MAHARSHI DAYANAND SARASWATI UNIVERSITY, AJMER
Department of Food Science and Nutrition
PG Diploma inNutrition and Dietetics
w.e.f. 2020-2021

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PROGRAMME OF STUDY: - The PG Diploma in Nutrition and Dietetics will be of 1 year duration with exams conducted according to the University semester scheme. The 1 year course will be divided into 2 semesters of 6 months duration each.

ELIGIBILITY:- B.Sc. Home Science/ B.Sc.(Pass/ Hons.) with chemistry / B.A. with Home Science /B.Sc. Agriculture/ B.Sc. Microbial and Food Technology / B.Sc. Food Science / B.Sc. Clinical Nutrition and Dietetics / B.Sc. Homeopathy / B.Sc. Physiotherapy / B.Tech. (Food Technology/ Biotechnology) / B.Sc. Nursing / MBBS / BAMS / BHMS/ Bachelor of Dental Science (BDS) / B.Sc. Sports Nutrition / B.Sc. Yogic Science / B.Sc. in Allied Fields related to Health and Nutrition with at least 50% aggregate marks.

SCHEME: - The scheme of examination with nomenclature of papers (Theory and Practical) for every semester, with marks and hours of instruction, are clearly mentioned in the syllabus. The minimum passing marks in individual papers for any semester excluding compulsory papers will be 40% and the aggregate pass marks for the semester will be 40%.

INTERNAL ASSESMENT: - For every theory and practical paper 20% of the maximum marks will be awarded on the basis of internal assessment. Internal assessment will be based on:-

a) Written tests (minimum two)- 10%
b) Assignment/class presentation/group discussion/regularity in the class room-10%.

EXAMINATION:-

a) Result: - The minimum passing marks in individual papers for any semester will be 40% and the aggregate pass marks for semester will be 40%.
b) Division: - First division is awarded to candidates securing 60% marks in the aggregate or above; Second division is awarded to candidates securing 48% to 59.9%. Candidates securing less than 48% marks will be awarded Third Division and below 40% marks in the aggregate will be declared as Failed.
c) Due Paper: - candidates securing less than 40% marks in two papers in a single semester can reappear in that paper when the next exam of the Semester Scheme is held.

Scheme of Examination of
PG Diploma inNutrition and Dietetics
2020-21

SEM	Paper No.	Nomenclature of Paper	Marks		Hrs. Of Instruction/week	
			Theory	**Practical**	**Theory**	**Practical**
I	I	Human Physiology	50	50	4	3
	II	Clinical Nutrition and Dietetics	50	50	4	3
	III	Public Health Nutrition	50	50	4	3
	IV	Food Science and Food Microbiology	50	50	4	3
	V	Seminar	-	100	-	2
		Semester I Total	**200**	**300**	**16**	**14**
			500		**30**	
II	VI	Nutritional Biochemistry	50	50	4	3
	VII	Therapeutic Nutrition	50	50	4	3
	VIII	Nutrition Security and Food safety	50	50	4	3
	IX	Institutional and Food Service Management	50	50	4	3
	X	Internship with Project Report	-	100	-	2
		Semester II Total	**200**	**300**	**16**	**14**
			500		**30**	

SEMESTER I

Paper 1

Human Physiology

Hours/Week:4 **Max. Marks: 50**
Duration of Examination: 3 hrs Main Exam:40
Internal Assessment :10

Note: Examiner is requested to set the question paper of 40 marks only. Each question paper is divided into three parts, Part- A, Part B and Part C.

Part A: (8 marks) is compulsory and contains 8 questions (20 words each) at least 1 question from each unit. (Each question is of 1 mark)

Part B: (8 marks) is compulsory and contains 4 questions (50 words each) at least 1 question from each unit. (Each question is of 2 marks)

Part C:(24 marks) is compulsory and contains 6 questions, 2 from each unit (400 words each) candidate is required to attempt 3 questions, one from each unit. (Each question is of 8marks)

Objectives:

This course will enable the students to:

a) Advance their understanding of some of the relevant issues and topics of human physiology.
b) Enable the students to understand the integrated function of all systems and to understand the concepts of nutritional science in Physiology.

Contents:

UNIT I

1. **Cell and Blood**
   a. Structure of Cell
   b. Cell Cycle
   c. Tissues and their functions
   d. Blood
   e. Blood composition
   f. Erythropoiesis
   g. Blood groups

2. **The Immune System**
   a. Nonspecific defence mechanism
   b. Specific defence mechanism
   c. Innate immunity
   d. Specific acquired immunity

3. **Cardiovascular system**
    a. Basics of Cardio vascular system
    b. Cardiac output, Cardiac Cycle
    c. Blood pressure and its regulation
    d. Pathophysiology of Hypertension
    e. Myocardial ischemia and Infarction

UNIT II

4. **Respiratory system**
    a. Organs of the respiratory system
    b. The Mechanics of respiration
    c. Pulmonary volumes
    d. Interchange of gases with in lungs
    e. Regulation of respiration

5. **Gastrointestinal System**
    a. Structure and function of various organs of GI Tract
    b. Movement of the GI Tract
    c. Gastrointestinal hormones
    d. Digestion, absorption and utilization of Carbohydrate, Proteins and Fats

6. **Excretory System**
    a. Structure and function of kidney, Ureters, Urinary Bladder,
    b. Formation of urine
    c. Structure and function of skin

UNIT III

7. **Nervous System**
    a. Nerve cell
    b. Structural organisation of nervous system
    c. The central nervous system
    d. The peripheral nervous system
    e. Special senses

