BENGALURU CITY UNIVERSITY

SYLLABUS FOR

M.Sc. NUTRITION AND DIETEITCS

(I &II SEMESTER)

2021 – 2022 ONWARDS

SEMESTER I

NUTRITION AND DIETETICS

PAPER I

HUMAN NUTRITION

Code: MSND 101 **Total marks: 100**
Hours: 52 **Theory: 70**
Instructions/week: 04 **IA : 30**

OBJECTIVES

- Enable the students to understand the metabolic role of macro and micro nutrients and their importance in human nutrition.
- Enable the students to translate the knowledge into practical guidelines to meet the nutritional demands of the individual at different ages.

UNIT I 14 hours

- Carbohydrates: Introduction, classification, physiological function, digestion, absorption, metabolic utilization of CHO, artificial sweeteners, glycemic index of food and its uses , glycemic load, modification of carbohydrate intake for specific disorders-lactose intolerance, diabetes mellitus.

- Dietary Fibre- Introduction, types, RDA, components of dietary fibre, Role of dietary fibre in human nutrition.

- Protein**:** classification, functions, requirements and RDA, digestion, absorption and metabolic utilization of protein, quality of protein and Protein deficiency.

- Amino acid-Types, functions, requirements and deficiency

UNIT II 10 hours

- Lipids- Classification, functions, significance of fatty acid, Requirements of total fats and fatty acids, RDA, digestion, absorption, metabolic utilization of fats. Role of lipo protein, cholesterol and triglycerides in health and disease.
- Fatty acid- Types, functions, requirements, food sources and deficiency.

- Omega fats: Classification, role in good health, daily requirements, food sources, fortification of omega fats.

UNIT III **8 hours**

- Water and Electrolytes: Electrolytes and body composition, body water distribution and functions, water balance and its regulations, requirements of water.
- Fluid Imbalance: Dehydration, Oedema, water toxicity.
- Determination of energy value of food, components of energy expenditure- BMR, PAL, RMR, PAR, Thermic control of food intake, Role of hormones in energy requirements for different age groups and energy balance.

UNIT IV **8 hours**

- Macro minerals-Physiological functions,food sources, deficiency and requirements of Calcium,Potassium, Phosphorus, Magnesium, Sodium, Chlorine and Sulphur.
- Micro minerals -Physiological functions, food sources, deficiency and requirements of Iron, Copper, Zinc, Iodine, Fluoride and Manganese.

UNIT V **12 hours**

- Fat soluble vitamins: Physiological functions, food sources, deficiency, interaction with other nutrients and requirements - Vitamin A,D, E and K.
- Water soluble vitamins: Physiological functions, food sources, deficiency and interaction with other nutrients and requirements -Thiamine, Riboflavin, Niacin, Folic acid, Pyridoxine, B12, Biotin, vitamin C and Pantothenic acid.

SEMESTER I

Nutrition and Dietetics

Paper I HUMAN NUTRITION

PRACTICALS

Code: MSND 101P **Total marks: 50**
No. of Weeks: 13 **Practicals : 35**
Hours/week :04 **IA : 15**

OBJECTIVE

- To familiarise students with planning and preparation of recipes with different nutrients.

Unit I

Planning and preparation of protein rich recipes and comparison with reference protein egg white

Unit II

Planning of recipes with low glycemic index and calculate glycemic load

Planning and preparation of recipes rich in soluble fibre and calculate

Unit III

Planning and preparation of recipes with optimal omega fatty acids ratio

Unit IV

Planning and preparation of bio available macro and micro mineral rich recipes (iron and calcium)

Planning and preparation of bio available vitamin rich recipes

UNIT V

Analysis of body composition using body stat apparatus

REFERENCES

1. Text Book of Human Nutrition – Mahtab S. Bamji, N Prahlad Rao, Vinodini Reddy, 2nd edition,Oxford & IBH Publishing Co. Pvt. Ltd.
2. Perspectives in Nutrition – Gordon M. Wardlaw, Margaret Kessel, 5th edition, Mc Graw Hill Publication.
3. Human Nutrition – Geissler & Powers, 11th edition, Elsevier Publications.
4. Normal and Therapeutic Nutrition - Robinson & Lawler, 17th edition, Mac Millan Publishers.
5. Foods – Nutrition and Health – Dr. Vijaya Khader, Kalyani Publishers.
6. Mahan L.K and Ecott- Stump, S.(2000): Krause's Food, Nutrition and Diet Therapy
7. Shils,M.B.Oslon,J.A.Shike, N and Rose, A.C.(Ed).(1999): Modern Nutrition in Health and Disease, 9th Edition, San Williams and Wilkins
8. WHO Technical Report Series
9. Indian Council of Medical Research, Recommended Dietary intake for Indians- Latest Recommendations
10. Advanced Nutrition and Human Metabolism, Sareen S.Gropper, Jack. L.smith, James, L.Groff. Fourth Edition
11. Williams Basic Nutrition and Diet Therapy. Static Nix. 12 th Edition(2005)

Journals

- Nutrition Reviews
- International Journal of Vitamin and Nutrition Research

SEMESTER I

NUTRITION AND DIETETICS

PAPER II

HUMAN PHYSIOLOGY

Code: MSND 102 **Total marks: 100**
Hours: 52 **Theory: 70**
Instructions/week: 04 **IA: 30**

OBJECTIVES

- To enable the students to understand the various systems in the body
- Advance their understanding of some of the relevant issues of human physiology

UNIT I 8 hours

- Basic Tissues-Classification, Structure, Functions, Haematopoiesis, Blood coagulation and blood groups.

