VIDYASAGAR UNIVERSITY

NUTRITION

(Honours & General)

Under Graduate Syllabus

(3 Tier Examination Pattern)

w.e.f. 2014-2015

REVISED

Vidyasagar University

Midnapore 721 102

West Bengal

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NUTRITION (HONOURS)
SYLLABUS

Nutrition Honours **Full Marks 800**

Theoretical Paper: 500 Marks

Practical Paper : 300 Marks

		Marks	Numbers of Lectures
	PART I (1 year course)		
Paper I	: Unit 01 : Physiological Aspects of Nutrition	50	50
	: Unit 02 : Information, Education and Communication with Nutrition Programme.	50	50
Paper II	: Unit 03 : Human Nutrition	50	50
	: Unit 04 : Community Nutrition	50	50
	PART II (1 year course)		
Paper III	: Unit 05 : Nutritional Biophysics, Biochemistry and Food Science .	50	50
	: Unit 06 : Food Commodities	50	50
Paper IV	: Unit 07 : Diet Therapy-I	50	50
	: Unit 08 : Food Microbiology, Hygiene and Sanitation	50	50
Paper V	: Unit 09 : Nutritional Physiology and Anthropometry	50	
(Practical)	: Unit 10 : Nutritional Biochemistry	50	

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PART III (1 year course)

			Marks	Numbers of Lectures
Paper VI	: Unit 11 :	Diet Therapy-II	50	50
	: Unit 12 :	Health Statistics, Computer application & Research Methodology	50	50
Paper VII	: Unit 13 :	Meal Management		50
(Practical)	: Unit 14 :	Project , Internship & Educational Excursion		50
Paper VIII	: Unit 15 :	Diet Therapy		50
(Practical)	: Unit 16 :	Health Statistics, Computer & Assignment programme on research methodology.		50

Note: The students will be assessed in each Theoretical paper (full marks : 100) on the basis of:

1. Class tests conducted by the college (internal assessment): 10 marks
2. Examination conducted by Vidyasagar University: 90 marks
3. In each unit marks for internal assessment will be proportionately distributed.

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PART - I

(1 year Course)

Paper - I (Theoretical)

Full Marks - 100

(University Examination - 90 marks and Internal Assessment - 10 marks)

Unit - 01 **Marks: 50**

PHYSIOLOGICAL ASPECTS OF NUTRITION Lectures: 50

1. Cardiovascular System:

a. Blood and its composition
b. Blood groups
c. Coagulation of blood
d. Structure and functions of heart,
e. Cardiac cycle, Cardiac output, Blood pressure and its regulation

2. Gastrointestinal System:

a. Structure and functions of various organs of the GI tract
b. Digestion and absorption of food and the role of enzymes and hormones.

3. Reproductive System:

a. Structure and functions of Testis & ovary.
b. Puberty, Menstrual cycle & Menopause.

4. Excretory System:

a. Structure and functions of kidney & Nephron, formation of urine, Micturation
b. Structure and function of skin
c. Regulation of temperature of the body

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5. Respiratory System:

a. Structure of respiratory system
b. Mechanism of respiration.
c. Respiratory volumes and capacities
d. O_2 & Co_2 trasport.

6. Nervous System :

a. Elementary structure of Nervous System.
b. Function of different parts of the brains in brief.
c. Sympathetic and Parasympathetic nervous system.
d. Special Senses (vision, olfaction & questation).

7. Musculoskeletal System :

a. Structure & functions of muscles.
b. Skeletal system: formation of bone and teeth. (General Idea)

8. Endocrine System:

a. Structure and functions, deficiency and excess symptoms.

9. Immune System & Immunization:

a) General concept of immune system, Types of immunity in brief.
b) Importance and Schedule of Vaccination of Children, Adult and foreign travelers. Full and partial immunization. Immunization hazards.
c) Role of community for universal vaccination implementation.

(The latest edition available should be used for all books.

1. Chatterjee Chandi Charan: Textbook of Medical Physiology, Medical Allied Agency, Kolkata.
2. Guyton, A. C., J. E.: Textbook of Medical Physiology. Prism Books (Pvt.) Ltd. Bangalore.

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3. Wilson: Anatomy and Physiology in Health and illness, Edinburg, Churchill Livingstone.
4. Winword: Sear's Anatomy and Physiology for nurses. London, Edward Arnold.

Unit - 02 **Marks: 50**

Lecture: 50

INFORMATION, EDUCATION AND COMMUNICATION (IEC) INCLUDING NUTRITION PROGRAMM

1. Process of information development in the field of Nutrition and Health, Information- a commodity and a state of mind.
2. Information rich & Information poor- Application in nutrition.
3. Communication in Nutrition and Health Education –
   a) Objective of Nutrition Education, Role of Nutrition Education, Impact of Nutrition Education.
   b) Objective of communication, Elements of communication, Basic principle of communication, Information centered methods, Health group communication method, Behaviour-centred method – their advantages, Barrier of communication.
   c) Concept of Mass Communication method, Mass Communication Media – their advantages and limitation.
   d) Impact of Education on Knowledge, Attitude and Practice development in the field of Nutrition and Health.
   e) Approaches and Strategies of Nutrition Education in Community – Women to women strategy, child to parent strategy.
4. Nutritional Programmes:
   a) Basic concept of Nutritional Programme Formulation.
   b) ICDS Programme – Aims, Objectives, Target group, Services provided, Advantages, Limitation, Suggestion for improvement.