8. **Endocrine System**
    a. Endocrine glands
    b. ThePituitary gland
    c. The thyroid gland
    d. The parathyroid glands
    e. The pancreas
    f. The adrenal glands
    g. ThePineal gland
    h. The thymus gland
    i. Kidney as an endocrine gland

9. **Reproductive system**
    a. The female reproductive system
    b. The male reproductive system
    c. Growth and development during pregnancy
    d. Physiology of lactation

e. Role of hormones in reproduction
f. Structure and functions of sex glands and organs including hormones
g. Menstrual cycle
h. Physiology of pregnancy, Parturition, Lactation and Menopause

References:

1) Guyton, A.C., Hall, J.E. (1996): Textbook of Medical Physiology, 9th Ed. Prism Books (Pvt.) Ltd., Bangalore.
2) Winwood (1998): Anatomy and Physiology for Nurses, London, Edward, Arnold.
3) Wilson(1989): Anatomy and Physiology in health and illness, Edinburgh, Churchill Living Stone.
4) Chatterjee, C.C., (1988): A Textbook of Medical Physiology, London W.B. Sounder's Co.

Paper I

HUMAN PHYSIOLOGY
PRACTICAL

Hours/Week:3 **Max. Marks: 50**
Duration of Examination: 3 hrs Main Exam:40
Internal Assessment :10

Contents:

1. First aid box layout.
2. Measurement of Height and Weight
3. Measurement of Blood Pressure
4. Collection of Blood and Urine for biochemical investigation.
5. Total Blood Count (RBC, WBC)
6. Other Haematological Parameters: Bleeding Time, Clotting Time and Blood Group estimation.
7. Determination of Erythrocyte Sedimentation Rate
8. Estimation of Haemoglobin
9. Urine analysis- Normal and abnormal constituents of urine.

Paper II

Clinical Nutrition and Dietetics

Hours/Week:4 **Max. Marks: 50**
Duration of Examination: 3 hrs Main Exam:40
Internal Assessment :10

Note: Examiner is requested to set the question paper of 40 marks only. Each question paper is divided into three parts, Part- A, Part B and Part C.

Part A: (8 marks) is compulsory and contains 8 questions (20 words each) at least 1 question from each unit. (Each question is of 1 mark)

Part B: (8 marks) is compulsory and contains 4 questions (50 words each) at least 1 question from each unit. (Each question is of 2 marks)

Part C :(24 marks) is compulsory and contains 6 questions, 2 from each unit (400 words each) candidate is required to attempt 3 questions, one from each unit. (Each question is of 8marks.

Objectives:

This course will enable the students to:

a) Understand the underlying changes during diseases.
b) Understand the role of diet in the management of various diseases
c) Enabling them to understand nutrition management in infection, stress and special conditions
d) Understand - planning, preparation and service of therapeutic diets for various diseases

Contents:

UNIT I

1. **Introduction to Medical Nutrition Therapy**
   a. Definition And Role of Dietician
   b. Health Care- Nutrition Care Process
   c. Patient Care and counselling

2. **Adaptation of Therapeutic Diets**
   a. Types of Dietary adaptations for Therapeutic Diets
   b. Normal Nutrition : A base for Therapeutic Diet
   c. Diet Prescription
   d. Constructing Therapeutic Diets
   e. Routine Hospital Diets
   f. Mode of Feeding

3. **Medical Nutrition Therapy in Critical Care**
   a. Nutritional management of the critically ill
   b. Special feeding methods in nutritional support

UNIT II

4. **Nutritional Management of Infections and Fevers**
   a. Defense Mechanism in the Body

b. Nutrition and Infection
c. Metabolic changes during infection
d. Classification and aetiology of Fever – Typhoid and Tuberculosis, HIV and AIDS

5. Nutrition during Stress
a. The stress response
b. Physiological response and Dietary management during Surgery, Burns, Trauma, Sepsis

6. Nutritional Management of Food Allergies and Food Intolerance
a. Adverse Food reaction: Food Allergy and Food Intolerance
b. Adverse Food reaction-Diagnosis Process
c. Treatment, management and prevention of adverse Food Reactions

UNIT III

7. Nutrients and Drugs Interactions: Basic Concept
a. Effect of nutrition on drugs
b. Effect of drugs on the Nutritional status
c. Diet and Drug Interaction
d. Clinical significance and risk factors for drug nutrient interactions

8. Nutrition, Diet and Cancer
a. Development , Characteristics and identification of cancer cell
b. Risk factors in cancer
c. Nutritional requirements and dietary management of cancer patient
d. Cancer prevention

9. Paediatric and Geriatric Nutrition
a**.** Paediatric problems and Nutritional management
i. Congenital heart disease
ii. Preterm/low birth weight
iii. Lactose Intolerance
iv. Celiac disease

b. Geriatric Nutrition and Nutritional management

i. Physiological changes during old age
ii. Nutritional changes during old age
iii. Health and Feeding problems
iv. Nutritional Support

REFERENCES:

1. Antia, F.P. and Abraham, P. (1997). Clinical Dietetics and Nutrition. Oxford University Press, Delhi.
2. Bamji, M.S., Rao, N.P. and Reddy, V. (1999) : Textbook of Human Nutrition, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi
3. Davis, J. and Sherer, K. (1994) : Applied Nutrition and Diet Therapy for Nurses, 2nd Edition, W.B. Saunders Co.
4. Escott-Stump, S. (1998) : Nutrition and Diagnosis Related Care, 4th Edition, Williams and Wilkins.
5. Fauci, S.A. et al (1998): Harrison's Principles of Internal Medicine, 14th Edition, McGraw Hill.
6. Garrow, J.S., James, W.P.T. and Ralph, A. (2000) : Human Nutrition Dietetics, 10th Edition, Churchill Livingstone.
7. Guyton, A.C. and Hall, J.E. (1999) : Textbook of Medical Physiology, W.B. Saunders Co.
8. Khanna, K., Gupta, S. and Seth, R. (1999). Textbook of Nutrition and Dietetics, Phoenix Pub. House Pvt. Ltd. , New Delhi.
9. Mahan, L.K. &Ecott-Stump, S. (2000) : Krause's Food, Nutrition and Diet Therapy, 10th Edition, W.B. Saunders Pvt. Ltd.
10. Ritchie, A.C. (1990) : Boyd's Textbook of Pathology, 9th Edition, Lea and Febiger, Philadelphia.
11. Robinson, C.H. and Lawler, M.R. (1986). Normal and Therapeutic Nutrition. Macmillan, New York.
12. Shils, M.E.. Olson, J.A., Shike, N. and Ross, A.C. (Ed) (1999) : Modern Nutrition in Health & Disease, 9th Edition, Williams and Wilkins.
13. Swaminathan, M.S. (1985). Advanced Textbook on Food and Nutrition. Vol. I & II. The Bangalore Printing & Publishing Co. Ltd. Bangalore.
14. Walker, W.A. and Watkins, J.B. (Ed) (1985) : Nutrition in Paediatrics, Boston, Little, Brown & Co.
15. Williams, S.R. (1993): Nutrition and Diet Therapy, 7th Edition, Times Mirror/Mosby College Publishing.
16. World Cancer Research Fund 9[1997). Food, Nutrition and the Prevention of Cancer – A Global Perspective. Washington E.D. WCRF

Journals :

1. American Journal of Clinical Nutrition.
2. European Journal of Clinical Nutrition.
3. Indian Journal of Nutrition and Dietetics
4. Journal of the American Dietetic Association.
5. Nutrition Reviews.
6. Nutrition Update Series.
7. World Review of Nutrition and Dietetics.

Paper II
Clinical Nutrition and Dietetics

PRACTICAL

Hours/Week:3 **Max. Marks: 50**

Duration of Examination: 3 hrs Main Exam:40
Internal Assessment :10

Contents:

1. **Exchange list and food composition tables for meal planning**
Diet planning using the exchange list and the food composition tables

2. **Planning of different types of therapeutic diets**

3. **Special feeding methods:**
   a) Planning home blend feeds
   b) Survey for commercial Enteral feeds available in the market

4. **Nutritional management of Fevers**
   a) Diet plan for Typhoid
   b) Diet plan for Tuberculosis

5. **Nutritional management of Cancer**
1. Diet plan for cancer patient

6. **Use of screening tool to assess nutritional status of hospitalized patients**
   a) Subjective Global Assessment (SGA) score sheet
   b) Mini Nutritional Assessment (MNA) Sheet for older patients
   c) Nutrition Risk Screening (NRS-2002)
   d) Malnutrition Screening Tool (MST)

7. **Study of a Dietetics unit in a Hospital**

Paper III

Public Health Nutrition

Hours/Week:4 **Max. Marks: 50**
Duration of Examination: 3 hrs Main Exam:40
Internal Assessment :10

Note: Examiner is requested to set the question paper of 40 marks only. Each question paper is divided into three parts, Part- A, Part B and Part C.

Part A: (8 marks) is compulsory and contains 8 questions (20 words each) at least 1 question from each unit. (Each question is of 1 mark)

Part B: (8 marks) is compulsory and contains 4 questions (50 words each) at least 1 question from each unit. (Each question is of 2 marks)

Part C:(24 marks) is compulsory and contains 6 questions, 2 from each unit (400 words each) candidate is required to attempt 3 questions, one from each unit. (Each question is of 8marks)

Objectives:

To enable students to understand various aspects of Public Health, Nutritional problems prevailing in the country, their epidemiology and demography, assessing and improving community health and government policies and programmes for control and prevention.

This course will enable the students to-

a) Develop holistic approach and knowledge base and understand the concept of health, nature and importance from the individual and community perspective.
b) Know the importance of epidemiology and demography in health.
c) Assess the health and nutritional status.
d) Know the factors affecting the health and nutritional status of the community.
e) Understand the causes, determinants and consequences of nutritional and health problems in the society.
f) Be familiar with various approaches and ongoing schemes and programmes for improving nutrition and health.

Contents:

UNIT I

1. **Definition and Key concept**: Health, Health Care,Nutrition, Public Nutrition Primary Health Care and Health care delivery
2. **Community and its Organization-** concept of community, types of community.
3. **Primary health care of the community**- National health care delivery system, determinants of health status, indicators of health.

UNIT II

4. **Nutritional status Assessment and Surveillance-** meaning, need, objectives, methods and interpretation ofNutritional Status- Determinants of Nutritional status of individual and population-Nutritional and Non-Nutritional indicators, Direct and Indirect Parameters. Rapid assessment procedure- need, importance, technique and interpretation.

5. **Common Nutritional Problems-** their causes, incidence, general signs and symptoms and treatment (PEM, Vitamin A, Iron, Iodine and Fluorosis).

6. **Life Style and Community health**- Preventive and promotive aspects, public education and action (alcohol, cigarette smoking, drugs, AIDS, STD, diet and chronic diseases).

UNIT III

7. **Approaches and Strategies for Improving Health and Nutritional Status-**
    a. Health based- PHC, Family welfare programme.
    b. Food Fortification, genetic improvement and supplementary feeding.
    c. Nutrition Education and Participatory Training.
    d. National Food and Nutrition Policies
    e. Major National Nutrition Programmes.