UNIT II 10 hours

Nervous System

- Structure of brain and spinal cord – Functions**,** Classification of Nervous system**,** Neurotransmitters**,** Cerebrospinal fluid.
- Afferent and Efferent nerves, Reflex action
- Structure of nerve cell and conduction of nerve impulse
- Blood brain barriers

UNIT III 12 hours

Endocrine System and Immune system

- Endocrine Gland: Structure , functions and secretion of endocrine glands
- Formation and secretion of hormones and control of hormone secretion
- Thyroid Gland: Structure, formation of hormones, functions, hyper and hypothyroidism.
- Pituitary Gland – Structure, secretion of hormones, abnormalities
- Parathyroid Gland – Structure of parathyroid, secretion, functions
- Islets of Langerhans –structure, functions, deficiency

Immune system

- Role of thymus
- Cell mediated and hormonal immunity
- Activation of WBC, production of antibodies and B cells

UNIT IV **12hours**

Digestive System

- Structure, functions of GI secretion, Role of enzymes in digestion, Gut flora, structure and functions of Liver.

Blood and Cardiovascular System

- Structure, functions of heart and blood vessels, Blood Pressure, heart rate, Blood pressure its regulations, Factors affecting BP and heart rate.

- Regulations of cardiac output, Pulmonary, systemic and Portal circulations.

Composition of blood

- Plasma proteins- functions.
- Blood lipids- Chylomicrons, VLDL, HDL, cholesterol and Triglyceride
- Enzymes in blood and blood coagulations.

Respiratory System

- Mechanism of respiration, Structure of respiratory tract, Respiratory rate, Air volume in lung, Respiratory abnormalities.

UNIT V **10 hours**

Excretory and Reproductive System

- Structure, functions of excretory tract
- Urine formation – physiology and composition
- Role of kidney in maintaining water and electrolyte balance
- Testes – structure of testes, function and deficiency
- Ovaries – Structure and functions

SEMESTER I

Nutrition and Dietetics

Paper II- HUMAN PHYSIOLOGY

PRACTICALS

Code: MSND 102P	**Total marks: 50**
No of weeks: 13	**Practicals : 35**
Hours/week: 04	**IA: 15**

OBJECTIVE

- To acquaint the students with principles, techniques and application of different methods of analysis for various components in blood.

Unit I

Determination of blood group and Rh factor

Enumeration of RBC Count

Estimation of haemoglobin

Unit II

Estimation of blood glucose using glucometer

Monitoring of pressure using BP apparatus

Test for physical fitness- flexibility endurance and muscular strength test

Unit III

Pulmonary function test (Spirometry test to assess lung health)

Unit IV

Skin Prick test to diagnose food allergy

Unit V

A visit to a physical fitness / health care centre and preparation of report

REFERENCES

1. Textbook of Medical Physiology – Guyton, 8th edition, HBJ International Edition, WB Sanders.
2. Essentials of Medical Physiology – Anil Baran Singha Mahapatra, 2nd edition, Current Books International.
3. Human Physiology – An Integrated Approach – DU Silverthorne, Prentice Hall.
4. Human Physiology – from cells to system – L Sherwood, 6th edition.
5. Textbook of Biochemistry (for Medical Students) – DM Vasudevan and S Sree Kumari,4th edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi
6. Ganong, W.F, (1985) Review of Medical Physiology, 12th edition, Lange Medical Publication
7. Guyton A.C(1985), Function of Human Body, 4th edition, W.B, Sanders Company, Philadelphia
8. Guyton, A.C and Hall, J.B, (1996) Text Book of Medical Physiology, 9th edition, W.B Sanders Company, Prism Books Pvt ltd, Bangalore
9. Jain A.K Text Book of Physiology, vol 1 and II. Avichal Publishing Co New Delhi.

SEMESTER I

NUTRITION AND DIETETICS

PAPER III

NUTRITIONAL BIOCHEMISTRY

Code: MSND 103 **Total marks: 100**
Hours: 52 **Theory: 70**
Instructions/week: 04 **IA: 30**

OBJECTIVES

- Develop knowledge in biochemical aspects of nutrition.
- To know the classification, functions and metabolism of lipids, vitamins, and minerals.

UNIT I 10 hrs

- Thermodynamics: Laws, Application of thermodynamic principles in living system
- Bioenergetics- energy transfer, free energy concept, exergonic and endergonic reactions, High energy compounds
- Mitochondrial Electron Transport chain – Stepwise process
- Schematic representation indicating sites of energy conservation, ATP synthesis, Oxidative Phosphorylation.