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c) MDMP – Aims, Objectives, Target group, Service provided, Advantages, Limitation, Suggestion for improvement.
d) ANP, SNP, CNP, BFP – Aims and Objectives, Target group, Service provided, Advantages, Limitation, Critical Analysis.
e) Evaluation of Nutritional Programme – Steps adopted.

Paper - II (Theoretical)
Full Marks - 100
(University Examination - 90 marks and Internal Assessment - 10 marks)

Unit - 03

Marks: 50
Lectures: 50

HUMAN NUTRITION

1. **Concept and definition of terms Nutrition, Malnutrition and Health**: Brief history of nutritional science. Scope of nutrition, Type of Malnutrition, Health & Nutrition, Basic Idea on nutrigenomics & nanotechnology.
2. **Nutritional Requirements and RDA** : Formulation of RDA, PAR, PAL and Dietary Guidelines: Reference Man and Reference Woman.
3. **Body Composition and Changes** through the life cycle.
4. **Energy in Human Nutrition**: Idea of energy and its unit, energy balance, Assessment of energy requirements, Deficiency and Excess, Determination of energy in food, B.M.R & influencing factors, RQ, S.D.A., ACU, Physical activity specific energy demand.
5. **Nutrition in women, children and adolescents**:
   a. **Nutrition during Pregnancy**: Physiology of pregnancy, factors (non-nutritional) affecting pregnancy outcome, importance of adequate

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weight gain during pregnancy, antenatal care and its schedule, Nutritional requirements during pregnancy and modification of existing diet and supplementation, nutritional factors affecting breast feeding. Deficiency of nutrients and impact- energy, iron, folic acid, protein, calcium, iodine. Common problems of pregnancy and their managements- nausea, vomiting, pica, food aversions, pregnancy induced hypertension, obesity, diabetes and Adolescent Pregnancy.

b. **Nutrition during Lactation**: Physiology of Lactation: Nutritional requirements during lactation, dietary management, food supplements, galactogogues, preparation for lactation. Care and preparation of nipples during breast feeding.

c. **Nutrition during infancy**: Infant physiology relevant to feeding and care. Breast feeding - colostrums, its composition and importance in feeding. Initiation of breast-feeding and duration of breast-feeding. Advantages of exclusive breast-feeding. Nutritional and other advantages of breast-feeding. Introduction of complementary foods, initiation of management of weaning, breast feeding etc. Bottle-feeding circumstances under which bottle-feeding is to be given. Care and sterilization of bottles. Preparation of formula. Mixed feeding, breast feeding and artificial feeding. Teething and management of problems.

d. **Nutrition to toddlers** / preschool/school going children or adolescent.

e. **Management of preterm and low birth weight children** – their special needs.

6. **Growth and development from infancy to adulthood:**

Somatic, physical, brain and mental development, puberty, menarche, pre-pubertal and pubertal changes, importance of nutrition for ensuring adequate development.

a. Growth monitoring and promotion: Use of growth charts and standards, Preventions of growth faltering.

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b. Growth assessment by Height, Weight, BMI, Skin fold thickness, Waist Hip Ratio.

7. Geriatric nutrition – Dietary requirement, Geriatric health problems, Nutritional care.
8. Sports Nutrition- nutritional demand on different sports and dietary recommendations.
9. Space Nutrition- Body composition changes in space, special diet in space persons.

Books Recommended:

(The latest edition available should be used for all books)

1. FAO/WHO/UNU: Technical Report Series, 724 Energy and Protein Requirements, Geneva.
2. Ghosh, S.: The Feeding and Care of infarcts and Young Children. VHAI. Delhi.
3. Gopalan, C. et al: Nutritive value of Indian Foods, Indian Council of Medical Research.
4. Guthrie, A. H.: Introductory Nutrition, the C.V. Mosby Company.
5. Indian Council of Medical Research: Nutrient Requirements and Recommended Dietary Allowance for Indians, New Delhi.
6. Indian National Code for Protection of Breast Feeding: Govt. of India. Ministry of Social Welfare, New Delhi.
7. King, M.H., King, EM.A., Morley, D., Burgess, A. P.: Nutrition for Developing Countries, ELBS Oxford University Press.
8. Robinson, C.H. Lawler, M.R., Chenoweth, W.L. and Garwick, A.E.: Normal and Therapeutic Nutrition. Mac Millan Publishing Co.
9. S. Davidson and R. Passmore et al., Current Ed. Human Nutrition and Dietetics.
10. Swaminathan, M.: Essentials of Foods and Nutrition, Vols-I and II Ganesh and Co. Madras.

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11. WHO Technical Reports Series for different Nutrients.
12. WHO: A growth chart for International use in Maternal and Children Health Care, Geneva.