8. **Communication Media in Nutrition and Health Education-** Audio- visual Aids, mass media (print, radio, TV, films and advertising), interpersonal communication.

9. **Community Nutrition Programme Management-**
    a. Planning (identification of problems, analysis of causes, resources, constraints, selection of intervention, setting of strategies).
    b. Implementation and Supervision.
    c. Operation Monitoring, Surveillance and Evaluation.

References:

1. Agarwal, A.N. (1981); Indian Economy Problems of development and planning.
2. Beghin, I.Cap.,M;Dujardan,B.(1988): A Guide to Nutritional Status Assessment, WHO, Geneva.
3. Dahama,O. P and Bhatnagar, O. P.(1991): Education and Communication for Development, Oxford and I.B.H publishing Co. Pvt. Limited.
4. Gopaldas, T. and Sheshadri, S.(1987): Nutrition Monitoring and Assessment, Oxford University press.
5. Jelliffe, D.B.(1966): Assessment of Nutritional Status of the Community, WHO.
6. Park, J.E and Park, K.(1994): Textbook of Preventive and Social Medicines, 9th Edition. M/S BanarsidasBhanot, Jabalpur.
7. Shukla, P. K.(1982): Nutritional Problems of India.
8. World Health Organization (1987): Health Promotions- Concept and Principles in action, a Policy framework, WHO Regional Office for Europe, Copenhagen.
9. Census Reports.
10. DGHS, Reports.
11. NNMB Reports.
12. Nutrition Education Series- UNESCO, Paris.
13. Documents from respective ministries implementing various schemes and programmes.

Paper III

PUBLIC HEALTH NUTRITION

PRACTICAL

Hours/Week:3 **Max. Marks: 50**

Duration of Examination: 3 hrs Main Exam:40
Internal Assessment :10

Contents:

1. **Identification of nutritional problems and strategies to tackle the problem**- Training in nutritional status assessment techniques and community based projects.

2. **Development of nutrition materials and their evaluation-**
   a. Charts, posters, flashcards, flannel graphs, flip charts, leaflets and pamphlets.
   b. Others- puppets, role play and street play.
   c. Analysis and critical appraisals of TV, films and advertisements.

3. **Critical appraisal of existing intervention programmes and surveillance systems** used by the government and non-government organizations for improving health and nutritional status of community and also suggest ways for their improvement
   .
4. **Development of plan of nutrition intervention project in the community**.

Paper IV

Food Science and Food Microbiology

Hours/Week:5 **Max. Marks: 50**
Duration of Examination: 3 hrs Main Exam:40
Internal Assessment :10

Note: Examiner is requested to set the question paper of 40 marks only. Each question paper is divided into three parts, Part- A, Part B and Part C.

Part A: (8 marks) is compulsory and contains 8 questions (20 words each) at least 1 questions from each unit. (Each question is of 1 mark)

Part B: (8 marks) is compulsory and contains 4 questions (50 words each) at least 1 questions from each unit. (Each question is of 2 marks)

Part C :(24 marks) is compulsory and contains 6 questions, 2 from each unit (400 words each) candidate is required to attempt 3 questions, one from each unit. (Each question is of 8marks)

Objectives: This course will enable students to:

a) Understand various properties of food components
b) Gain deeper knowledge of micro organisms in the environment
c) Understand the importance of microorganisms in food spoilage
d) Understand the latest procedures adopted in various food operations to prevent food borne disorders and legal aspects involved in such cases.

Contents:

UNIT I

1. **Carbohydrates in the diet- Classification**
   Sugars: chemistry, functionality and their role in Food Industry, sweeteners
   Characteristics and Functional properties of native and modified starches
   Non Starch polysaccharides: Cellulose, Hemicellulose

2. **Lipids-**
   Classification and composition
   Functional properties of food lipids
   Deteriorative changes in fats and oils

3. **Proteins –**
   Classification and composition
   Functional properties of proteins

UNIT II

4. **Cereals and Pulses**
   Structure and composition of cereal grains
   Breakfast cereals
   Different types of flours
   Composition and processing of Pulses

5. **Milk and Milk products**
   Composition of milk
   Properties of milk
   Processing of milk and milk products

6. **Eggs and Meat**
   Structure and composition of Egg and Meat
   Processing of egg and meat
   Effects of heat ?

UNIT III

7. **Microorganisms of importance in foods**- role of Bacteria, Fungi, yeast, sources, characteristics and biochemical activities.
8. **Food spoilage-** factors responsible for food spoilage, chemical changes due to spoilage. Spoilage of different foods- meat, fish, poultry, fruits and vegetables, cereal and cereal products, milk and milk products
9. **HACCP, Food Safety and Assurance System**- Need, Benefits and Principles of HACCP, Guidelines for application of HACCP principles

Paper IV

Food Science and Food Microbiology

PRACTICAL

Hours/Week:3 **Max. Marks: 50**
Duration of Examination: 3 hrs Main Exam:40
Internal Assessment :10

Contents:

1. **Starch cookery**- Gelatinisation, Dextrinisation, thickening power of starches
2. **Sugars**- stages of sugar cookery, Caramelisation, crystal formation in foods employing sugars.
3. **Fats and oils-** Fat as shortening agent, frying medium (shallow, deep). Acid value, Peroxide Value, Saponification Value of fats.
4. **Cereals-** Gluten formation and retardation
5. **Milk**- Estimation of milk protein by Walker Formal titration method, Estimation of milk lactose by Benedict's method, Calculation of percentage purity of milk

6. **Analysis of proximate constituents of foodstuffs**- Moisture, Protein, Fat, Fiber, Mineral Ash