UNIT II 12 hrs

- pH, physiological relevance, buffers and their biological importance.
- Water as a solvent of life.
- Polysaccharides: Definition, classification and functions of homo and hetero polysaccharides, nutritional significance of polysaccharides.
- Fat: Types and Nutritional significance
- Blood Proteins : Nature and functions
- Enzymes: Charecteristics, classification, functions, clinical significance

UNIT III **10 hrs**

- Metabolism of Carbohydrates: Glycolysis, TCA cycle, HMP shunt and gluconeogenesis, threshold for glucose, glycogen metabolism, impairment of carbohydrate metabolism.
- Metabolism of proteins - General reactions and urea formation.
- Metabolism of Lipids - Role of essential fatty acids and Lipoproteins, Biosynthesis and breakdown of Cholesterol, Beta Oxidation of fatty acids, biosynthesis of fatty acids, disorders of lipid metabolism- Ketosis
- Metabolic Changes during starvation.

UNIT IV **10 hrs**

- Molecular biology : Central Dogma, DNA replication, Transcription and Translation
- Nutrigenomics and human genome project: Definition, concept and theory.
- Mutation : Principle, types, effects, mutagens
- Antioxidant nutrients: Source, principle compounds, protective compounds in foods, inhibition of carcinogen activation.

UNIT V **10 hrs**

- Water Soluble Vitamins-Physiological action, storage, transport, sources, functions and deficiency of: Thiamin, Riboflavin, Vitamin B12, Pantothenic acid, Folic Acid, Pyridoxine, Niacin, Ascorbic acid.
- Fat Soluble Vitamins- Physiological action, transport, utilization, storage, sources, functions and deficiency ofVitamin A, Vitamin D, Vitamin E , Vitamin K
- Minerals - sources, daily requirements, functions, dietary sources and deficiency of calcium, Phosphorus, Iron, Iodine, Fluorine and Zinc, Copper, Manganese, Selenium and Chromium.

- Water - Functions, Distribution, Requirements
- Disturbances in Fluid Balance- Dehydration and Oedema

SEMESTER I

Nutrition and Dietetics

Paper III-NUTRITIONAL BIOCHEMISTRY

PRACTICALS

Code: MSND 103 P **Total marks: 50**
No. of Weeks: 13 **Practicals : 35**
Instructions/week: 04 **IA : 15**

Unit I:

Estimations of Glucose – Benedict's method

Estimation of reducing sugar – DNS Method

Unit II

Estimation of ascorbic acid – Bessey's modified method

Estimation of inorganic phosphate – Fiske Subbarow Method

Unit III

Determination of Iodine value

Determination of saponification value

Unit IV

Estimation of Alanine by Sorenson's Method

Preparation of buffer

Unit IV

Preparation of starch from potatoes

Preparation of casein and lactose from milk

REFERENCES

1. A Textbook of Biochemistry – A V S S Rama Rao, 9th edition, UBS Publisher's Distribution Pvt.Ltd.
2. Nutritional Biochemistry – Tom Brody, 2nd edition, Academic Press
3. Biochemistry – U Satyanarayana, U Chakrapani, Books & Allied (P) Ltd.
4. Textbook of Biochemistry (for Medical Students) – DM Vasudevan and S SreeKumari,4th edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
5. Textbook of Biochemistry (for Medical Students) – DM Vasudevan and S SreeKumari,4th edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
6. Textbook of Medical Biochemistry – M N Chatterjee, RanaShinde, 7th edition,Jaypee Brothers.
7. Textbook of Medical Biochemistry – S Ramakrishnan, K G Prasannan, R Rajan,3rd edition,Orient Longman.
8. Command Stumph, Outlines of Biochemistry.
9. Devlin T.M., Biochemistry by Stryer Text book of Biochemistry with clinical correlations.
10. Lehninger, Principles of Biochemistry, by 4th Ed. By Nelson D.L. and Cox.M.M.
11. Murray R.K., Grammer, D.K., Mayer P.A., Rodwell V.W., Harpers, Biochemistry, a lange medical book 26th Ed. Mc. Graw Hill, HealthProfessions Division.
12. West. E.S., Todal, W.R., Mason H.S. and Van Brygen J.T., Text Book of Biochemistry.

SEMESTER I

NUTRITION AND DIETETICS

PAPER IV

FOOD MICROBIOLOGY AND PRESERVATION

Code: MSND 104 **Total marks: 100**
Hours: 52 **Theory: 70**
Instructions/week: 04 **IA: 30**

OBJECTIVE

- To gain knowledge about principles and methods of food Preservation.

UNIT I 9 hours

- Classification of microorganisms, morphology – bacteria, yeast, mould and algae.
- Micro-organisms-Importance in food, intrinsic and extrinsic parameters that affect microbial growth.
- Microbes and growth of microbes, nutrient content, pH, water activity, humidity, temperature, gaseous atmosphere

UNIT II 10 hours

- Food spoilage – Definition, factors influencing food spoilage, types of food spoilage such as microbes, changes in food quality due to spoilage, methods of detection of food spoilage.
- Sources of contaminants – water, air soil, animals and humans. Food-borne diseases. Bacterial food borne diseases, food-borne viral pathogens, food-borne animal parasites, protozoa, mycotoxins – types, health issues caused by mycotoxins.

UNIT III 11 hours

- Spoilage of cereals and cereal products – moulds and ropiness
- Spoilage of fruits and vegetables
- Microbiology of milk and milk products – kinds of microbes, sources of contaminants and control in milk, butter, yogurt, and cottage cheese,spoilage of milk and milk products – ropiness and proteolysis
- Microbiology of egg, poultry, fish and meat – sources of contaminants, Spoilage of fish and other sea food, meat and meat products (aerobic and anaerobic),poultry , eggs and control measures.

