short type questions (having no internal choice) and spread over the entire syllabus.
* Eight questions, two questions from each unit (I, II, III & IV) will be set.
* The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

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| **Objectives:**   * To familiarize with hazards and toxicity associated with food and their implications for health. * Know the various kinds of hazards. * Be familiar with various tests.     **Learning Outcomes:**  After successful completion of this course students will be able to:   * Assess and evaluate different aspects of food safety and various types of hazards. |

**UNIT-I**

1. **Introduction to food safety and Toxicology:** Hazards- Microbiological, Nutritional, Environmental, Natural Toxicants, Pesticide residues and Food Additives.
2. **Assessment of Food Safety**

* Risk assessment and risk benefit
* Indices of human exposure
* General design of toxicity assays
* Acute toxicity
* Mutagencity and carcinogenicity
* Reproductive and development toxicity
* Neurotoxity and behavioural effects
* Immunotoxicity
* Biotechnology and food safety
* HACCP

**UNIT-II**

1. **Evaluation Guidelines and Computer Modeling of Risk Assessment.**
2. **Microbial Problems in Food Safety including Mycotoxins and viruses**

**UNIT-III**

1. **International Direct Additives:** Preservatives, Nitrate and N-nitroso Compounds.
2. **Indirect Additives, Residues and Contaminants:** Multi-contaminant studies. Anti-microbial and veterinary drugs, pesticides, polyhalogenated aromatic hydrocarbons, polycylic aromatic hydrocarbons. Other organic residues, packaging materials, heavy metals, radio nuclides in foods.

**UNIT-IV**

1. **Naturally occurring toxicants & food contaminants:** Sea food toxins, biogenic amines, mutagens & carcinogens in heated & processed foods, coffee & methylxanthines, toxicity of mushrooms alkaloids compounds, glucosinolates, protease inhibitors, phytate, otherantinutritional compounds.
2. **Safety aspects of foods produced by biotechnology and genetic engineering.**

**References:**

1. OECD Documents (1996): Food Safety Evaluation. Organization for Economic Co-operation and Development Paris.
2. World Health Organization (1990): Strategies for Assessing the Safety of Food Produced by Biotechnology. Report of a Joint FAO/WHO Consultation- Geneva.
3. Walker and Quattrucci, E. (eds) (1980): Nutritional and Toxicological Aspects of Food Processing, Tayloss and Francis, New York.
4. Lava, K.; Muller, E.I.; Toxicological Aspects of Foods; Elevier Applied Science, London.
5. Lee, L.W. (ed) (1995): Human Tissue Monitoring and Specimen Banking; Opportunities for Exposure Assessment, Risk Assessment and Epidemiologic Research. Proceedings of a Symposium Research Triangle Park, NC, March 30 to April 1, 1993. Environ. Health Perspect. 103 (suppl.3)1.
6. Hayes, A.W. (ed) (1994): Principles and Methods of Toxicology, 3rd rd, Raven Press, New York.
7. Tyson, C.A.; Fraizer, J.M. eds (1994): Methods in Toxicology, Academic Press, New York
8. Yang, R.S.H. (ed) (1994): Toxicology of Chemical Mixtures, Case Studies, Mechanisms and Novel Approaches, Academic Press, New York.
9. Finley, J.W., Robinson, S.F. and Armstrong, D.J. (1992): Food Safety Assessment, ACS Symposium Series, American Chemical Society, Washington.
10. Graham. H.D. (1980): The Safety of Foods, AVI publishing Company Inc., Westport.
11. Steinhart, C.E. Doyce , N.E. and Coohrance, B.A. (1996): Food Satety, Food Research Institute, Marcel Dekker Inc., New York.
12. McMurray, C.H., Strewart, E.M., Gray, R. Pearce, P. (ed) (1996): Detection Method for irradiated Foods- Current Status, Vol. 14, Academic Press, New York.
13. Varnham, A.H. Evans, M.G. (1991): Foodborne Pathogens Wolfe.
14. Doyle, M.D. (ed) (1989): Food-borne Bacterial Pathogens, Marcel Dekker, New York.
15. Hayatsu, H. (1991) Mutagens in Food: Detection and Prevention. CRC Press.
16. Bronzetti, G.; De Flora, S.; Waters, M.D. and Shankel, D.M/ (1993): Antimutagenesis and Anticarcinogenesis Mechanisms Plenum Press, New York.

**M.Sc. (Food, Nutrition & Dietetics) Under CBCS**

**Semester –III**

**Elective**

**Paper -FND-406**

**Food Processing and Technology**

Total Marks: 100

External: 80

Internal: 20

Duration of Exam: 3 hrs

**Note:**

* Examiner will set nine questions in all.
* All the questions will carry equal marks.
* Question No.-1 will be compulsory consisting of 5-10 short type questions (having no internal choice) and spread over the entire syllabus.
* Eight questions, two questions from each unit (I, II, III & IV) will be set.
* The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

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| **Objectives:**  This course will enable students to:   * To impart knowledge on the importance of nutrition during life span. * To enlighten on the dietary modification.   **Learning Outcomes:**   * To prove the basic knowledge about role of nutrition in different disease. |

