SCHEME OF EXAMINATION AND COURSES OF STUDY

M.Sc. FOOD & NUTRITION

Previous Examination 2022—23
Final Examination 2023-24

SEMESTER SCHEME OF EXAMINATION

AND COURSES OF STUDY

MAHARAJA GANGA SINGH UNIVERSITY, BIKANER

EDITION : 2022-23

Semester Scheme of Examination

Maximum Marks of each paper = 50 (10 Internal assessments & 40 Written exam.)

Minimum Passing Marks of each Paper = 13 (03 Internal assessments & 10 Written exam.)

Total Passing Marks of all four papers = For promotion 25% marks is needed in a paper with aggregate 36% in all papers.

Max. Marks of Each Practical =50 (10 internal assessments & 40 practical exam.).

Minimum Passing Marks=18 (04 Internal assessments & 14 Written exam.)

Duration of each practical = 3 hours

Pattern of Theory Paper

Each paper is divided into 3 Sections

Section A :- Consists of 10 compulsory Questions of 1 (one) mark each.

Word limits: Max 50 words.

Selection of question of Examiner- Maximum 2 from each unit (10X1=10)

Section B :- Consists of 5 Questions of 3 (Three) marks each with internal choice. Students are required to attempt all five questions.

Word limits: Max 200 words.

Selection of question of Examiner- Maximum 2 from each unit (5X3=15)

Section C: - Consists of 5 Essay type Questions of 5 (Five) marks each. Attempt any 3 questions from out of five (3x5=15)

Word limits: Max 500 words.

M.Sc. PREVIOUS - FOOD & NUTRITION 2022-23

SEMESTER I

Paper No.	**Nomenclature of Paper**	Theory	Practical
Paper 1	RESEARCH METHODOLOGY	50	-
Paper 2	FOOD SCIENCE	50	50
Paper 3	MACRO NUTRIENTS IN HUMAN NUTRITION	50	-
Paper 4	ADVANCED NUTRITIONAL BIOCHEMISTRY	50	50
	Total	200	100
	Grand Total (200+100)	300	

SEMESTER II

Paper No.	**Nomenclature of Paper**	Theory	Practical
Paper 1	STATISTICAL METHODS AND APPLICATION	50	-
Paper 2	MICRO NUTRIENTS IN HUMAN NUTRITION	50	50
Paper 3	PUBLIC HEALTH & NUTRITION	50	50
Paper 4	NUTRITIONAL CHALLENGES IN LIFE CYCLE	50	-
	Total	200	100
	Grand Total (200+100)	300	

M.Sc. FINAL - FOOD & NUTRITION 2023-24

SEMESTER III

Paper No.	**Nomenclature of Paper**	Theory	Practical
Paper 1	INSTITUTIONAL FOOD SERVICE MANAGEMENT	50	50
Paper 2	FOOD MICROBIOLOGY	50	-
Paper 3	FOOD SAFETY AND STANDARDS	50	-
Paper 4	CLINICAL & THERAPEUTIC NUTRITION	50	50
	Total	200	100

	Grand Total (200+100)	300

SEMESTER IV

Paper No.	**Nomenclature of Paper**	Theory	Practical
Paper 1	NUTRITION FOR HEALTH & FITNESS	50	-
Paper 2	FOOD PROCESSING TECHNOLOGY	50	-
Paper 3	RECENT TRENDS IN FOOD SCIENCE AND TECHNOLOGY	50	-
Paper 4	DISSERTATION	150	-
	Total	300	-
	Grand Total (Semester I to IV)	**1200**	

SEMESTER I

PAPER I

RESEARCH METHODOLOGY

Duration of Examination : 3 hrs. Max. Marks : 50

Note:-

The question paper shall contain three sections. Section A contains 10 questions two from each unit of 1 marks each. The candidate is required to answer all the questions. The answers should not exceed 50 words. Section B shall contain 5 questions, one from each unit with internal choice. Each question shall be of 3 marks. The Candidate is required to answer all questions. The answers should not exceed 200 words. Section C shall contain 5 questions of 5marks each, one from each unit. The candidate is required to answer 3 questions. The answer shall not exceed 500 words.

UNIT I

I i. Research: Definition, Scientific Methods, Scientific Approach. Objectives of Research.

ii. An overview of research process.

iii. Criteria of good research.

iv. Common problems faced during research study.

v. Qualities of a good researcher.

vi. Types of research: Historical, Descriptive, Experimental, Case study, Social research and Participatory research.

2. i. Definition and identification of research problem.

ii. Selection of research problem.

iii. Justification.

iv. Hypothesis, basic assumptions, limitations and delimitations of the problem.

UNIT II

3. i. Variables: Types of variables- Dependent and independent; qualitative and quantitative; discrete and continuous.

ii. Error producing variables, intervening, extraneous, and attribute variables.

iii. Methods of controlling variables.

4. i. Theory of probability.

ii. Population and sample.

iii. Probability sampling, simple random, systematic random sampling, two stage and multistage sampling, cluster sampling.

iv. Non-probability sampling, purposive, quota and volunteer sampling, snowball sampling.

UNIT III

5. i. Research design: Basic principles.

ii. Purposes of research design: fundamental, applied and action, exploratory and descriptive, experimental, survey and case study, Ex-post facto.

iii. Longitudinal and cross-sectional, correational.

6. i. Qualitative research methods.

ii. Theory and design in qualitative research.

iii. Definition and types of qualitative research.

iv. Methods and techniques of data collection.

v. Data gathering instruments: Observation, questionnaire, interview, sealing methods, case study; reliability and validity of measuring instruments.