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Unit - 04

Marks: 50
Lectures: 50

COMMUNITY NUTRITION

1. Community: Concept of Community, types of community, Factors affecting health of the community.
2. Nutritional Assessment and Surveillance: Meaning, Need, Objectives and Importance.
   a. Direct nutritional assessment of human Groups: Clinical Signs, Nutritional Anthropometry, Biochemical tests, Biophysical methods – Merits, Limitations.
   b. Diet Survey: Need and importance, methods of dietary survey. Interpretation - concept of consumption unit, intra and inter individual distribution in family. Adequacy of diet with respect to RDA, concept of family food security.
   c. Clinical Signs: Need and importance, identifying signs of PEM, vitamin A deficiency and iodine deficiency, interpretation of descriptive list of clinical signs.
   d. Indirect Assessment : Secondary sources of community health data. Sources of relevant vital statistics of infant, child and maternal mortality rates. Epidemiology of nutritionally related diseases – Marasmus, Kworshiorkar, Scurvy, Ricket, Osteomalacia, Obesity, Diabetis.
3. Nutritional problem in the community : Malnutration. Other problems – Vit.–A deficiency, Vit.–D deficiency. Sociological factors in the etiology and prevention of malnutrition. *Food* production and availability, cultural influences, socio-economic factors, food consumption, conditioning infections, medical and educational services, psycho - social, emergency/disaster conditions e.g., famine, floods, war.

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4. Concept of Surveillance Systems: Role of international, national, regional agencies and organizations.
5. Food availability, factors affective food availability and its consumption.
6. Public Health, Demography and Epidemiology: Demography and it's applications, Epidemiology – study of the epidemiologic approach – time distribution, place, person, determinants of disease, preventive and social means. Community health through the lifespan. Vital statistics and their significance.
7. Epidemiological method: Descriptive, analytical experimental, serological, clinical. Communicable and infective disease control: Nature of communicable and infectious diseases, infection, contamination, disinfections, decontamination, transmission – direct and indirect, vector borne disease, epidemiology of infection, infecting organisms, causative agents – their microbiology, environmental measures and epidemiological principles of disease control.
8. Food Adulteration: Laws governing food standards, significance – PFA, FPO, ISI, Agmark, Meat Products order, Codex Alimentations. Common adulterants in food and their effects on health, common adulterants in food and their effects on health, common household methods to detect adulterants in food.

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Books Recommended .:

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1. Beghin, I., Cap. M., Dujardan, B.: A guide to Nutritional Stabs Assessment,. Oxford University Press.
2. Gopaldas, T. Seshadri, S.: Nutrition Monitoring and Assessment, Oxford University Press.
3. Gopalon, C.: Nutrition Foundation of India, Special Publication Series.
4. Jelliffe, D.B.: Assessment of the Nutritional Status of the Community, World Health Organization.
5. Mason, J.B., Habicht, J.P., Tabatabai, H. Valverde, U.: Nutritional Surveillance, W.H.O.
6. Ritchie, J.A.S.: Learning Better Nutrition FAO, Rome.
7. Saln, D.R., Lockwood, R., Scrimshaw, N. S.: Methods for tie Evaluation of the Impact of Food and Nutrition Programmes, United Nations University.

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PART- II

(1 year Course)

Paper -III (Theoretical)

Full Marks - 100

(University Examination - 90 marks and Internal Assessment - 10 marks)

Unit – 05 **Marks: 50**

Lectures : 50

NUTRITIONAL BIOPHYSICS, BIOCHEMISTRY AND FOOD SCIENCE

1. Cell membrane transport system, Surface Tension, Colloids – Basic idea and their biological importance.
2. Principles of Colorimetry, Photometry and Electrophoresis.
3. Acid, Base, Buffer, pH and Acid-Base balance.
4. Enzymes: Definition, types and classification of enzymes, definition and types of coenzymes, specificity of enzymes, Isozymes, enzyme kinetics including factors affecting velocity of enzyme catalyzed reactions, enzyme inhibition.
5. Carbohydrates – Classification, Structure and Properties. Daily requirement, Effect of too high and too low carbohydrate diet on health, Glycaemic index.
6. Lipids – Classification, Structure and Properties, Fatty acids – saturated, unsaturated – their importances.
7. Proteins – Classification, Structure in brief, Properties, Protein quality (BU, PER, NPU).
8. Dietary fibres – Classification, properties, nutritional significance.
9. Antioxidants, Nutraceuticals – Preliminary idea, Natural sources.
10. Intermediary metabolism:
    a. Carbohydrates: Glycolysis, T.C.A. cycle and energy generation, Gluconeogenesis, Glycogenesis, Glycogenolysis, Oxidative Phosphorelation, Blood sugar regulation.

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b. Lipids: Oxidation and biosynthesis of fatty acids saturated, monounsaturated, polyunsaturated. Synthesis and utilization of Ketone bodies, Ketosis, Fatty livers.
c. Proteins: General reaction of amino acid metabolism, urea cycle, Protein Biosysthesis.

11. Lipoproteins: Types, composition, role and significance in disease (in brief).
12. Introduction to Nucleic acids: Structure, Replication, Transcription, Genetic Code (in brief).
13. Water - Metabolism & balance.
14. Vitamins: Chemistry and biochemical role of fat soluble vitamins A, D, K and E and water soluble vitamins- B1, B2, B6,B12, niacin and C, folic acid.
15. Minerals: Biochemical role of inorganic elements, deficiency of Calcium, Iron, Iodine and Zinc.