7. **Tests for adulterants in foodstuffs-**

   1) Metanil Yellow in Bengal gram flour
   2) Artificial colour in chilli powder
   3) Chicory in Coffee
   4) Metanil Yellow in Dals
   5) Starch in Khoa
   6) Metanil yellow in Turmeric

8. **Microscopy: Principles ,Use and Maintenance**

9. **Microbiological apparatus and equipments**

10. **Microbial analysis of food samples**

    a. Preparation of sterelized media.
    b. Gram's staining of bacterial cultures
    c. Determination of fungal and yeast count in the given food samples
    d. Determination of Coliforms in the given food samples
    e. Determination of the quality of milk sample by Methylene Blue Reductase test
    f. Determination of number of bacteria in milk

g. Visit to Food Manufacturing Unit/Processing Units/Hotels to observe processing & manufacturing of food products; to learn various microbial techniques & to understand HACCP functioning.

SEMESTER I

Paper V

Seminar

Max. Marks: 50

Internal Assessment

Every studentwill be allotted a topic on which he/she is required to collect material and present it as a seminar before the entire class and concerning faculty. The topic would be related to current issues in nutrition and health. Marks would be awarded on the basis of content, extent of literature surveyed, preparation of the PowerPoint and the actual seminar presentation.

SEMESTER II

Paper VI

Nutritional Biochemistry

Hours/Week:4 **Max. Marks: 50**
Duration of Examination: 3 hrs Main Exam:40
Internal Assessment :10

Note: Examiner is requested to set the question paper of 40 marks only. Each question paper is divided into three parts, Part- A, Part B and Part C.

Part A: (8 marks) is compulsory and contains 8 questions (20 words each) at least 1 question from each unit. (Each question is of 1 mark)

Part B: (8 marks) is compulsory and contains 4 questions (50 words each) at least 1 question from each unit. (Each question is of 2 marks)

Part C:(24 marks) is compulsory and contains 6 questions, 2 from each unit (400 words each) candidate is required to attempt 3 questions, one from each unit. (Each question is of 8marks)

Objectives:

This course will enable the students to:

a) Develop an understanding of the principles of biochemistry
b) To get an insight into the chemistry of major nutrients and physiologically important compounds
c) To understand the biochemical process and systems as applicable to human nutrition
d) To apply the knowledge in human nutrition and dietetics

Contents:

UNIT I

1. **Introduction to Nutritional Biochemistry**

a. Meaning and importance of Nutritional Biochemistry
b. Development of Nutritional Biochemistry

2. **Chemistry of Carbohydrates**

a. Monosaccharides
b. Isomerism and properties of Monosaccharides
c. Oligosaccharides
d. Polysaccharides

3. Lipids

a. Structure and Classification
b. Chemical properties of Fatty acids and Neutral Fats

UNIT II

4. Proteins-

a. Structure and Classification
b. Physio-Chemical properties of Protein

5. Enzymes and coenzymes

a. Nomenclature and Classification of enzymes
b. Mechanism of enzyme action
c. Factors affecting enzyme activity.
d. Role of enzymes and Coenzymes in Metabolism
e. Enzymes in clinical diagnosis

6. **Intermediary Metabolism**

a. Carbohydrates- Glycolysis, Gluconeogenesis, Glycogenesis, Glycogenolysis, Citric acid cycle
b. Lipids- Beta oxidation of fatty acids , Lipogenesis, Lipoprotein metabolism
c. Proteins- Urea cycle, Deamination, Transamination

UNIT III

7. Biological oxidation

a. Electron Transport Chain
b. Oxidative Phosphorylation

8. Vitamins-

a. Structure and properties of water soluble vitamins
b. Structure and properties of water soluble vitamins

9. **Minerals**-

a. Biochemical role of Micro minerals- Calcium, Phosphorus, Magnesiun
b. Biochemical role of Macro minerals- Iron, Iodine,Zinc ,Selenium, Copper, Chromium, Cobalt, Manganese.

References-

1. West, E.S., Todd, W.R., Mason, H.S. and Van Bruggen, J.T. (1974): 4th Ed. Text book of biochemistry, Amerind Publishing Co. Pvt. Ltd.
2. White, A., Handlar, P., Smith E.L., Stelten, D.W. (1959): 2nd Ed. Principles of biochemistry, McGraw Hill Book Co.
3. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (1993): 23rd Ed. Harper's Biochemistry. Lange medical book.
4. Lehinger, A.L., Nelson, D.L. and Cox, M.M. (1993): 2nd Ed. Principles of Biochemistry, CBS Publishers and distributors.
5. Devlin, T.M. (1986): 2nd Ed. Text book of Biochemistry with Clinical Correlations, John Wiley and sons.
6. Stryer, L. (1995): Biochemistry, Freeman WH and Co.
7. Satyanarayan U, Chakrapani U., Biochemistry, ArunabhaSen, books and Allied (P) limited.