UNIT IV

7. i. Quantitative research.

ii. Design strategies in research: Descriptive studies. A brief over view of types of descriptive studies.

iii. Co-relational studies (Populations/Individuals).

iv. Case reports and case studies.

v. Cross sectional surveys.

8. i. Use of descriptive studies in research.

ii. Hypothesis formulation.

iii. Issues in the design and conduct of descriptive studies.

UNIT V

9. Selecting a problem and writing a research proposal.

i. Selection of problem area, topic and defining the problem.

ii. Literature search- reviewing related literature, referencing, abstracting, bibliography.

iii. Developing the research proposal- title, statement of the problem and its scope, defining concepts, objectives, basic Assumption.

10. i. Delimitations and limitations of the research problem.

ii. Statement of Hypotheses- Types of Hypotheses.

iii. Data collection procedures- Designing study, treatment of data.

PAPER II

FOOD SCIENCE

Duration of Examination : 3 hrs. Max.Marks : 50

Note:-

The question paper shall contain three sections. Section A contains 10questions two from each unit of 1 marks each. The candidate is required to answer all the questions. The answers should not exceed 50 words. Section B shall contain 5 questions, one from each unit with internal choice. Each question shall be of 3 marks. The Candidate is required to answer all questions. The answers should not exceed 200 words. Section C shall contain 5 questions of 5marks each, one from each unit. The candidate is required to answer 3questions. The answer shall not exceed 500 words.

UNIT - I

1. Introduction to Food Science : Evaluation of the food industry. Emergence of Food Science as a discipline.

2. Basic physio-chemical concepts of importance in food system-Hydrogenion concentration (pH), Osmotic pressure, Isoelectric points of proteins, Solutions, Colloidal Systems - Properties of Colloidal Systems, Types of Colloidal dispersion existing in food system - Soles, gels, foams and emulsions, browning reactions in food - enzymatic and non - enzymatic.

UNIT - II

3. Functional properties of food constituents in terms of their chemical and physiochemical properties-

(a) Polysaccharides. Sugars and Sweeteners -

(i) Starch : Structure, Functional properties of Starch - Gelatinization, Gelatin, Retrogradation, Dextrinization, modified food starches.

(ii) Non-starch polysaccharides: Cellulose, Hemi-cellulose, Pectic substances. Gums and Lignins.

(iii) Sugars and Sweeteners Functional properties of Sugars -

Sweeteners. Hygroscopicity, Solubility, Hydrolysis, Degradation, Caramelization, the Maillard reaction. Crystallization. Fermentation, Food applications - Crystalline candies, Amorphous candies, Types of sweetener.

UNIT - III

4. Functional properties of proteins in different foods during processing-

(a) Cereals and Cereal products - Flours and flour quality, Gluten, Factors affecting hydration of gluten. Roles of ingredients in baking process. Cereal produces - Extruded foods, breakfast cereals, wheat germ, bulgar, puffed and flaked cereals.

(b) Milk and Milk Products - Milk proteins, effect of heat, enzymes, acid and salt on milk protein. Processing of milk (pasteurization, Homogenization, Evaporation, Drying and Fermentation). Milk products - milk, butter, cream, cheese, whey and ice cream.

(c) Eggs and Egg Products - Egg proteins, Processing of egg - Drying, Freezing, Functional properties of egg - Coloring, Emulsification, Denaturation and Coagulation, Foaming.

(d) Meat and Poultry - Meat proteins, Factors affecting quality - Maturity postmortem changes, Effect of cookery - Heat, pH, Salt, Tenderizers.

5. Fats and Oils - identification of Natural fats and oils, Flavour changes in fats and oils, the Technology of Edible oils and fats, Functional roles of fat Colour, Flavour, Texture, Tenderness, Emulsifier, Cooking medium.

UNIT - IV

6. Additional Food Constituent - Their role in improving functional properties.

(i) Enzymes - Enzymes in food Processing, Carbohydrates, Proteases, Lipases, Oxidoreducatase, Immobilized enzymes.

(ii) Pigments - Pigments in food processing - Chlorophylls, Myoglobin, Anthocyanins, Flavonoids, Tannins, Betalins, Quinones, and Xanthones, Carotenoids.

(iii) Flavour Compounds - Terpenoids, Flavonoids, Sulphur compounds, Volatile flavour compounds.

(iv) Minerals - Role minerals in food processing.

(v) Water - Water contents of food, significance of water, bound water, water activity.

UNIT - V

7. Chemical, Physical and Nutritional alterations occurring in food products during.

(a) Freezing - Changes in food during refrigerated storage, Immersion freezing with cryogenic liquids.

(b) Thermal processing.

(c) Dehydration - Effect of food properties on dehydration.

(d) Irradiation - Food irradiation, direct and indirect effect, safety and wholesomeness of irradiated food.

(e) Microwave heating - Properties of microwaves, microwave food application.