Books Recommended:

(The latest edition available should be used for all books)

1. Assaini. J. Kaur. Text Book of Biochemistry. C.B.S. Publication.
2. Devlin. T. M.: Biochemistry. Freeman W. H. and Co.
3. Handler, P., Smith E. I., Stelten, D. W. Principles of Biochemistry, Mc. Grew Hill Book Co.
4. Lehninger, A.L., Nelson, D. L. and Cox, M. M. : Principles of Biochemistry. CBS Publishers and Distributors.
5. Murray, R. K. Grannen, D.K., Mayes, P. A. and Rodwell. V W.: Harper's Biochemistry. Lange Medical Book.
6. Stryer L.: Biochemistry. Freeman W. H. and Co.
7. West. E. S., Todd, W.R.- Mason, H. S. and Van Bruggen J.T.: Text Book of Biochemistry. Amerind Publishing Co. Pvt. Ltd.

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Unit - 06 **Marks: 50**

Lectures: 50

FOOD COMMODITIES

1. **Cereals and Millets:** Cereal products, breakfast cereals, fast foods. Structure, processing, storage, use in various preparations, variety, selection and cost.
2. **Pulses and Legumes**: Production (in brief), structures, selection and variety. Storage, processing and use in different preparations. Nutritional aspects and cost.
3. **Milk and Milk-products**: Composition, classification, selection quality and cost, processing, storage and uses in different preparations. Nutritional aspects, shelf - life and spoilage.
4. **Eggs**: Production, grade, quality, selection, storage and spoilage, cost, nutritional aspects and use in different preparations.
5. **Meat, Fish and Poultry**: Types, selection, purchase, storage, uses, cost, spoilage of fish poultry and meat, uses and preparations.
6. **Vegetables and Fruits**: Types, selection, purchase, storage, availability. Cost of use and nutritional aspects of raw & processed products and use in different preparations.
7. **Sugar and Sugar products**: Types of natural sweeteners, manufacture, selection, storage and use as preserver, stages in sugar cookery.
8. **Fats and Oils**: Types and sources (animal and vegetable), processing, uses in different preparations, storage, cost and nutritional aspects.
9. **Raising and Leavening agents**: Types, Constituents, Uses in cookery and bakery, Storage.
10. **Food Adjuncts**: Spices, Condiments, Herbs, Extracts, Concentrates, Essences, Food Colours. Origin, classification, Description, uses, Specifications, procurements and Storage.
11. **Convenience Foods**: Role, types, advantages, uses, cost and contribution to diet.
12. **Salt** : Types and uses.

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13. **Beverages**: Tea, Coffee, Chocolate and Cocoa, others beverages: Aerated beverages, juices.
14. **Preserved Products**: Jams, Jellies, Pickles, Squashes, Syrups, Types, Composition and Manufacture, Selection, Cost, Storage, uses and nutritional aspects.
15. **New food**: fast food, junk food, GM food, Free food.
16. **Food preservation**, food processing, food security, food storage, Food Fertification Chemical and Biological fortification.

Books Recommended:

(The latest edition available should be used for all books)

1. Dowell, P. and Bailey, A.: The book of ingredients. Borling Kinderley Ltd. London.
2. Hughes, O. and Bennion, M: Introductory Foods, Macmillan & Co., New York.
3. Lavies, S.: Food Commodities Ltd. London.
4. Phillip, T. E.: Modem cookery for teaching and the trade, Orient longman, Bombay.
5. Prevention of food Adulteration Act: Govt. of India.
6. Pruthi, J.S.: Spices and Condiments. National Book trust, New Delhi.
7. Pyke, M.: Catering Service and Technology. John Murrey Pub., London.

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Paper - IV (Theoretical)
Full Marks - 100
(University Examination - 90 marks and Internal Assessment - 10 marks)

Unit - 07 **Marks: 50**
Lectures: 50

DIET THERAPY- I

1. **Basic Concepts of diet therapy**: Transformation of normal diet to therapeutic diet, classification of therapeutic diets, Dietary counseling.
2. **Team approach to health care**: Assessment of patients' needs.
3. **Routine Hospital Diets**: Regular, light, soft, fluid, parenteral and eternal feeding.
4. **Energy modifications and nutritional care for weight management**: Identifying the overweight and obese, etiological factors contributing to obesity prevention and treatment. Low energy diets, balanced energy reduction and behavioral modification. Underweight - etiology and assessment, high energy diets for weight gain, anorexia nervosa and bulimia.
5. Diets for febrile conditions, infections and surgical conditions.
6. **Etiological factors, symptoms, diagnostic tests and management of upper GI tract disease**: Disease of esophagus and dietary management, diseases of stomach and dietary management. Gastric and duodenal ulcers and dietary management.
7. **Etiology, symptoms, diagnostic tests and management of intestinal diseases**: Diarrhea, Steatorrhoea, Diverticular disease, Inflammatory bowel disease, Ulcerative Colitis, Flatulence, Constipation, Irritable Bowel Syndrome, Haemorrhoids.
8. **Etiology, symptoms, diagnostic tests and management of** Malabsorption syndrome, Celiac sprue, tropical sprue, Intestinal brush border deficiencies (Acquired disaccharide intolerance), Protein losing enteropathy. RUTF

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9. Disease of the liver, Exocrine Pancreas and Biliary System. Liver function tests, application of diet therapy and nutritional care in liver disease. Dietary care and management in Viral Hepatitis, Cirrhosis of liver, Wilson's diseases. Dietary care and management in diseases of Gall Bladder and Pancreas Cholelithiasis, Cholecystitis, Cholecystectomy, Pancreatitis.