- Spoilage of sugar products
- Spoilage of canned products

UNIT IV **12hours**

Methods of food preservation

- Principles of food preservation, methods of food preservation – pasteurization, blanching, canning, drying and dehydration, Use of high temperature, Use of low temperature - slow and quick freezing, freeze drying , microwave heating, hurdle concept, food irradiation- principle effects of irradiation, advantages and disadvantages.
- Control of microorganisms – sterilization, physical agents – light, electricity, heat, chemical agents and filtration.
- Definition of fermentation – benefits of fermentation, types of fermentation, acid fermented and yeast fermented foods, fermented dairy products – yoghurt, cheese, fermented milk, vegetable fermentation, fermented beverages. Indigenous products – idly, dosa, dokla.

UNIT V **10 hrs**

- Food Additives – Definition, antioxidants, chelating agents, food colours, curing agents, emulsifying, stabilizing and anti foaming agents, sequestrants, flour improvers, flavors, anti-caking agents, humectants, leavening agents.
- Preservatives – Definition, classification – Class I and Class I,Use of preservatives, salt, sugar and vinegar.
- Methods of food preservation – cold storage and dry storage
- Method of packaging- list of common packaging materials and their usage with examples.

SEMESTER I

Nutrition and Dietetics

Paper IV - FOOD MICROBIOLOGY & PRESERVATION

PRACTICALS

Code: MSND 104 P **Total marks: 50**
No. of Weeks: 13 **Practicals : 35**
Hours/week: 04 **IA : 15**

OBJECTIVES

- To understand the microorganisms in foods and in relation to health
- To gain knowledge about principles and methods of food preservation.

UNIT I

Identification of microorganism causing spoilage in bread/fruits/vegetables

Role of yeast in bread.

UNIT II

Quality testing for milk and milk products

UNIT III

Identification of class I and class II preservatives and E numbers

UNIT IV

Preparation of jams, jellies and pickles

a. Spread test

b. Test jam for setting point

c. Sensory evaluation

d. Shelf life

UNIT V

Preparation of squash, tomato ketchup and chutneys

a. Sensory evaluation

b. Shelf life

REFERENCES

1. Frazier, We, Food Microbiology, Tata Mc Graw Hill 1978.
2. Food Facts and Principles – ShakuntalaManay, New Age International Publishers.
3. Fruit and Vegetable Preservation – Principles & Practices – R P Srivastava, Sanjeev Kumar. 3rd, edition, international Book Distributing Co., Lucknow
4. Nutritional Science – B. Sri Lakshmi, New Age International Publishers, 2nd edition.
5. Food Science, Chemistry and Experimental Foods – Dr.M.Swaminathan, the Bangalore Printing& Publishing Co. Ltd., Mysore.
6. Food Science – Norman N Potter, Joseph H. Hotchkiss, 5th edition, CBS Publishers &Distributors, New Delhi.
7. Food Hygiene and Sanitation – S Roday, Tata McGraw Hill Publishing Co. Ltd.,3rd reprint.
8. Food Poisoning and Food Hygiene – Hobbs B C and R J Gillbert, 4th edition,English Language, Book Society and Edward Arnold Publishers Ltd.
9. Food Science – Sumati R. Mudambi, Shalini M. Rao, M V Rajagopal, Revised 2nd edition, New Age International Ltd. Publishers.

SEMESTER I

NUTRITION AND DIETETICS

PAPER V

SOFT CORE

RESEARCH METHODS AND BIO STATISTICS

Code: MSND 105 **Total marks: 100**
Hours: 40 **Theory: 70**
Instructions/week: 03 **IA: 30**

OBJECTIVES

- To enable the students to understand the importance of research design.
- To understand the application of statistical techniques for analysis and interpretation.

UNIT I 8 hrs

- Methods of Research- Definition, meaning, objectives, characteristics, criteria of good research, role of need and scope of research in the field of Nutrition Research process – steps in conducting research, selection of topic/ROL and Research/formulate concepts.
- Hypothesis – definition, purposes, types, attributes of sound hypothesis
- Research design, research questions, objectives and assumptions
- Funding agencies for research, Research ethics.

UNIT II 8 hrs

- Tools for Data collection, Primary and secondary methods of data collection, advantages and disadvantages, Different types of questionnaires, rating scales, interview, schedule, observation, inventories, checklist, rating scales, ranking scales, checklists, attitude scale, inventories standardised tests, interviews, observation. Development of tools, estimation of reliability and validity of tools.
- Sampling – Definition, meaning, and importance, characteristic of good sample, limitations and advantages of sampling. Types of Sampling – Probability Sampling – simple, random sample, systematic random sample stratified random sample, cluster, random and non-random samples, random numbers and use.

UNIT III **8 hrs**

- Non-probability – purposive samples, incidental samples, judgment samples, convenience sampling, quota samples, volunteer sampling, snowball and incidental. Sampling and non-sampling errors, general consideration in the determination of sample size.
- Survey – meaning, advantages and limitations, types
- Report Writing- Reporting – methods of reporting, technical reports, research publications – citation, index, impact factor. Writing Thesis – Thesis definition, parts, steps in writing, writing research proposals
- Research abstract – definition, guidelines in writing abstract.