SEMESTER II

Paper VI

Nutritional Biochemistry

Practical

Hours/Week:3 **Max. Marks: 50**
Duration of Examination: 3 hrs Main Exam:40
Internal Assessment :10

OBJECTIVE:

This course will enable the students to:
Develop an understanding of the principles that underlie biochemical estimations
Develop skills in both qualitative and quantitative estimations

Contents:

1. Basic instruments/ equipment used in biochemical laboratories and important working tips
    a) Basic instruments/ equipment used in biochemical laboratories
    b) Safety in laboratory
    c) Basic calculations
2. Investigative techniques and procedures in nutritional biochemistry
    a) Qualitative and quantitative procedures
    b) Separation Techniques:Chromatography (Paper chromatography, Thin layer Chromatography),Electrophoresis (Paper and Gel Electrophoresis)
3. Colorimetry
4. Qualitative analysis of Carbohydrates
5. Qualitative analysis of Fats and Oils
6. Qualitative analysis of amino acids and proteins
7. Estimation of Moisture and Ash content of foodstuffs
8. Estimation of acid value of Fats and Oils
9. Estimation of vitamin-C by Titrimetric method
10. Estimation of blood Glucose, Serum Cholesterol, Blood Urea, LipidProfile
11. Fluorimetry- general principle
12. Flame Photometry- general principle

References-

1. Sharma S. "Practical Biochemistry" Classic publishing house, Jaipur- Delhi
2. Practical manual wheeler publishers.
3. Devlin T.M. (1986) 2nd Ed. Text Book of Biochemistry with Clinical Correlation, John Wiley and Sons.
4. Fruton J and Symond S. General Biochemistry, Asia Publishing House, Bombay.
5. Indian Standards Institution (1985) ISI Hand Book of Food Analysis Parts I to XI, ManakBhawan, New Delhi.
6. Talwar G.P. Text Book of Biochemistry and Human Biology, Prentice Hall of India, New Delhi.
7. Kahn Conn, EE Stamf P.K. Outlines of Biochemistry Willey Eastern Pvt. Ltd. New Delhi.
8. Nagar, R and Nair, S. Biochemistry. Rajasthan HinidiGranth Academy, Jaipur 2001.
9. Oser B.L. (1965) 14th Ed. Hawk's Physiological Chemistry McGraw Hill Book Co.
10. Sharma Sheel, Practical Biochemistry. Classic Publishing House, Jaipur-Delhi (1993).
11. Stryu L. (1995) Biochemistry Freeman WH & Co.
12. Sundararaj, P and Siddhu A (1995) Qualitative tests and Quantitative Procedures in Biochemsitry.
13. Varley H. Gowenlock, A.H. and Bell, M (1980) 5th Ed. Practical and Clinical Chemistry Vol. I William Heinemann Medical Book Ltd.
14. William S, 16th Ed. JAOAC Official Methods of Analysis of the Association of Official Analytical Chemists.
15. White, A. Handar, P. Smith E.L. Stelten D.W. (1959) 2nd Ed. Principles of Biochemistry McGraw Hill Book Co.
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SEMESTER II

Paper VII

Therapeutic Nutrition

Hours/Week:4 **Max. Marks: 50**
Duration of Examination: 3 hrs Main Exam:40
Internal Assessment :10

Note: Examiner is requested to set the question paper of 40 marks only. Each question paper is divided into three parts, Part- A, Part B and Part C.

Part A: (8 marks) is compulsory and contains 8 questions (20 words each) at least 1 question from each unit. (Each question is of 1 mark)

Part B: (8 marks) is compulsory and contains 4 questions (50 words each) at least 1 question from each unit. (Each question is of 2 marks)

Part C:(24 marks) is compulsory and contains 6 questions, 2 from each unit (400 words each) candidate is required to attempt 3 questions, one from each unit. (Each question is of 8marks)

Objectives:

THERAPEUTIC NUTRITION

UNIT I

1. **Nutrition Care in Weight Management**
    a. Imbalance of Weight
    b. Obesity
    c. Etiology and Management of obesity
    d. Underweight
    e. Etiology and Management of Underweight

2. **Nutritional Management of Eating Disorders**
    a. Anorexia Nervosa
    b. Bulimia Nervosa
    c. Etiology and Management of Eating Disorders

3. **Nutritional Management of Gastrointestinal Diseases and Disorders**

Etiology and Management of Gastrointestinal Disease and Disorders- Diarrhoea, Constipation, Dyspepsia, Gastritis, Diverticular Disease, peptic Ulcer, Malabsorption Syndrome

UNIT II

4. **Nutritional Management of Coronary Heart Diseases (CHD)**
    a. Prevalence, Etiology and Pathophysiology of CHD
    b. Common Disorders of CHD and their Management
    c. Prevention of CHD

5. **Nutritional Management of Metabolic Diseases : Diabetes Mellitus**
    a. Prevalence, Etiology, Diagnosis and complications
    b. Management of Diabetes Mellitus

6. **Etiology and Nutritional Management of Metabolic Diseases : Gout and Inborn Errors of Metabolism**
    a. Gout – Etiology and Management
    b. Nutritional Management of Inborn Errors of Metabolism- Phenylketonurea (PKU), Tyrosinemia, Maple syrup urine disease (MSUD), Homocystinuria, Galactosemia

UNIT III

7. **Etiology and Nutritional Management in Liver, Gall bladder and Pancreatic Diseases**
    a. Liver Disease- Viral Hepatitis, Liver Cirrhosis, Hepatic Encephalopathy
    b. Gall Bladder and Biliary Tract Diseases
    c. Pancreatic Diseases : Acute Pancreatitis and Chronic Pancreatitis

8. **Etiology and Nutritional Management of Renal diseases**
    General principles of Dietary management in Renal Diseases- Acute and Chronic Nephritis, Nephrotic Syndrome, Acute and Chronic Renal Failure, End Stage Renal disease, Renal Calculi

9. **Etiology and Nutritional Management of Neurological Disorders**
    Common Neurological Disorders- Etiology, Clinical features and Nutritional management of Dysphagia, Alzheimer ’s disease, Parkinson’s Disease, Epilepsy

Paper VII

Therapeutic Nutrition

Practical

Hours/Week:3 **Max. Marks: 50**
Duration of Examination: 3 hrs Main Exam:40
Internal Assessment :10