Unit – 08 **Marks: 50**
Lectures: 50

FOOD MICROBIOLOGY, HYGIENE AND SANITATION

1. Brief history of food microbiology and introduction to important microorganisms in foods.
2. Cultivation of microorganisms: Nutritional requirements of microorganisms, types of media used, methods of isolation.
3. Primary sources of microorganisms in foods, physical and chemical methods used in destruction of micro organisms in foods - sterilisation and disinfection.
4. Fundamentals of control of micro organisms in foods: Extrinsic and intrinsic parameters affecting growth and survival of microbes, use of high and low temperature, dehydration, freezing, freeze - drying, irradiation and preservatives in food preservation.
5. Food Spoilage: Contamination of micro organisms in the spoilage of different kinds of foods, such as cereal and cereal products, vegetable and fruits, fish and other sea foods, meat and meat products, eggs and poultry, milk and milk products, canned foods.
6. Public health hazards due to contaminated foods; Food borne infections and intoxications-symptoms, mode of transmission and methods of prevention; investigation and detection of food borne disease out-break.

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7. Importance of sanitation and hygiene in foods, kitchen hygiene, employee health, food plant hygiene, food laws.
8. Indices of food, milk and water: Sanitary quality, Microbiological criteria of foods, water and milk testing (Bacteriological analysis).
9. Community Water and Waste Management: Importance of water to the community, etiology and effects of toxic agents, water borne infectious agents, sources of water, safe drinking water/portability and tests for portability, community, waste and waste disposal, sewage disposal and treatment, solid waste and disposal, liquid waste disposal.
10. Fermented Foods- Dietary different fermented products, economical importance of fermented foods.

Books Recommended:

(The latest edition available should be used for all books)

1. Benson Harold, J.: Microbiological Applications, Wn. C. brown Publishers, U.S.A.
2. Collins, C.R and Lyne, P.N.: Microbiological Methods, Buttersworth, London.
3. Frazier, W. C. and Westhoff, D. c.: Food Microbiology, McGraw Hill Inc.
4. Jay James, M.: Modem Food Microbiology, Van Nostrand Reinhold Company Inc.
5. Pelczar, M. I. And Reid, R. D.: Microbiology, McGraw Hill Company, New York.

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Paper - V (Practical)
Full Marks - 100

Unit – 09 **Marks : 50**

NUTRITIONAL PHYSIOLOGY & ANTHROPOMETRY

1. Identification of prepared Slides:
   (a) Lungs, (b) Supra Renal Gland, (c) Thyroid, (d) Tongue, (e) Testis, (f) Ovary, (g) Kidney, (h) Liver, (i) Pancreas, G) Small Intestine, (k) Large Intestine, (1) Spinal cord, (m) Cerebellum, (n) Cerebrum, (o) Oesophagus (p) Stomach.
2. Determination of Haemoglobin by cyanomate method.
3. Blood flim with identification of WBC.
4. Measurement of Blood Pressure and Pulse rate.
5. Weight for age, Height for age, Weight for height, Mid upper arm circumference, BMI, W/H Ratio.
6. Growth chart preparation (WHO, NCHS & ICMR).

Unit – 10 **Marks: 50**

NUTRITIONAL BIOCHEMISTRY

1. Carbohydrates:

(i) Qualitative analysis of carbohydrate, protein, fat, acetone, bile salt & pigment, Urea

(ii) Estimation of reducing and total sugars in foods.

(iii) Estimation of lactose in milk.

(iv) Qualitative test with saliva (Amylase activity) and urine (glucose, Protein, Acetone, bile pigments).

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2. Fats:

(i) Determination of Acid value, Saponification of natural fats and oils.

3. Proteins:

(i) Estimation of tatal protein by biuret method.

4. Vitamins :

Estimation of Ascorbic acid content of foods Vit-E, Vit-A in foods by biochemical method.

5. Minerals

Estimation of Sodium, Potassium, Calcium and Iron in different food staffs.

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PART-III

(1 year Course)

Paper - VI (Theoretical)

Full Marks - 100

(University Examination - 90 marks and Internal Assessment - 10 marks)

Unit – 11 **Marks : 50**

Lectures: 50

DIET THERAPY-II

1. Diet in disease of the endocrine pancreas : Diabetes Mellitus - Classification, symptoms, diagnosis, management - Insulin therapy, oral hypoglycemic agents, glucose monitoring at home, dietary care and nutritional therapy, meal plan (with and without insulin), special diabetic foods, sweeteners and sugar. substitute.
2. Diseases of the cardiovascular system: Atherosclerosis etiology and risk factors. Hyerlipidemias - brief review of Lipoprotein and their metabolism, classification of hyperlipidemias, clinical and nutritional aspects of hyperlipidemias. Dietary care - Ischemic Heart Disease-nutritional management, Hypertension - etiology, prevalence, nutritional management. Prevention of cardiovascular diseases and diet.
3. Renal Diseases: Classification, etiology, symptoms of Glomerulonephritis-dietary management. Acute and Chronic Nephritis-dietary management. Nephritic & Nephrotic syndrome-dietary management. Renal failure and Ureaemia-dietary management. Nephrolithiasis-dietary management. Use of sodium and potassium exchange list.
4. Allergies: Definitions, symptoms, diagnosis and dietary management-food selection.
5. Inborn error of metabolism – Lactose Intolerance, Galactosamia, Phenyl ketonuria.