Reference:

1. Bower, Jane, Food theory and applications. Mac Millan publishing company. 1992

2. Potter, N.N. & Hotchkiss, J.H., Food Science, CBS publishers & Distributors New Delhi. 1986

3. Pomerange, Y., Functional properties of food components, Academic press. INC. 1991

4. Early, R. The technology of dairy products. VCH publishers, INC.

5. Belitz, H.D. and Grosch, W. (1999) Food Chemistry. Springer-Verlag, Berlin Heidelberg

6. Damodaran, S. and Parot. A (1997) Food Proteins and their Applications. Marcel Dekker Inc.

7. Davis, M.B. Austin, J. and Partridge, D.A. (1991) Vitamin C : Its Chemistry and Biochemistry. The Royal Society of Chemistry T.G. House, Science Park, Cambridge CB4 4WF

8. Diehl, J.F. (1995) Safety of Irradiated Foods Marcel Dekker Inc, New York

9. Friberg, S.E. and Larsson, K. (editors) (1997) Food Emulsions. Marcel Dekker, New York

10. Golderg, I. (ed) (1994) Functional Foods Chapman and Hall, Inc.

11. Gunasekaram, S. (ed) (2001) Nondestructive Food Evaluation Marcel Dekker, Inc. New York.

12. Tombs, M.P. (1991) Biotechnology in the Food Industry Prentice-Hall Inc. India

13. Brien, L.O., and Gelardi, R.C. (1991) Alternative Sweeteners Marcel Dekker, New York.

14. Risch, S.J. and Hotchkiss, J.H. (ed) (1991) Food Packaing Interactions II. ACS Symposium Series 473, American Chemical Society, Washington D.C.

15. Marhawa. S.S. and Arora, J.K. (2000) Food Processing: Biotechnological Applications Asiatech Publishers Inc. New Delhi.

16. Mahindru. S.N. (2000) Food Safety - A Techno-legal Analysis Tata McGraw Hill Publishing Co. Ltd., New Delhi.

17. Mathindru. S.N. (2000) Food Additives - Characteristics - Detection and Estimation Tata McGraw Hill Publishing Co. Ltd.

18. Borwanker, R.P. and Shoemaker, C.E. (1992) Rheology of Foods. Elsevier Science Publishers Ltd. England.

19. Charalambour. G. (1990) Flavours and off-Flavours 89, Elesiver Science Publishers Ltd., P.O. Box 211, 1000 AE Amsterdam, The Netherlands.

20. Salunke, D.K. and Kodam. S.S. (2001) : Handbook of vegetable Science and Technology, Marcel Dekker. Inc. 270, Madisom Avenue. New York N.Y. 10016

21. FAO food and Nutrition Paper: Manual of Food Quality Control - Parts 141 (1979) to (1986), FAO of the United Nations Rome.

PRACTICAL

Hours of Instruction/Week : 3 Max Marks : 50

1. Starch cookery -

(a) Study the microscopic structure of different starches before & after cooking.

(b) Study the gelatinization properties of food starches and various factors affecting the gelatinization properties & setting quality of food starches.

2. Sugar cookery -

(a) Study the effect of temperature on solubility of sugar and determine the concentrations at which solutions become saturated.

(b) Study the effect of sugar on the boiling point of water.

(c) Determine the effect of heat on sugar solutions and observe their behaviour corresponding to thread & cold water test.

(d) Demonstrate the process of sugar recrystallization through preparation of fondant, fudge and shakarpara.

(e) Study the process of inversion, melting and caramelization in sucrose.

3. Milk cookery - determine the relative density of milk at different temperatures. Effect of heat and acid on the proteins of milk.

4. Egg cookery - study the effect of cooking time on the colour. Texture & acceptability of whole egg. Observe the effect of method of cooking, coagulation property of eggs.

5. Visits to commercial food manufacturing packaging units where food products are developed and tested.

PAPER III

MACRO NUTRIENTS IN HUMAN NUTRITION

Duration of Examination : 3 hrs. Max. Marks : 50

Note:-

The question paper shall contain three sections. Section A contains 10questions two from each unit of 1 marks each. The candidate is required to answer all the questions. The answers should not exceed 50 words. Section B shall contain 5 questions, one from each unit with internal choice. Each question shall be of 3 marks. The Candidate is required to answer all questions. The answers should not exceed 200 words. Section C shall contain 5 questions of 5marks each, one from each unit. The candidate is required to answer 3 questions. The answer shall not exceed 500 words.

UNIT-I

1. Carbohydrates: Classification, composition, functions, sources and dietary requirements. R.D.A.
2. Physiological significance of carbohydrates and deficiency. Digestion and absorption of Carbohydrates. Regulation of blood glucose concentration.

UNIT-II

3. Dietary Fibre: meaning, composition, classification, physiological role and health benefits of dietary fibre. Recommended level of dietary fibre consumption.
4. Resistant starch and fructo-oligosaccharides: meaning and its physiological importance, requirement and food sources. glycemic index and glycemic response to carbohydrates.

UNIT-III

5. Proteins: Classification, functions and food sources. Dietary requirement and deficiency. PEM.
6. Digestion, absorption and transport of proteins. Synthesis of non-essential amino acids in the body. Protein quality and factors influencing it.

UNIT-IV

7. Urea Cycle: Relationship between energy and protein requirements. Evaluation of protein quality and methods.
8. Regulation of food intake. Nutrient adaptation to low intake of energy and protein.

UNIT-V

9. Lipids: classification of lipids and fatty acids functions and sources. Dietary requirements. Digestion and absorption. Excessive fat intake.
10. Deficiency disorders of lipids and essential fatty acids. Role of Omega – 3 and Omega-6 fatty acids in physiological disorders.

PAPER IV

ADVANCED NUTRITIONAL BIOCHEMISTRY

Duration of Examination : 3 hrs. Max. Marks : 50

Note:-

The question paper shall contain three sections. Section A contains 10 questions two from each unit of 1 marks each. The candidate is required to answer all the questions. The answers should not exceed 50 words. Section B shall contain 5 questions, one from each unit with internal choice. Each question shall be of 3 marks. The Candidate is required to answer all questions. The answers should not exceed 200 words. Section C shall contain 5 questions of 5 marks each, one from each unit. The candidate is required to answer 3 questions. The answer shall not exceed 500 words.