UNIT IV **8 hrs**

- Classification and Tabulation
- Measures of central tendency-mean, median and mode, their relative advantages and disadvantages
- Measures of dispersion: Mean deviation, standard deviation
- Correlation and Regression- Correlation and its interpretation. Product Moment and Rank order Correlation, Coefficient Regression Equation and its interpretations, use for prediction.
- Probability-Rules of probability and its application Distribution- Normal, binomial- their properties, importance of these distributions in statistical studies. Skewness and kurtosis

UNIT V **8 hrs**

- Coefficient of variation, percentile
- Types of correlation, coefficient of correlation and its interpretation
- Contingency tables, Chi-square test
- Elements of testing a statistical Hypothesis- formulation of the problem, definition of type I and II errors. Level of significance, t test , Z test, F test
- Design of experiment- Analysis of Variance
- Non Parametric Inference: sign Mann-Whitney and X^2 test (as goodness of fit and independence of attributes in 2x2 and r x c contingency tables)
- Soft ware packages for statistical analysis
- Coding of data, editing and cleaning of data
- Data interpretation, presentation of result

REFERENCES

1. Statistical Methods (2002), – S P Gupta, Sultan Chand and Sons Publishers, New Delhi.
2. Research Methodology – methods and techniques (2002), – C R Kothari, Wiley Eastern Limited, Madras.
3. Methodology of research in Social science – O.R. Krishnaswami and M. Ranganatham, revised edition, , Himalaya Publishing house ltd, 2015.
4. Shanthi, P., Sophia and Bharathi(2000), Computer oriented statistical methods/probability and statistics, charulatha publications, second edition.
5. Pillai, R.S.N and Bagavathi, V.(2001), Statistics, Chand and company limited.
6. Research Methodology (Concepts, Methods, Techniques and SPSS)-Dr.
7. Priri R. Majhi, Dr.Prafull K. Khatua, II Edition, Himalaya Publishing House, Pvt. Ltd. 2015.
8. A Handbook of Methodology of Research – Dr.Rajammal P Devadas and Dr. K Kulandaveil, Sri Ramakrishna Mission, Coimbatore.

II SEMESTER

NUTRITION AND DIETETICS

PAPER I

FOOD SCIENCE

Code: MSND 201 **Total marks: 100**
Hours: 52 **Theory: 70**
Instructions/week: 04 **IA: 30**

OBJECTIVES

- To provide an understanding of composition of food
- To familiarize students with changes occurring in various food stuffs as a result of processing and cooking
- Study the effect of food in cooking
- To familiarise on the recent advancement in food science

UNIT I 10hrs

Introduction and Sensory Evaluation

- Introduction to Food Science as a Discipline
- Concept of food
- Properties of food- Physical properties[Definitions and properties of Solution, Boiling point, Freezing point, Bound and Free water, Osmotic Pressure, Acids and bases in food, Colloids- sols ,gels, emulsions, foams, suspensions]
- Applications of Colloidal Chemistry in food preparations

Sensory Evaluation

- Definition
- Introduction to Quality Attributes of Food
- Gustation - the Sense of Taste
- Types of tests- Subjective and Objective tests
- Selection of panel of Judge
- Preparation of samples
- Culinary skills, Culinary applications in food industry and product development

UNIT II **12 hrs**

Cereals and Millets

- Structure, Composition and Nutritive value - Cereals and Millets
- Starch – gelatinization, factors affecting gelatinization, starch gel, retrogradation, and syneresis
- Cereal protein – gluten, factors affecting gluten formation
- Nutrient changes during different treatment methods of cereal grains
- Role of natural leavening agents.
- Characteristics and functional properties of native and modified starches
- Flour – Types, properties, quality and tests for flour quality, role of ingredients and preparation of bread.

Pulses and Legumes

- Pulses - Composition, nutritive value, toxic constituents physical & chemical properties of pulses, pulse cookery.
- Decortication
- Soaking and germination of pulses
- Fermentation of pulses
- Roasting and Puffing
- Effect of cooking treatments on the nutrient composition, quality and quantity of legumes

UNIT III **10 hrs**

Fruits and Vegetables

- Composition, texture and flavour components-terpenoids, flavonoids, Sulphur compounds and other volatile flavor compounds
- Pigments – Water insoluble and Water soluble pigments and factors affecting plant pigments in cooking: acid, alkali, metals, heat
- Changes during cooking and processing
- Browning reaction and preventive measures
- Post harvest changes and storage methods
- Enzymatic browning and its prevention
- Physio – chemical changes in Fruits and Vegetables- ripening and textural changes.

Spices and Beverages

- Composition, flavouring extract, and medicinal value.
- Classification and nutritive value, Preparation of milk based beverages.