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6. **Anaemias**: Pathogenesis and dietary management - Nutritional Anaemias, Sickle Cell Anaemias, Thalassemia, Anaemia resulting from Acute Haemorrhage.

Books Recommended:

(The latest edition available should be used for all books)

1. Anderson, L., Dibble, M. V, Turkki, P. ., Mitchall, HS. and Rynbergin H. J.: Nutrition in Health and Disease, 1. B. Lipincott and Co. Philadelphia.
2. Antia, F. P. and Abraham, P.: Clinical Dietetics and Nutrition, Second Edition, Oxford University Press, Delhi.
3. Joshi, S. A.: Nutrition and Dietetics, Tata McGraw Hill Pub., New Delhi.
4. Mahan, L. K., Arlin, M.T.: Kranse's Food, Nutrition and Diet Therapy, W.B., Saunders Company, London.
5. Raheena, Begum: Textbook of food, nutrition and dietetics, Sterling Publishers, New Delhi.
6. Robinson, C.H, Lawler, M.R., Chenoweth, W. L. and Garwick, A.E.: Normal and Therapeutic Nutrition. Mc Millan Pub. Co.
7. Williams, S.R.: Nutrition & Diet Therapy, Times Mirror/ Mosby College Pub., St. Louis.

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Unit - 12 **Marks: 50**
Lecture: 50

HEALTH STATISTICS, COMPUTER APPLICATION AND RESEARCH METHODOLOGY

A. Research Methodology

1. General concept of research, types of Research – Exp. research, Action research, Historical research.
2. Sampling – Criteria, Design, Characteristics of good sampling, types of sampling.
3. Data, Data collection method, Criteria of good data, grouped data, ungrouped data.
4. Experimental design – In brief.

B. Health Statistics

1. Definition, Meaning of Importances of Statistics, Bio-statistics, Descriptive and Inferential Statistics, Hypothesis and their types, Level of significance, Critical region and accepting region, Variable and their types.
2. Tabulation of data – Frequency distribution and its types, Cumulative, Bivariate and Multivariate frequency distribution, Graphical presentation of frequency distribution – Histogram, Bar diagram, Polygram, Pie diagram.
3. Measurement of central tendency, standard deviation and standard error – Definition, Calculation, Kurtosis, Skeness.
4. Test of significance – Null hypothesis, Alternative hypothesis, degree of freedom, t-test – one tail-t test, two tail-t test, pair observation, standard mean of observation, test of significance,

C. Computer

1. Computer fundamental – Basic anatomy of computer, generation of computer, application of computer.

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2. Hardware and Software concept – Storage devices, system software, multi programming operating system, multi tasking operating system.
3. Computer viruses: Computer viruses, working of viruses, network viruses, antivirus, common antivirus software.
4. Data Processing – Types of data, types of data processing, step in data processing, application of data processing.
5. Principle of Programming – Programme language approaches.

Books Recommended:

(The latest edition available should be used for all books)

1. Asten, G., Tiffuey, J. : Guide to Improving Food Hygiene. North World, London.
2. Beaglehole, R., Bonita, R., Kjellstrom, T.: Basic epidemiology. World Health Organisation, Geneva.
3. Cassens, B. : Preventive Medicine and Public Health, Wiely Medical Publication, John Wiely & Sons.
4. Clark, J., Henderson, J.: Community Health, Churchill Living stone.
5. Mittal, S. K., Kukreja, S.: Immunization in Practice. Indian Academy of Pediatrics.
6. Park, K.: Park's Text book of Preventive and Social Medicine, MIs Banarasida Bhanot, Jabalpur.
7. Saha, A., Shattock, E, Moustafa, T.: Epidemiology in Primary Health Care, Interprint.
8. Smith, G. W. : Preventive Medicine and Public Health, Macmillan Co., New York.

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Paper - VII (practical)
Full Marks - 100

Unit - 13

Marks: 50

MEAL MANAGEMENT

1. Principles of formulation of diet chart.
2. Diet chart and menu planning for adult .men and women of different physical activity and economic status.
3. Diet chart and menu planning for infants, pre-school children and adolescents from different socio-economic status.
4. Diet chart and menu planning for pregnant, lactating and nursing mothers from different socio-economic group.
5. Diet chart and menu planning for elderly people.
6. Food service management: Definitions, principles and functions. Tools of management, resources.

Unit - 14 **Marks: 50**

PROJECT, INTERNSHIP & EDUCATIONAL EXCURSION

A. Project Work: **25 marks**

A Project work on public health / nutritional biochemistry / nutritional survey to be submitted.