UNIT-1

1. Carbohydrates and types of polysaccharides. Important reactions of monosaccharides. Hormonal control of carbohydrates, Homeostasis.
2. Lipids: chemical properties of lipids – hydrolysis, saponification, hydrogenation and acetylation, saponification number, acid number, Reichert–Meissel number, UV absorption.

UNIT-II

3. Protein – classification of amino acids, reactions, methods of separation of amino acids – chromatography, micro-biological, electrophoretic methods. Structure of proteins, denaturation of proteins. Plasma proteins – properties and functions.
4. Nucleic Acids – synthesis and breakdown of purines and pyrimidines. Structure of DNA and RNA. DNA replication and transcription. Genetic code. Genetic mutation. Protein biosynthesis.

UNIT-III

5. Vitamins – structure, metabolism and bio-chemical role (fat soluble and water-soluble vitamins).
6. Minerals – biochemical role of all essential minerals – Macro elements and trace elements.
7. Hormone's – biochemical role of adrenocorticotropic hormone, FSH, leutinising hormone, gonadotropin, growth hormone, thyroxine, thyroid stimulating hormone insulin, male and female sex hormone.

UNIT-IV

8. Enzymes – Classification, general properties. Intra cellular distribution of enzymes, allosteric enzymes, isoenzymes Enzyme kinetics. Importance in clinical diagnosis.
9. Biological oxidation – concept of free energy, redox potential, oxido-reductases, oxidases, dehydrogenases and hydroperoxidases.

UNIT-V

10. Intermediary Metabolism
    a. Overview
    b. Carbohydrates – glycolysis, glycogenolysis and glycogenesis, gluconeogenesis, citric acid cycle.
    c. Lipids: □-oxidation of odd and even numbered saturated fatty acids. Biosynthesis of cholesterol, formation and metabolism of ketone bodies, Ketosis.
    d. Protein – Urea cycle, creatine and creatinine synthesis.
11. Inborn errors of metabolism – incidence, clinical changes and treatment of phenylketonuria, maple syrup urine disease homocystinuria, galactosemia, Wilson disease.

PRACTICAL

Hours of Instruction/week : 2 Max. Marks : 50

1. Qualitative analysis of carbohydrates.

2. Qualitative analysis of amino acids.

3. Qualitative analysis of proteins.

4. Determination of acid value, saponification value and iodine number.

5. Demonstration on estimation of nitrogen by kjeldhal method.

6. Demonstration on estimation of soxhelet method.

7. Determination of P H

8. Demonstration of chromatography and electrophoresis techniques.

SEMESTER II

PAPER I

STATISTICAL METHODS AND APPLICATION

Duration of Examination : 3 hrs. Max. Marks : 50

Note:-

The question paper shall contain three sections. Section A contains 10questions two from each unit of 1 marks each. The candidate is required to answer all the questions. The answers should not exceed 50 words. Section B shall contain 5 questions, one from each unit with internal choice. Each question shall be of 3 marks. The Candidate is required to answer all questions. The answers should not exceed 200 words. Section C shall contain 5 questions of 5marks each, one from each unit. The candidate is required to answer 3 questions. The answer shall not exceed 500 words.

UNIT I

1. Statistics

    i. Definition, meaning and scope.

    ii. Role of statistics in research.

    ii. Limitations of statistics.

2. i. Conceptual understanding of statistical measures.

    ii. Classification and tabulation of data.

    iii. Measurement of central tendency- Mean, Mode, and Median.

UNIT II

3. i. Measures of variation.

    ii. Frequency distribution-, Histogram, Frequency polygons.

    iii Student's t-test.

4. i. Correlation, Coefficient of Correlation, Rank Correlation.

    ii. Regression and Prediction.

UNIT III

5. i. Analysis of Variance- One-way and Two-way classification.

    ii. Experimental Designs:

        a. Completely randomized design

        b. Randomized block design

c. Latin square design

d. Factorial design

e. Trend analysis

6. i. Computers- Role in Research.

ii. Word processing.

iii. Use of computers in data processing, analysis and presentation.

UNIT IV

7. Analysis / Presentation and reporting of Data.

i. Data processing and analysis: Categorization, Editing, Coding, Tabulation and Statistical testing.

ii. Presentation of data- General guidelines for presenting data.

8. i. Use of tables, graphs diagrams in presentation.

ii. Types and characteristics of good tables, graphs, diagrams and other illustrations.

iii. Interpretation of findings.

UNIT V

9. Scientific writing as a means of Communication

i. Different forms of scientific writing.

ii. Articles in Journals. Research notes and Reports, Review Articles, Monographs, Dissertations, Bibliographies.

10. Writing Dissertation/ Research Report/ Article

i. Preliminaries- Title page, Acknowledgement, Index, List of tables, List of figures, Plates, Photographs etc.

ii. Text, Footnotes, Quotations

iii. Spacing, Margins, Pagination, Indentation.

iv. Writing; Introduction, Scope, Objectives, Hypothesis, Review of related Literature, Methodology, Results and Discussions, Summary, Conclusions and Recommendations, Bibliography, Abstract.

v. Checking Content, Continuity, Clarity, Validity, Internal consistency and Objectivity during writing each of the above parts.

PAPER II

MICRO NUTRIENTS IN HUMAN NUTRITION

Duration of Examination : 3 hrs. Max. Marks : 50

Note:-

The question paper shall contain three sections. Section A contains 10questions two from each unit of 1 marks each. The candidate is required to answer all the questions. The answers should not exceed 50 words. Section B shall contain 5 questions, one from each unit with internal choice. Each question shall be of 3 marks. The Candidate is required to answer all questions. The answers should not exceed 200 words. Section C shall contain 5 questions of 5marks each, one from each unit. The candidate is required to answer 3 questions. The answer shall not exceed 500 words.