UNIT IV **10 hrs**

Fats and Oils

- Sources, physical and chemical properties
- Reactions of fats - Rancidity and Polymerization
- Functional properties of fat and oils
- Interesterification of fats
- Fat replacers
- Factors affecting amount of fat absorbed during cooking

Nuts and Oilseeds

- Nuts and oil seeds – composition and nutritive value
- Role of nuts and oil seeds in cookery.
- Oil extraction and by- products

Sugar Cookery

- Principles and stages of sugar cookery
- Solubility of solution
- Caramalization, Crystallization and factors affecting it
- Non enzymatic browning
- Functionality and their Role in Food Industry
- Sweeteners

UNIT V **10hrs**

Milk and Milk Products

- Composition, physical and chemical properties, nutritive value
- Factors affecting coagulation of milk protein.
- Processing of milk and types of processed milk
- Fermented [Cheese, yogurt]and Unfermented products [ice cream and khoa]
- Milk products – Composition, classification and processing

Animal foods

- Meat-Structure and composition, changes during meat cooking, post mortem changes in meat, muscle proteins, tenderizing and curing of meat, storage
- Poultry- Composition, poultry processing, storage, changes during cooking

- Fish-composition and nutritional importance, types, Selection and characteristics of fresh fish and methods of cooking.
- Egg-structure, composition, quality testing, grading, processing, storage, changes during cooking.

Methods of Food Processing

- Introduction, Methods of Food Processing, production, harvesting and handling of fresh foods, primary processing of cereals, pulses and oilseeds.

SEMESTER II

Nutrition and Dietetics

Paper I FOOD SCIENCE

PRACTICALS

Code: MSND 201P **Total marks: 50**
No. of Weeks: 13 **Practicals : 35**
Instructions/week: 04 **IA : 15**

OBJECTIVE

- To familiarize students with changes occurring in various food stuffs as a result of processing and cooking.

Unit I

- Sensory Evaluation of recipes – Hedonic rating scale, Paired comparison test
- Gelatinization and factors affecting gelatinization
- Factors affecting gluten formation – gluten test, effect of kneading and added substances in chapathi
- Starch--microscopic examination

Unit II

- Pulses – Effect of various methods of cooking
- Testing pectin strength in fruits and vegetable extracts.
- Study of factors affecting texture and pigments of vegetables
- Enzymatic browning in fruits [factors affecting and prevention]

Unit III

- Egg– Preparation of stable emulsion- Mayonnaise, permanent and temporary emulsions
- Assessing egg quality
- Prevention of ferrous sulphide formation

Unit IV

- Test for checking rancidity of oils
- Smoking point

Unit V

- Stages of Sugar cookery ,Any two recipes
- Use of different leavening agents in food preparation
- Chemical leavening agents – preparation of cakes using egg white and whole egg, slow and fast acting baking powder

REFERENCES

1. Food Science – Norman N Potter, Joseph H. Hotchkiss, 5th edition, CBS Publishers & Distributors, New Delhi.
2. Food Facts and Principles – ShakuntalaManay, New Age International Publishers.
3. Food Science – B Sri Lakshmi, New Age International Publishers.
4. Fruit and Vegetable Preservation – Principles & Practices – R P Srivastava, Sanjeev Kumar. 3rdedition, international Book Distributing Co., Lucknow.
5. Food Science, Chemistry and Experimental Foods – Dr.M.Swaminathan, The Bangalore Printing& Publishing Co. Ltd., Mysore
6. Gaman, P.M. and Sherrington, K.B. (1996), The science of food, oxford, Butterworth – Heinemann.
7. Meyer, Lilian H. Ed. (1987), Food chemistry. Indian Ed. CBS Publishers and Distributors.

SEMESTER II

NUTRITION AND DIETETICS

PAPER II

NUTRITION THROUGH LIFECYCLE

Code: MSND 202 **Total marks: 100**
Hours: 52 **Theory: 70**
Instructions/week: 04 **IA: 30**

OBJECTIVES

- To enable the students to understand the role of nutrition in different stages of lifecycle.
- To understand the interrelationship between nutrition, growth and development

UNIT I 10hrs

- Concept of food groups, RDA for Indians, meal planning, principles and factors.
- Nutrition in pregnancy – stages of gestation, maternal physiological adjustments, nutritional requirements, nutritional deficiencies and complications of pregnancy and its management.

UNIT II 14 hrs

- Nutrition in lactation – Physiological adjustments during lactation, nutritional requirements, physiology of milk production, composition of breast milk, importance of breast feeding, cholestrum, complementary foods, special foods during lactation, dietary guidelines.
- Nutrition in Infancy - Growth and development during infancy, immunization schedule, types of milk and their use in infant feeding, breast feeding Vs bottle feeding, complementary foods, dietary guidelines during infancy, problems in weaning.

UNIT III 12 hrs

- Preschool Nutrition - Growth and development, nutritional needs of preschool, dietary guidelines, nutritional problems in preschool children – PEM, Obesity.
- Nutrition during Childhood –Growth and development, nutritional requirements, dietary guidelines, importance of breakfast and packed lunch, nutritional problems – obesity and under nutrition, iron deficiency, dental carries.

UNIT IV **10 hrs**

- Nutrition in Adolescence- Nutritional requirements during growth and development during adolescence, dietary guidelines, fast foods and its impact, nutritional problems – anaemia, eating disorders, malnutrition, teenage pregnancy.
- Nutrition in Adults - Nutritional requirements, dietary guidelines, physiology, social and psychological changes, pre and post menopausal change in women, importance of weight management, nutritional concerns – obesity, diabetes, hypertension, cardiovascular diseases.

UNIT V **8 hrs**

Geriatric Nutrition

- Nutritional requirements, dietary guidelines; physiological, socioeconomic and psychological factors and its effect on dietary intake, nutritional problems – malnutrition – obesity and under nutrition, diabetes mellitus, hypertension, osteoporosis, anaemia, rheumatism.