Formulation of the Project:

1. Meaning of scientific research and its methods. Formulation of project design.

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2. Types of project design- exploratory, descriptive, experimental, cross sectional or longitudinal.
3. Methods: survey, case study, anthropological or experimental.
4. Tools and techniques: observation, interviewing, questionnaire schedules or rating scales.
5. Tabulation and interpretation: Tabular and graphic representation of data and its interpretation, bar diagram, pie diagram. Statistical procedures - variables, mean, standard deviation, test of hypothesis (t-test), chi-square test, degrees of freedom, null hypothesis, z-score.

B. Internship: 15 marks

A report on the basis of internship in a hospital dietary department or diet clinic to be submitted.
Aspects to be covered for general knowledge to :

a. Establish rapport with patients - assess the nutritional status and diet history of patients.
b. Plan diet sheets after careful study of patients' case sheets - prepare and provide guidance in the production of therapeutic diets.
c. Supervise preparation of diets, assist and guide in tray setting with special emphasis on portion control and therapeutic modifications.
d. Supervise delivery of trays to patients.
e. Get feedback from patients regarding diets.
f. The modification of diet through consultation doctors.
g. Undertake case study at hospital situations.
h. Visits to different dietary departments of various hospitals.
i. Updating knowledge of presentation and participation through seminars and projects.
j. Gain experience in the administrative set up of a dietary department.
k. The role of dietician in hospital management.

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C. Educational excursion in research hospital/ nutrition research related higher learning center: 10 marks

a. Submitted a typed report considering minimum following.
b. Description of the Institute.
c. Principle of different instruments with uses.
d. Overall idea about excursion.

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Paper - VIII (Practical)
Full Marks - 100

Unit - 15 **Marks: 50**

DIET THERAPY

1. Planning and preparation of normal diets.
2. Planning and preparation of fluid diets.
3. Planning and preparation of soft/semi solid diets.
4. Planning and preparation of high protein diets.
5. Planning and preparation of low fat and low calorie diets.
6. Planning and preparation of diets using sugar substitute for diabetic patients.
7. Planning and preparation of high fiber diets.
8. Planning the preparation of diets for the following conditions: Peptic Ulcers, Viral Hepatitis, Anaemia, Diabetes Mellitus, CHD, Gout.

Unit - 16 **Marks : 50**

HEALTH STATISTICS, COMPUTER & ASSIGNMENT PROGRAMME ON RESEARCH METHODOLOGY

1. Graphical presentation of data.
2. Computation of Mean, Median, Mode, SD & SE.
3. Significance of testing by 't' test with interpretation – Paired observation, standard/population mean.
4. Tabular form of data presentation in computer.
5. Use of Microsoft Word and Excel with specific problem.
6. Assignment programme for Experimental design – covering any one of the following fields.
   (i) Protein under nutrition and its recovery.

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(ii) Vitamin or Mineral undernutrition and its recovery.
(iii) Dietary management of non-communicable disease.
(iv) Dietary management of growing child.
(v) Impact of nutrition education on awareness development in the field of personal health.

7. Community survey Report- Anyone.

Framing of questions and distribution of marks in each unit of theoretical question papers:

1. Five short answer type questions are to be answered from eight questions of 2 marks each (10 marks).
2. Five semi long answer type questions are to be answered from eight questions of 5 marks each (25 marks).
3. One long answer type question is to be answered from two questions of 15 marks each which will be subdivided into two components: 8 marks and 7 marks. (15 Marks)

Distribution of marks in practical papers :

PART – II
Paper – V Unit 09

1. Identification of prepared slides : 5 slides – 2 marks each : 5×2 =10 marks
2. One question from item No. 2, 3 : 10 marks
3. One question from item No. 4, 5 : 10 marks
4. Growth chat preparation : 5 marks
5. Laboratory Note Book : 5 marks
6. Viva – voce : 10 marks

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Paper V Unit 10

1. Identification of unknown carbohydrates / fats / Proteins, bile salt & pigments, acetone & Urea/ Qualitative test with saliva (Amylase activity) and urine (glucose, Protein, Acetone, bile pigments). 10 marks
2. Estimation of reducing and total sugars in food / lactose in milk / determination of acid value, saponification of natural fates and oils/ Estimation of tatal protein by biuret method. 15 marks
3. Estimation of ascorbic acid / Vitamin – E / Calcium / Potassium / Iron : 10 marks
4. Laboratory Note Book 5 marks
5. Viva – voce 10 marks

Part - III
Paper VII Unit 13

1. One question from item No. 2 and 3 : 10 marks
2. One question from item No. 4 : 10 marks
3. One question from item No. 5 to 6 : 15 marks
4. Laboratory Note Book : 5 marks
5. Viva – voce : 10 marks

Paper VII Unit 14

1. Item No – A : Report – Introduction, aims and objectives, methods, results, discussion, summary and conclusion – 20 marks and viva voce – 5 marks. 25 marks
2. Item No- B : Report – 10 marks, Viva-voce- 5 marks. 15 marks
3. Item No – C : Report – 07 marks, Viva-voce- 03 marks. 10 marks

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Paper VIII Unit 15

1. One question from item No.1, 2 and 3	:	10 marks
2. One question from item No. 4, 5 and 6	:	10 marks
3. One question from item No. 7 and 8	:	15 marks
4. Laboratory Note Book	:	5 marks
5. Viva – voce	:	10 marks