UNIT-I

1. Functions, absorption, requirement, sources, deficiency and toxicity of fat-soluble Vitamins – A, D, E and K.
2. Functions, absorption, requirement, sources, deficiency and toxicity of water-soluble Vitamins – Thiamine, Riboflavin and Niacin.

UNIT-II

3. Functions, absorption, requirement, sources, deficiency and toxicity of water-soluble Vitamins – Pyridoxine, Folate, B12.
4. Functions, absorption, requirement, sources, deficiency and toxicity of water-soluble Vitamins – Ascorbic acid, Pantothenic acid and Biotin.

UNIT-III

5. Functions, absorption, requirement, sources, deficiency and toxicity of macrominerals – Calcium and Phosphorus.
6. Functions, absorptions, requirement, sources, deficiency and toxicity of microminerals – Iron, Zinc, Sodium.

UNIT-IV

7. Functions, absorptions, requirement, sources, deficiency and toxicity – Copper, Cobalt, Selenium and Chromium.
8. Functions, absorption, requirement, sources, deficiency and toxicity of Iodine and Fluorine.

UNIT-V

9. Water: Body composition. Physiological functions and distribution of water in the body.
10. Water and Electrolyte Balance, Electrolyte composition of body fluids.

PRACTICAL

Hours of Instruction/week : 2 Max. Marks : 50

1. Planning and preparation of nutrient rich dishes.
2. Preparation of preserved items. Display and Sale.
3. Napkin folding and table setting.
4. Study of common adulterants.
5. Labeling and pricing of food items.
6. Identification of nutritional problems prevalent in community using method of nutritional assessment.
7. Preparation of teaching aid.

PAPER III

PUBLIC HEALTH & NUTRITION

Duration of Examination : 3 hrs. Max. Marks : 50

Note:-

The question paper shall contain three sections. Section A contains 10questions two from each unit of 1 marks each. The candidate is required to answer all the questions. The answers should not exceed 50 words. Section B shall contain 5 questions, one from each unit with internal choice. Each question shall be of 3 marks. The Candidate is required to answer all questions. The answers should not exceed 200 words. Section C shall contain 5 questions of 5marks each, one from each unit. The candidate is required to answer 3 questions. The answer shall not exceed 500 words.

UNIT I

1. Definition and key concepts - community, nutritional anthropology, community health & community nutrition. Role of public nutritionists the health care delivery. Ecology of Health & amp; Specific determinants of food behavior

2. Population Dynamics Demographic transition, population structure, fertility behaviour, population policy, fertility, nutritional and quality life - interrelationship.

UNIT II

3. Health Economics and Economics of malnutrition Social and behaviour consequences, economic losses - reduced physical and mental efficiency, lossdue to premature deaths, underutilization of potential women and the ultimate cost of under nutrition. Impact on national development. Cost-benefit, cost effectiveness and cost efficiency.

4. Sectors and public policies relevant to nutrition & Primary health care of the community - National health care delivery system, determinants of health status, indicators of health.

5. Magnitude and background of the problem of malnutrition in India-Prevalence, etiology biochemical and metabolic changes in protein energy malnutrition Vitamin-A deficiency, iron deficiency, anemia, Iodine deficiency disorder and other life style disorders.

UNIT-III

6. Nutritional status -

(a) Nutrition and non-nutritional indicators.

(b) Planning and conducting a nutritional status assessment survey.

i. Defining scope and objectives of survey, defining population and selecting samples.

ii. Selecting and standardizing parameters.

iii. Executing the survey-organizing team, materials, training and field testing of methodology, verification and cross checking of data. Interpretation of data and reporting.

(c) Monitoring and evaluation.

7. Food and Nutrition Security

UNIT – IV

8. Approaches and Strategies for improving nutritional status & health:

(a) Programmatic options - their advantages and demerits. Feasibility, available resources (human, financial & infrastructural) and support. Case studies of selected strategies and programmes: their rationale and context, selection of interventions from a range of possible options.

(b) Health based intervention (primary health care & family welfare program)

(c) Food based interventions including fortifications, genetic improvements of food and supplementary feedings.

(d) Nutrition education for behaviour changes. Participatory training.

UNIT-V

9. Community Nutrition Programme Management –

(a) Planning - identification of problem, analysis of causes, resources, constraints, selection of intervention, setting a strategy.

(b) Implementation and supervision

(c) Operations monitoring, surveillance and evaluation (process &impact evaluation).

10. National Food and Nutrition Policy, Plan of Action and Programmes

PRACTICAL

Hours of Instruction/week : 2 Max. Marks : 50

1. Techniques of assessment of nutritional status
2. Use of Screening Tools
3. Visit to the ongoing public health nutrition programme and report writing.
4. Study of existing diet and nutrition practices
5. Planning and conducting survey, analysing data and report writing

6. Development, implementation and evaluation of community nutrition and health programmes

PAPER IV

NUTRITIONAL CHALLENGES IN LIFE CYCLE

Duration of Examination : 3 hrs. Max. Marks : 50

Note:-

The question paper shall contain three sections. Section A contains 10 questions two from each unit of 1 marks each. The candidate is required to answer all the questions. The answers should not exceed 50 words. Section B shall contain 5 questions, one from each unit with internal choice. Each question shall be of 3 marks. The Candidate is required to answer all questions. The answers should not exceed 200 words. Section C shall contain 5 questions of 5marks each, one from each unit. The candidate is required to answer 3 questions. The answer shall not exceed 500 words.