OBJECTIVE:
This course will enable the students to –

a) Understand - planning, preparation and service of therapeutic diets for management of various diseases

Contents:

1. **Nutritional care of weight management**
    a) Diet plan for overweight , Obese children
    b) Diet plan for underweight children
2. **Planning diet Gastrointestinal Diseases and Disorders**
    a) Diet plan for Peptic ulcer
    b) Diet plan for ulcerative colitis
    c) Diet plan for Lactose intolerance
3. **Planning diet for coronary heart diseases**
    a) Diet plan for Hypertensive
    b) Diet plan for Acute myocardial Infarction and Hypercholesterolemia
    c) Diet plan for congestive heart failure
4. **Planning diet for metabolic diseases**
    a) Diet plan for non-insulin dependent diabetes mellitus
    b) Diet plan for non-insulin dependent diabetes mellitus
    c) Diet plan for Gout
5. **Planning diet for Liver, Gall bladder and Pancreatic Diseases**
    a) Diet plan for Cholelithiasis / Cholecystitis
    b) Diet plan for Pancreatitis
6. **Planning diet for Renal diseases**
    a) Diet plan for Glomerulonephritis
    b) Diet plan for Nephrotic syndrome
    c) Diet plan for Acute and Chronic renal failure
    d) Diet plan for Nephrolithiasis
7. **Observation of Dietetics unit in a hospital**

SEMESTER II

Paper VIII

NUTRITIONAL SECURITY AND FOOD SAFETY

Hours/Week:4 **Max. Marks: 50**
Duration of Examination: 3 hrs Main Exam:40
Internal Assessment :10

Note: Examiner is requested to set the question paper of 40 marks only. Each question paper is divided into three parts, Part- A, Part B and Part C.

Part A: (8 marks) is compulsory and contains 8 questions (20 words each) at least 1 questions from each unit. (Each question is of 1 mark)

Part B: (8 marks) is compulsory and contains 4 questions (50 words each) at least 1 questions from each unit. (Each question is of 2 marks)

Part C:(24 marks) is compulsory and contains 6 questions, 2 from each unit (400 words each) candidate is required to attempt 3 questions, one from each unit. (Each question is of 8marks)

Objectives:

This course will enable the students to-

1) To understand issues related to food and health security and its assessment.
2) To familiarise students with the concept of food assistance as an instrument for alleviating chronic hunger.
3) To understand the scope of food marketing, processing and distribution.
4) To understand International relations, economic structures, political systems and global issues related to food security.
5) To create awareness about the hazards and toxicity associated with food and their implications for health.

UNIT I

1) **Concept of Sustainable Development**
    a. Sustainability- meaning, concept.
    b. Sustainable development – concept, goals and challenges.
    c. Dimensions of sustainable development – social, spiritual, economic and educational security.

2) Management of Community resources and sustainability

a. Factors affecting sustainability of community resource management
b. Program sustainability and financial sustainability.

3) Food Security and Nutrition

a. Definition, Measurement and Levels
b. Dimensions of the nutrition problems of now, and in the future, who are the foodinsecure and malnourished.
c. Gender issues in attaining food and nutrition security.

UNIT II

4) Food Security and World Hunger

a. Introduction of Food Security and World Hunger.
b. Forms of food insecurity and hunger, poverty and chronic hunger, life cycle hunger, seasonal hunger, acute hunger,
c. Geography of hunger.

5) Sustainable Food security at Country and state level

a. Conceptual frame work of Food Security- availability of food, accessibility of food, consumption, utilization of food and sustainability
b. Food security Policy and status of macro food security in India.

c. Socioeconomic characteristics leading to vulnerability to food insecurity.
d. Development initiative imparting food security.
e. Nature and status of food insecurity at household level.

6) Food assistance and Nutrition Improvement Programmes

a. Current levels of food security and the role of food assistance
b. Food assistance to sustain and enhance lives.
c. Food assistance for increasing agricultural production and generating income.
d. Food assistance to save lives.
e. Financial food assistance.

UNIT III

7) Food for Consumers

a. Marketing, Processing and Distribution.
b. Meeting consumer demand
c. On – farm operations, storage in the marketing system
d. Improving market service to farmers.
e. The role of Government supplying food in the cities.
f. Food processing.

8) Trade, Sustainability and Food Security

a. Trade and Food Security
b. Trade and Food availability
c. Trade and Food supply instability
d. Trade and income growth.

9) Food Technology and Toxicology

a. Factors affecting nutritive value in processed foods.
b. Nutrification of foods.
c. Food additives, contaminants and natural toxins
d. Food Security Programmes and Policies.

SEMESTER II

Paper VIII

Nutritional Security and Food Safety

Practical

Hours/Week:3 **Max. Marks: 50**
Duration of Examination: 3 hrs Main Exam:40
Internal Assessment :10

Note: Examiner is requested to set the question paper of 40 marks only. Each question paper is divided into three parts, Part- A, Part B and Part C.

1. Develop a tool (18 Core Food Security Module) to assess the level of food insecurity at individual and household level.
2. Construct a Questionnaire to Asses the Socio-economic status of the community.
3. Identify common food adulterants and food additives in food.
4. Develop few recipes to enhance the nutritive value of food and food products.

SEMESTER II

Paper IX

Institutional Food Service Management

Hours/Week:4 **Max. Marks: 50**
Duration of Examination: 3 hrs Main Exam:40
Internal Assessment :10

Note: Examiner is requested to set the question paper of 40 marks only. Each question paper is divided into three parts, Part- A, Part B and Part C.