**UNIT-I**

1. **Introduction:** Maincrops grownin the country- importance and storage
2. **Physical principles in food processing operations:**
   * + Thermal processing- Degree of processing or preservation, selecting heat treatment, heat resistance of micro organism, nature of heat transfer, protective effects of food constituents, types of thermal treatment.
     + Refrigeration – Refrigeration, cool storage and shelf life extension; cool storages with air circulation, humidity control and gas modification (i.e. CA, MA, & SA)
     + Freezing – Changes during freezing- rate of freezing, choice for final temperature for frozen foods, freezing methods, freezing effects.
     + Dehydration- Dehydration, water activity and food safety/quality; methods of dehydration.
     + Ionizing radiations- Forms of radiant energy; ionizing radiations, sources and properties; radiation units; radiation effects, limiting indirect effects; dose fixing factors; objectives in food irradiation, safety and quality of irradiated food; irradiation of various foods and comparison with other methods of preservation.

**UNIT -II**

1. **Chemical principles in food processing:** Preservation/processing by sugar, salt, curing, smoke, acid and chemicals; chemical changes in foods that affect texture, flavor, colour, nutritive value and safety during handling, storage and processing; Chemical and biochemical reactions affecting food quality and safety.
2. **Cereals and Pulses:** Wheat grain characteristics and products; wheat milling process; milling of drum or semolina; macaroni or pasta products noodles, wheat starch and gluten fraction, baking technology, production of bread, biscuits and cakes.
   * + Corn wet milling; dry milling and air classification; wet fractionation of barley, pearling.
     + Barley malting; dry milling and air classification; wet fractionation of barley. Pearling.
     + Storage and quality of cereal grains
     + Rice processing, fractionation, quick-cooking rice, parboiled rice, rice based instant foods.
     + Pulses – processing, elimination of toxic factors, quick-cooking dals, fermentation and germination.

**UNIT -III**

1. **Fruits and vegetables:**
   * + Structure, composition, physiological and biochemical changes during ripening, handling and storage.
     + Varietal, harvesting and pre- processing considerations for vegetables; post harvest processing practices. Processing of vegetables, canning, freezing, dehydration, pickels and chutneys.
     + Potato processing- Raw material handling and storage, raw material quality and suitability for chips, French fries, dehydrated granules and boiled/canned potatoes; processing for chips, French fries, dehydrated granules.
     + Fruit processing- Canning, fruit-based beverages and concentrates, squashes, jams, jellies, ketchup’s sauces, high sugar, high acid products.
2. **Meat, Fish and Eggs:**
   * + Chemistry of processed meats, Ageing and tenderizing, curing, smoking and freezing of meat, fresh storage of meat.
     + Fish preservation and processing.
     + Meat and fish products: preservation by curing, smoking, salting and pickling and dehydration, corned beef, sausages, salami, bacon, luncheon meat.
     + Dehydrated egg powder and frozen egg, egg storage.
     + Sources of bone meal, gelatin, casing plasma and blood, curing.

**UNIT –IV**

1. **Oilseeds:** Oilseed pressing, solvent extraction, purification (degumming, refining, bleaching, deodorization), hydrogenation, plasticisi ng and tempering, products- butter, margarine, shortening, mayonnaise and salad dressing, inter- esterification and production of MCT.
2. **Spices:** Processing and extraction of essential oils and colours, stability, storage and preservation.
3. **Fermentation Technology:**
   * + Fermentationtechnology, yeast, milk products, fermented vegetables, beer, vinegar, fermented soy products.
     + Enrichment and fortification technology, high protein food technology.
4. **Functional foods and Technologies to meet special needs. New advances.**

**Reference:**

1. Gould, G.W. (1995), New Methods of Food Preservation, Blackie Academic & Professional, London.
2. Connor, J.M. and Schick W.A. (1997), Food Processing An industrial Powerhouse in Transition, John Wiley and Sons, New York.
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5. Philips, R.D. and Finley J.W. (1989), Protein Quality & Effects of Processing, Marcel Dekker, INC, New York.
6. Inglett, G.C. and Munet, L. (1980), Cereals for Food and Beverages, Academic Press, New York.
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9. Kalp, K. Lorenz, k. and Brummer, J. (1995), Frozen and Refrigerated Doughs and Batters, American Association of Cereal Chemists INC. St. Paul, Minnesota.
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11. Marts, S.A. (1996), Bakery Technology and Engineering, Third Edition, CBCs Publishers, New Delhi.

**M.Sc. (Food, Nutrition & Dietetics) Under CBCS**

**Semester –IV**

**Core**

**Paper- FND-407(Practical)**

**Clinical Dietetics- II**

* Planning, Calculation, Preparation, serving and evaluation of therapeutic diets for diseases covered in theory.
* Market survey of commercial nutritional supplements and nutritional support substrate.
* Study of the management of food services in selected Hospitals.
* Visits to dietetic clinics in hospitals- case study of patients needing specific therapeutic diets.
* Internship in a hospital for 45 days after the theory exam with report submission.

**M.Sc. (Food, Nutrition & Dietetics) Under CBCS**

**Semester –IV**

**Core**

**Paper- FND-408(Practical)**

**Public Health Nutrition- II**

* Assessment of nutritional status of community by using dietary, anthropometric measurement. (Report to be submitted in the practical exam).
* Preparation and effective use of aids for nutrition education.