UNIT I: Importance of maternal nutrition

1. Nutritional needs during first 1000 days;
2. Influence of maternal nutritional status on outcome of pregnancy: birth Weight of infant and lactation performance

UNIT II: Human milk

1. Psycho-physiology of lactation; Milk synthesis and secretion;
2. Maternal needs during lactation; Composition of colostrum and mature human milk;
3. Milk of mothers of preterm babies;
4. Milk of animal and formula feeds; Non-nutritional Factors of human milk-immunological factors, Enzymes and hormones;
5. Human milk banking.

UNIT III: Nutrition during childhood

1. Nutritional needs of the children and adolescents;
2. Common childhood ailments and dietary considerations; Growth spurt and nutrition

UNIT IV: Nutrition during Adolescence and adulthood

1. Adolescent fads influencing nutrition, food preferences and nutritional problems;
2. Nutritional requirements in Adulthood; Malnutrition, mental Development, learning abilities and behavior.

UNIT V: Geriatric nutrition

1. Overview of ageing process; Nutritional variables related to the ageing

process;

2. Physiology of aging; Biological markers of aging; Sociology of aging;
3. Nutritional requirements and deficiencies in elderly;
4. Medications and psychiatric problems in elderly; Immuno pathological diseases and aging; Parkinson and Alzheimer syndrome;
5. Care of the elderly; Care-givers and community services.

SEMESTER III

PAPER I

INSTITUTIONAL FOOD SERVICE MANAGEMENT

Duration of Examination : 3 hrs. Max. Marks : 50

Note:-

The question paper shall contain three sections. Section A contains 10 questions two from each unit of 1 marks each. The candidate is required to answer all the questions. The answers should not exceed 50 words. Section B shall contain 5 questions, one from each unit with internal choice. Each question shall be of 3 marks. The Candidate is required to answer all questions. The answers should not exceed 200 words. Section C shall contain 5 questions of 5marks each, one from each unit. The candidate is required to answer 3 questions. The answer shall not exceed 500 words.

UNIT I

1. Food Service Institutions: An overview
2. Types of Food Service Institutions
3. Principles of Management
4. Functions and Tools of Management in Food Service Institutions

UNIT II

1. Personnel Management, Selection and Training, Desirable qualities, Grooming
2. Financial Management, terms used, Budgeting
3. Account keeping and record keeping
4. Cost control- Calculation of food cost and methods of controlling food cost, Use of left-over food

UNIT III

1. Meal Service Management, Quantity food production
2. Menu Planning, Types and writing of Menu
3. Standardization of Recipes

4. Principle involved in development of recipes

UNIT IV

1. Planning and Layout for Food Service Institutions

2. Types of kitchen

3. Selection and care of equipment

4. Food Service, Styles of Service

UNIT V

1. Quality control - Sanitation and hygiene in food handling, Food Laws and Standards

2. FSSAI and CODEX guidelines

3. Preventive measures to control common accidents

4. Challenges faced by Food Service Institutions

PRACTICAL

Hours of Instruction/week : 2 Max. Marks : 50

1. Standardization of recipes.

2. Planning, preparation and modification in basic recipes.

3. Quantity food production and cost calculations.

4. Preparation of menu cards of various types.

5. Menu planning and table setting.

6. Maintenance of account and record keeping.

7. Visit to different types of food service, institutions and study the following:

   Organization, physical plan and layout, menu cards, serving style, table setting, personnel work schedule, hygiene and sanitation, safety measures.

8. Practical experience in organization and management of a college cafeteria/ hostel/ hotels. Record keeping and cost calculation.

9. Planning and preparations for special occasions birthday, festivals, packed lunches.

PAPER II

FOOD MICROBIOLOGY

Duration of Examination : 3 hrs. Max. Marks : 50

Note:-

The question paper shall contain three sections. Section A contains 10 questions two from each unit of 1 marks each. The candidate is required to answer all the questions. The answers should not exceed 50 words. Section B shall contain 5 questions, one from each unit with internal choice. Each question shall be of 3 marks. The Candidate is required to answer all questions. The answers should not exceed 200 words. Section C shall contain 5 questions of 5marks each, one from each unit. The candidate is required to answer 3 questions. The answer shall not exceed 500 words.

UNIT I

1. Food Microbiology- Introduction, Definition, Overview
2. Importance of Food Microbiology
3. Factors affecting growth of Micro-organisms-intrinsic and extrinsic factors like pH, water activity, oxidation reduction potential, nutritional requirements, temperature, relative humidity, gaseous environment, biological structure of food and inhibitory substances

UNIT II

1. Methods of isolation or detection of micro-organisms or their products in food

    a. Conventional methods

    b. Rapid method (Newer techniques)

    c. Immunological methods- Fluorescent, Antibody, Radio-immune assay, ELISA etc.

    d. Chemical methods- Thermo stable, Nuclear, ATP measurement, PCR (Polymer Chain Reactions)- only principles in brief

UNIT III

1. Sources of contamination of food- water, air soil, sewage, animals, during handling and processing
2. General principles underlying spoilage

    a. Chemical changes due to microbial spoilage

    b. Spoilage of different groups of food- cereal and cereal products, vegetables and fruits, meat and meat products, egg and poultry, fish and other sea foods, sugar, milk and milk products, canned foods.

UNIT IV

1. Role of microbes in fermented food and genetically modified foods, malt, bread, beverages, vinegar, fermented vegetables, fermented dairy products, tea and coffee. Single cell protein, fats, amino acids, and enzymes from micro-organisms.