Part A: (8 marks) is compulsory and contains 8 questions (20 words each) at least 1 questions from each unit. (Each question is of 1 mark)

Part B: (8 marks) is compulsory and contains 4 questions (50 words each) at least 1 questions from each unit. (Each question is of 2 marks)

Part C:(24 marks) is compulsory and contains 6 questions, 2 from each unit (400 words each) candidate is required to attempt 3 questions, one from each unit. (Each question is of 8marks)

Objectives:

This course will enable the students to-

1. Gain knowledge about the development and scope of food service institutes in India.
2. Understand the characteristics and functioning of food service institutions.
3. Know the types of resources and tools required to manage the food outlets.
4. Learn to maintain and analyze the cost and accounting of food service institutions.
5. To make up an opportunity to start food service industry.

Contents:

Unit I

1. **Introduction to food service institutions-**
   a. Scope and Development of Food Service Institutions in India.

b. Characteristics of Food Service Establishments.
c. Effect of environmental changes on different types of establishments.

2. Food Service Management-
a. Principles and Functions.
b. Tools of management.
c. Management of Resources.
d. Approaches to management.

3. Personnel Management-
a. Personnel policies.
b. Recruitment, selection and induction.
c. Training and Development.
d. Employee facilities and benefits.

Unit II

4. Financial Management-
a. Definition and Scope
b. Cost concept and cost control.
c. Pricing Book keeping and accounting.

5. Food Management, Production and Service-
a. Characteristics of food.
b. Food purchasing, Receiving and Storage.
a. Food production system.
b. Food production process.
c. Quantity cooking techniques.
d. Styles of services.

6. Menu Planning-
a. Definition, history and origin of menu.
b. Types of menu.
c. Construction of menu.
d. Courses of menu.
e. Factors to be considered while planning a menu.

Unit III

7. **Organization of Spaces and Equipments-**

a. **Organization of Spaces**Kitchen (Types, Design and Layouts), Storage (Types, Design, Sanitation and Safety), Service Areas (Location, Planning service areas, Dimensions and Décor).

b. **Equipments**: Classification, Selection, Design, Installation and Operations. Purchasing, Care and maintenance.

8. Hygiene, Sanitation and Safety-

a. Environmental hygiene.
b. Personnel hygiene.
c. Safety.
d. Laws, Legislations and Policies.

9. Entrepreneurship in Food Service Organizations-

a. Definition, Need, Scope and Characteristics.
b. Identification of opportunities in food enterprises.
c. Government of India's Policies towards promotion of food entrepreneurship.

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Paper IX

Institutional Food Service Management

PRACTICAL

Hours/Week:3 **Max. Marks: 50**
Duration of Examination: 3 hrs Main Exam:40
Internal Assessment :10

Practical:

1. **Quantity Cooking: Concept, Principles and Techniques-** quantity cooking basic concept, the cooking process, weights, measures and conversions, recipe conversion
2. **Planning and organisation of meals** : Institutional feedings, mid day snack, college canteen, college hostel mess, working women's hostel
3. **Planning and organisation for industrial catering**: Industrial canteen, railway mess kitchen, reviews of a flight catering establishment.
4. **Catering for special occasion and events:** birthday party, cocktail party and conference

Paper X

Internship /Review of Literature /Case Study

Max. Marks: 50
Internal Assessment

In the end of Semester II, the students will undergo internship training of 45 days in a hospital / health clinic so that they get to understand the existing working practices, conditions and acquire an indepth technical know how.
The student shall prepare a report and submit it. Studentswill be required to make the presentation of the work. The student is also required to get the certificate from the concerned organization/ institution regarding successful training.

REVIEW OF LITERATURE

This paper is in lieu of the Internship and will be offered as an option to the M.Sc. students who are not able to conduct research /collect data/do field work/ conduct surveys under special circumstances such as the Covid-19 pandemic & lockdown conditions in the country

during the Academic session of 2019-20. The students will be required to select a topic which is relevant in the field of Nutrition Science & collect literature to review the recent progress in that topic. The review article would summarise the current state of knowledge & understanding on a topic. It would survey & summarise the previously published studies rather than reporting new facts or analysis. The students will be required to submit this in a typed form with spiral binding. The review paper should approximately be between 35-40 A4 sized pages typed in double spacing.

CASE STUDY

This paper is in lieu of the Internship and will be offered as an option to the M.Sc. students who are not able to conduct research /collect data/do field work/ conduct surveys under special circumstances such as the Covid-19 pandemic & lockdown conditions in the country during the Academic session of 2019-20. The students will be required to select a topic which is relevant in the field of Nutrition Science & collect literature to review the recent progress in that topic. The review article would summarise the current state of knowledge & understanding on a topic. It would survey & summarise the previously published studies rather than reporting new facts or analysis. The students will be required to submit this in a typed form with spiral binding. The review paper should approximately be between 35-40 A4 sized pages typed in double spacing.

The student will be required to conduct or detailed study of a persons/group of persons either suffering from metabolic or degenerative a diseases/ disorder or belonging to a vulnerable section of the society or from an endemic nutritional deficiency area or suffering from any micronutrient deficiency etc. The students will examine the case thoroughly & record the medical & nutritional history, social economic profile, bio chemical records, records of anthropometries/chemical assessment record the present signs & symptoms, assess the dietary intake of macro & micro nutrients by the subjects, analyse the etiology of the disease etc. Students will be able to develop an in depth understanding of the problem on which the case study has been undertaken. The case study will have to be documented with supporting literature, questionnaires & relevant findings. The students will be required to submit this in a typed form with spiral binding. The case study should be approximately be between 20-30 A4 Sized pages typed in double spacing.