SEMESTER II

Nutrition and Dietetics

Paper II NUTRIITON THROUGH LIFE CYCLE

PRACTICALS

Code: HSND 202 P **Total marks: 50**
No. of Weeks: 13 **Theory: 35**
Instructions/week: 04 **IA: 15**

OBJECTIVE

- To impart learning on menu planning strategy, analysis of nutrient intake and sufficiency of food intake.

UNIT I

Planning and preparation of diet for pregnant and lactating mothers.

UNIT II

Planning and preparation of complimentary foods

UNIT III

Planning and preparation of nutrient dense recipes for pre-schoolers

Planning and preparation of packed lunch for school going children

UNIT IV

Planning and preparation of menu for adolescence

UNIT V

Menu planning for adulthood

Menu planning for old age.

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JOURNALS

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2. Journal of Nutrition
3. American Journal of Clinical Nutrition
4. British Journal of Clinical Nutrition
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SEMESTER II

NUTRITION AND DIETETICS

PAPER III

PUBLIC HEALTH NUTRITION

Code: MSND 203	**Total marks: 100**
Hours: 52	**Theory: 70**
Instructions/week: 04	**IA: 30**

OBJECTIVES

- To enable the student to learn about the community diet programmes
- To learn the policies and improve nutritional status

UNIT I **8 hours**

- Concept of community nutrition – Relationship between health and nutrition, role of nutritionist in health care. Etiological factors leading to malnutrition, synergism between malnutrition and infections, consequences of malnutrition and measures to overcome
- Prevalence of common nutritional problems – PEM, Vitamin A deficiency, anemia, iodine deficiency diseases and fluorosis.

UNIT II **10 hours**

- Nutritional status – Assessment– Anthropometry, Biochemical and clinical assessment, Dietary assessment- family dietary survey, assessment of dietary intake of individuals, institutional diet survey and food balance sheet.Vital statistics, mortality rates and morbidity rates (infant mortality rate).

UNIT III **10 hours**

- Nutrition education to the community – meaning, nature and importance, qualities of community workers and training of nutrition education programs, methods of education, when to teach, whom to teach, principles of planning, executing and evaluating nutrition education programmes, problems of nutrition education. Epidemiology of communicable diseases – factors responsible for the spread of communicable diseases, mode of transmission – chicken pox, typhoid fever, malaria, filariasis.

UNIT IV **12 hours**

- Nutrition intervention programmes in India – Genesis, objectives and operation - National anaemia control, prophylaxis programme, National goiter control programme, Vitamin A prophylaxis programme, school lunch programme.
- National Nutrition Policy - Aims, tools, implementation at national level, impact of national policy on food security, nutrition programmes – Integrated Child Development Services (ICDS), Mid-day meal programmes.

UNIT V **12 hours**

Public health, hygiene and sanitation:

- Immunization – importance of immunization, food adulteration, Food Adulteration Act, waste management.
- Organization concerned with Food and Nutrition –
  National: ICMR, NIN, CFTRI, NIPCCD, DFRL
  International: FAO, WHO, UNICEF, World Bank.

SEMESTER II

Nutrition and Dietetics

Paper III PUBLIC HEALTH NUTRITION

PRACTICALS

Code: MSND 203 P	**Total marks: 50**
No of Weeks: 13	**Practicals: 35**
Hours/week: 04	**IA: 15**

OBJECTIVE

To develop audio visual aids and nutrition programs to impart education to the community.

UNIT I

Preparation of Audio Visual Aids – Charts, Posters, and Power point

UNIT II

Standardization of cups/vessels for diet survey

Planning of recipes for nutritional deficiencies - Vitamin A, iron and folic acid.

UNIT III

Preparation of low-cost recipes for PEM.

UNIT IV

Nutritional assessment for adolescents – Anthropometric measurements, Clinical examination and Diet survey.

UNIT V

Nutrition education program for any age group using aids.

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7. Part, k. (2000) – Parts Textbook of Preventive and Social Medicine, 18th Edition, M/S Banarasidas Bhanot, Jabalpur
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3. Journal of Nutrition, Society for Nutrition Education, Berccley
4. Proceedings for Nutrition Society of India, New Delhi.

SEMESTER II

NUTRITION AND DIETETICS

PAPER IV

FOOD SAFETY

Code: MSND 204	**Total marks: 100**
Hours: 52	**Theory: 70**
Instructions/week: 04	**IA: 30**

OBJECTIVES

- Understand basics of food safety and quality assurance.
- To make students understand the importance of personal hygiene and Environmental Sanitation.

UNIT I **10 hrs**

- Basics of food safety: Factors contributing to physical, chemical and biological contamination in food chain, prevention and control of food borne hazards, definition and regulation of food sanitation, sources of contamination, basic rules regarding personal hygiene-food handlers, cleaning compounds, sanitation methods, waste disposal strategy (solid and liquid waste) and pest control

- Food Safety Assessment, The importance of food safety, Food safety management procedures, Terms relating to quality, management and organization Terms relating to process and product, characteristics and conformity, Terms relating to documentation, examination and audit.