2. Food preservation- Physical methods. Chemical preservatives and natural anti-microbial compounds. Food borne diseases- infections and intoxications. Bacterial and viral food borne disorders. Mycotoxins.

UNIT V

1. Food sanitation- Microbiology in food plant sanitation, bacteriology of water, sewage and waste treatment and disposal.

2. Indicators of food safety and quality- microbiological criteria of food and their significance

3. HACCP system and food safety used in controlling microbiological hazards. Food control and enforcement agencies. Microbioligical standards of food and water.

PAPER-III

FOOD SAFETY AND STANDARD

Duration of Examination : 3 hrs. Max. Marks : 50

Note:-

The question paper shall contain three sections. Section A contains 10questions two from each unit of 1 marks each. The candidate is required to answer all the questions. The answers should not exceed 50 words. Section B shall contain 5 questions, one from each unit with internal choice. Each question shall be of 3 marks. The Candidate is required to answer all questions. The answers should not exceed 200 words. Section C shall contain 5 questions of 5marks each, one from each unit. The candidate is required to answer 3 questions. The answer shall not exceed 500 words.

UNIT-I

1. Food quality assurance- Introduction to quality assurance. Current concept of quality ontrol, Principles of Quality assurance, Raw material quality assurance, in process quality assurance, finished product quality.

2. Food safety and toxicology- Introduction, Hazards- Microbiological, Nutritional, Environmental, physical, Biological, Chemical, HACCP- as a method to prevent food borne diseases.

UNIT-II

3. Naturally occurring toxicants and food contaminants, Toxicants in natural spices and flavours, Carcinogens, Goitrogens, Radioactive materials.

4. Food Poisoning – Types, causative factors, signs and symptoms and preventive measures.

UNIT-III

5. Food Additives- Introduction, Role of different additives in controlling the quality of food product, Antioxidants, Chelating agents, Colouring agents Curing agents, Emulsifiers, Flavour and Flavour enhancers, Flour improvers, Humectants; Anticaking agent, Leavening agents, Nutrient supplement, Non nutritive Sweeteners. PH Control agents, Stabilizers & Thickeners, Preservatives, Additives and Food safety.

6. Food packaging-Functions of food packaging, requirement for effective food packaging, food packaging materials and forms, safety of food packaging.

UNIT-IV

7. Government regulation of food and nutrition labeling- Introduction, food and nutrition law and acts, food labeling, nutrition labeling.

8. Evaluation of food quality

   (a) Sensory evaluation

(b) Objective evaluation Advantages, disadvantage, basic guidelines.

UNIT-V

9. Food product development- Defining new food product, classification; characterization of new food product, food product development tool.

10. Food safety Laws and Standards – FSSAI, FPO, ISI, Agmark, Codex Alimentarius, ISO mark for vegetarian and non-vegetarian foods, eco-friendly products.

PAPER IV

Clinical and Therapeutic Nutrition

Duration of Examination : 3 hrs. Max. Marks : 50

Note:-

The question paper shall contain three sections. Section A contains 10questions two from each unit of 1 marks each. The candidate is required to answer all the questions. The answers should not exceed 50 words. Section B shall contain 5 questions, one from each unit with internal choice. Each question shall be of 3 marks. The Candidate is required to answer all questions. The answers should not exceed 200 words. Section C shall contain 5 questions of 5marks each, one from each unit. The candidate is required to answer 3 questions. The answer shall not exceed 500 words.

Unit-I

1. Concept of Diet Therapy- Dietetics, Purpose and principles of therapeutic diet. Modification of normal diet. Classification of therapeutic diet.

2. Role of Dietitian- Definition & nutritional care, Assessment of Patient needs based on interrelation of patient data- clinical, biochemical, bio-physical and Personal.

3. Hospital Diets- feeding methods.

4. RDA for Indians by ICMR, Protein, energy malnutrition.

Unit-II

5. Diet in fever & infection – types of fever, metabolism in fever, Diet in influenza, typhoid, malaria, tuberculosis

6. Diet in disturbances of GIT- gastritis, small intestine and colon- peptic ulcer, Diarrhea, Constipation, Etiology- Symptom, clinical finding, treatment, dietary modification.

Unit-III

7. Cardiovascular diseases- acute & chronic diseases of heart, atherosclerosis, plaque formation, hyperlipidemia, Hyperproteinemia, treatment, dietary management.

8. Diet in diseases of liver, gall bladder & pancreas basic hepatic function, etiology, symptoms and dietary management, hepatitis A & B, cirrhosis, of liver & hepaticcoma.

Unit-IV

9. Diabetes- etiology, classification, sign & symptoms, Insulin,, dietary treatment, oral hypoglycemic drugs short & long term complications of diabetes.

10. Diet in Renal diseases- basic renal function, symptoms & dietary treatment, glomerulonephritis, renal failure, dialysis, transplantation.

11. Diet for hypertension- primary & secondary Role of rennin in hypertension, dietary management, low sodium diet.

Unit-V

12. Nutrition in cancer- Role of diet in cause of cancer metabolic effects of cancer. Cancer cachexia, Impact of radiations and chemotherapies, Nutritional effect of cancer therapy.

13. Diet and drug interaction- effect of drugs on food and nutrient intake ingestion, digestion, absorption, metabolism and requirement. Interaction between nutrient, infections and drugs.

PRACTICAL

Hours of Instruction/week : 2 Max. Marks : 50

1. Planning and preparation of diets with modifications in:

a) Consistency:

b) Fibre and Residue.

c) In Diarrhoea

d) For Peptic Ulcer

e) For Liver diseases.

f) For Obesity

g) For fevers and infections

h) For Insulin and non-insulin dependent diabetes.

i) For cardiovascular diseases.

j) For kidney diseases.

k) Trauma (burns)

l. Surgery

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

3. Preparation of Diet Counseling aids for common disorders.

4. Case studies: Selection of 3 to 5 admitted patients from a unit of a Hospital. Study of cliical. Nutritional, biochemical profile of the patient on admission, during hospital stay and at discharge. Therapeutic Modification of the diet for that condition. Dietary counseling of the Patients. Study of accept ability and compliance of diet planning, maintenance diets on discharge. Report writing.

SEMESTER IV

PAPER I

NUTRITION FOR HEALTH AND FITNESS

Duration of Examination : 3 hrs. Max. Marks : 50

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Unit – I

1. Definition, Components and assessment criteria of age: Specific fitness and health status.

2. Holistic approach to the management of fitness and health: Energy input and output. Diet and Exercise. Effect of specific nutrients on work performance and physical fitness, Nutrition, exercise, physical fitness and health interrelationship.

Unit - II

3. Review of different energy systems for endurance and power activity: Fuels and nutrients to support physical activity. Shifts in carbohydrate and fat metabolism. Mobilization of fat stores during exercise.

4. Nutrition in Sports : Sports specific requirements. Diet manipulation. Pre-gameand post-game meals. Assessment of different nutragenic aids and commercial supplements.

Unit - III

5. Diets for persons with high energy requirements, stress, fracture and injury.

6. Water and electrolyte balance: Losses and their replenishment during exercise and sport events, effect of dehydration, sports drinks.

Unit - IV

7.

(a) Significance of physical fitness and nutrition in the prevention and management of weight control, obesity, diabetes mellitus, CV disorders, bone health and cancer.

(b) Nutritional and exercise regimes for management of obesity, Critical review of various dietary regimes for weight and fat reduction. Plateau effect and weight cycling.

8. Defining nutritional goals/guidelines appropriate to health, fitness prevention and management of the above chromic degenerative disorders.

Unit – V

9. Nutrition and exercise regimes for pre and post-natal fitness.

10. Alternative systems for health and fitness like ayurveda, yoga meditation.Vegetarianism and traditional diets.

Reference :

1. Mahan. L.K. and Econ-Stump. S. (2000) : Krause's Food. Nutrition and Diet Therapy, 10 th Edition, W.B. Saunders Ltd.

2. Sizer, F. and Whitney, E. (2000) Nutrition-concepts and Controversies, 8th Edition, Wadsworth Thomson Learning.

3. Whitney, E.N. and Rolfes. S.R. (1999) : Understanding Nutrition, 8th Edition, West/Wadsworth. An International Thomson Publishing Co.

PAPER II

FOOD PROCESSING TECHNOLOGY

Duration of Examination : 3 hrs. Max. Marks : 50

Note:-

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Unit I: Food processing techniques

1. Principles underlying food processing operations including thermal, radiation, refrigeration freezing and dehydration;
2. Effect of processing on physiochemical characteristics;
3. Principles under lying pressure modified processing (highhydrostatic pressure, hyper baric processing, vacuum cooling, hypobaric storage).

Unit II: Processing technologies for plant foods

1. Processing technology for preservation and production of variety food products during storage, handling and processing of cereals/millets and legumes, oil seeds, fruits and vegetables;
2. Food preservation by Hurdle technology and canning technology.

Unit III: Processing technologies for animal foods

1. Processing technology for milk and milk products, egg, meat, poultry and fish, convenience foods and processed foods;
2. Technologies underlying mutual supplementation, enrichment and fortification, fermentation, malting and germination;
3. Food additives commonly used in food industries for colour, flavour and as preservatives; Nano materials as food additives.

Unit IV: Quality control in food processing

1. Quality control in food industry - raw materials and finished products;
2. Waste management and sanitation in food industries;

UNIT V: PACKAGING FOR QUALITY CONTROL

1. Packaging - self-cooling self-heating packaging,
2. micro packaging,
3. antimicrobial packaging
4. water-soluble packaging.

PAPER III

RECENT TRENDS IN FOOD SCIENCE AND TECHNOLOGY

Duration of Examination : 3 hrs. Max. Marks : 50

Note:-

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Unit I: Macro and micronutrients

1. Recent advances in the field of carbohydrates, lipids, proteins, vitamins and minerals in relation to food science;
2. Nutrigenomics, incorporating genetics into dietary guidance.

Unit II: Food analysis

1. Recent advances in the field of food analysis
2. food fortification.
3. Food supplementation

Unit III: Advanced techniques

1. Membrane technology: micro-filtration, ultra-filtration, nano-filtration, reverse osmosis and their applications in food industry;
2. Super critical fluid extraction-concept and extraction methods;
3. Microwave and radio frequency processing- mechanism and application in food processing;
4. Hurdle technology- concept and its applications.

Unit IV: Foods of future

1. Food processing and product development;
2. Regulating; food processing and preservation through Total Quality Management (TQM)
3. Hazard Analysis
4. Use of nano-technology

UNIT:V

1. Development of a food product
2. Food labeling
3. Product feasibility study

DISSERTATION

Marks : 150

The Dissertation shall not be of more than 100 pages and is to be submitted in triplicate so as to reach the office of the Registrar at least 3 weeks before the commencement of the theory examination. Only such candidates who shall be permitted to offer Dissertation Paper in lieu of a paper as those who have secured at least 55% marks in aggregate, irrespective of the number of papers in which a candidate actually appeared at the examination.

N.B.(i) Non-Collegiate candidates are not eligible to be offered the Dissertation Paper