UNIT II **10 hrs**

- Food Laws and Standards in India - Food Safety and Standards Act, 2006, The food safety and standards regulations (FSSR,2011): Licensing and

Registrations, FSS Rules and Regulations, Agricultural Produce Act, 1937 (Grading and Marketing), Bureau of Indian Standards relevant to food safety , Legal Metrology Act, International Food Control Systems/ Laws, Regulations and Standards, Guidelines with regard to Food Safety: CODEX.

UNIT III **10 hrs**

- FSAAI- Genesis and evolution of FSSAI, structure and functions of food authority, initiatives of FSSAI- promoting safe and wholesome foods (eat right India), food fortification, SNF, clean street food hub, training and capacity building, role of state food authorities, FoSTaC, food safety on wheels .
- Recent advances in packaging and labelling requirements, safety issues in food packaging materials, regulations related to nutraceuticals and foods for special dietary uses, provisions on organic food and non specified food/food ingredients.

UNIT IV **12hrs**

- Understanding food hazard, food borne illnesses, water and sanitation, GHP, GAP, HACCP,VACCP,TACCP food allergies, food intolerance, food adulteration-Definition, common adulterants, simple detection techniques, Effects of food adulteration, types of adulteration and recent trends in food adulteration, prevention of food adulteration, detect adulterations with rapid test (DART), food testing and rapid detection methods.
- Laws governing food service institutions -food laws, labour laws, laws concerning hygiene and safety, environmental hygiene and sanitation-Hygiene in food, food plant hygiene, safety handling, personal hygiene, procedure followed in food service establishment to prevent accidents, facilities and benefits to workers in each establishment, Management of food waste and water waste.

UNIT V **10 hrs**

- Food Safety and Quality Assurance: quality control of raw materials, in – process food control, quality control of finished products, quality assurance of therapeutic, functional, nutraceutical and novel foods.
- Food quality management: structures, policies and responsibilities: Quality benefits, quality control department and its responsibilities Quality control department interrelations with research and product development, production, and marketing departments.

SEMESTER II

Nutrition and Dietetics

Paper IV FOOD SAFETY

PRACTICALS

Code: MSND 204P **Total marks: 50**
No. of Weeks: 13 **Practicals : 35**
Instructions/week: 04 **IA : 15**

OBJECTIVE

Enable students to understand the basics of food safety and hygiene

UNIT I

Basic rapid test for adulterants in food

Unit II

To compare the surface and core temperature of food products

UNIT III

Case studies on food safety

UNIT IV

Visit to food companies to understand the safety measures followed in their work area.

UNIT V

Examination of labeling information on food products

REFERENCES

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SEMESTER II

NUTRITION AND DIETETICS

SOFT CORE

PAPER V

FUNCTIONAL FOODS AND NUTRACEUTICALS

Code: MSND 205 **Total marks: 100**
Hours: 40 **Theory: 70**
Instructions/week: 03 **IA: 30**

OBJECTIVES

- To be aware of the growing importance of nutraceuticals and functional foods
- To familiarize students with the recent advances in nutraceuticals.
- To impart knowledge on the health benefits of nutraceuticals and functional foods.

UNIT I 8 hrs

- Nutraceuticals: Introduction, definition, classification of nutraceuticals based on chemical nature and mechanism of action,
- Phytochemicals: Definition, mode of action, classification of Phytochemicals. Phytochemicals as nutraceuticals- Isoprenoids, polyphenolics, glucocyanovates, phytosterols, dietary fiber, their potential health benefits.
- Scope involved in the health care industry. Concept of nutraceuticals through traditional food and medicine.

UNIT II **8hrs**

- Organizational models for nutraceuticals-Food source – Plant: Soya, olive oil, plant steroid, tea, grape vine, garlic, capsicum, dietary fibre and other fruits. Animal: Milk and milk products, meat, fish. Microbial probiotics.
- Mechanism of action – Anticancer, positive influence on blood lipid profile, antioxidation, anti inflammatory
- Applications of nutraceuticals with specific examples in reference to general health

UNIT III **8 hrs**

- Functional foods – Evolution and Definition of functional foods, review of the history of functional foods
- Health benefits of functional foods and future promises in Indian diet
- Development of biomarkers to indicate efficacy of functional ingredients
- Safety and regulatory aspects of functional foods
- Dietary fibre, oligosaccharides, resistance starch, omega fatty acids as functional foods.

UNIT IV **10 hrs**

- Instant foods and formulas, supplement soups, herbal and functional food beverages
- Significance and relevance of nutraceuticals in the management of disease and disorders – CVD, cancer, diabetes, obesity, osteoarthritis, immune enhancement, endurance and mood disorders.
- Animal products and microbes (prebiotics and probiotics) as nutraceuticals

- Probiotics – Definition, types, health benefits of probiotics in gastrointestinal health, cancer, and other diseases, recent advances in probiotics, challenges and regulatory issues related to probiotics.
- Prebiotics – Definition, types, health benefits of prebiotics, recent advances in prebiotics.

UNIT V **6 hrs**

- Antioxidant: Definition and Mechanism of action, Formation of Free Radicals, classification of antioxidants- endogenous and exogenous. Role of endogenous antioxidants- Super Oxide Dismutase (SOD), Peroxidases- Glutathione Peroxidase in protecting cells. Role of Exogenous antioxidants- Retinol, ß –carotene, Ascorbic acid and Tocopherol in prevention of Cancer, CVD, Ageing and Inflammation.

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