Paper VIII Unit 16

1. Statistics	:	10 marks
2. Computer	:	10 marks
3. Assignment Report	:	5 marks
4. Community Report	:	10 marks
5. Practical Note Book	:	5 marks
6. Viva	:	10 marks

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NUTRITION (GENERAL) SYLLABUS

PART - I

(One year course)

Paper - I (Theoretical) **F.M. :100**

Unit - 01 : Biophysical, Biochemical principles and Biochemistry of Nutrients **(50 Marks)**

Unit - 02: Human Nutrition **(50 Marks)**

PART-II

(One year course)

Paper -II (Theoretical) **F.M. :100**

Unit - 03 : Physiological aspects of Nutrition **(50 Marks)**

50 Lectures

Unit - 04: Food, Nutrition and Health **(50 Marks)**

50 Lectures

Paper -III (Practical) **F.M. : 100**

Unit - 05: Qualitative detection of Nutrients and adulterants **(50 Marks)**

Unit - 06: Quantitative aspects of Nutrients **(50 Marks)**

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PART-III

(One year course)

Paper-IV **F.M. : 100**

Unit - 07: Applied Nutrition (Theoretical) **(70 Marks)**

70 Lectures

Unit - 08: Practical **(30 Marks)**

Note:

1. The students will be assessed in each theoretical paper (Full marks: 100) on the basis of :
   a) Class tests conducted by the college (internal assessment) : 10marks.
   b) Examination conducted by Vidyasagar University: 90 marks.
2. In each unit marks for internal assessment will be proportionately distributed.
3. For a paper less than 100 marks, the marks for internal assessment will be proportionately less. For the Paper-IV, Unit-07, Marks for internal assessment: 7 and marks for examination conducted by Vidyasagar University: 63.

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PART- I

(One year course)

Paper - I (Theoretical)

Full Marks - 100

(University Examination - 90 marks and Internal Assessment - 10 marks)

Unit – 01 **Marks: 50**

Biophysical, Biochemical principles and Biochemistry of Nutrients

1.1 Biophysical and Biochemical principles **25 Lectures**

(a) Basic process and biological importances of diffusion, osmosis, Surface tension, ultra filtration, dialysis, Brownian movement, absorption.
(b) Colloids : Definition, types, properties, biological importance.
(c) Normal Solution, Dielectric constant – importance in nutrition.
d) Acids, Bases, Buffers, pH, Indicators. Biological importance of pH and Buffers. Buffers in pH regulation, pH determination by indicators.
(e) Enzymes: Enzymes as catalyst, classification of enzymes, co-enzymes, co-factors. Mechanism of enzyme activity.
(f) Calorimetry, Refrigeration and Isotope in nutrition.

1.2 Biochemistry of Nutrients **25 Lectures**

(a) Carbohydrates: Classification, isomerism-stereoisomerism, optical isomerism, anomerism, mutarotation, properties of monosaccharides, amino sugars, deoxy sugars, sialic acid. Functions of carbohydrates in body.
(b) Proteins: Proteins and amino acids. Classification of amino acids. Properties of proteins, classification of proteins. Elementary idea of

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protein structure. Essential and non-essential amino acids. Functions of proteins in the body. Protein quality- Biological value of protein, net protein utilization (NPU), Protein efficiency ratio (PER).

(c) Fats: Classification of lipids. Properties of fats. Classification of fatty acids. Essential fatty acids. Function offats in the body. Plasma lipoproteins - LDL, VLDL, HDL, Triglycerides.

(d) Vitamins: Fat and water-soluble vitamins - source, daily requirement, functions and deficiency symptoms, Hyper vitaminosis, provitamin and anti-vitamin, vitamin as co-enzyme.

(e) Minerals: Major and minor minerals. Sources, functions and deficiency symptoms of calcium, iron, sodium, potassium, iodine, zinc, copper, cobalt, manganese, magnesium.

(f) Water: Function of water. Deficiency of water.

(g) Dietary fiber: classification, sources, and nutritional significance.

(h) Antioxidant system and nutracenticals

Unit – 02 Human Nutrition **Marks 50**

2.1 Basic Nutrition **12 Lectures**

(a) Concept and definition of terms Nutrition, Malnutrition and Health. Brief history of Nutritional Science. Scope of nutrition.

(b) Body composition and its changes in different phases of life.

(c) Minimum nutritional requirements and recommended dietary allowance. Reference man and reference woman.

(d) Energy in Human Nutrition: Energy and its unit. Energy balance. Energy requirement of the body. Basal Metabolic Rate (BMR) - Factors affecting measurement of BMR. Specific dynamic action (SDA). RQ. Calorific & physiological fuel value of food. Determination of energy in food.

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(e) Energy and other nutritional requirement of adult male and female engaged in different types of work (sedentary, moderate, heavy).

2.2 Growth and Nutrition **14 Lectures**

(a) Growth and development: Physical growth and development in different phases of life-embryonic, infancy, school children, adolescents. Growth spurt in puberty, pubertal changes. Use of growth charts and standards.
(b) Nutrition during infancy - Breast feeding and its advantages and disadvantages. Colostrums and its importance in feeding, Formula feeding. Supplementary foods. Digestive disturbance of infants.
(c) Nutritional requirements of toddlers, pre-school children, school going children and adolescents.

2.3 Diet **12 Lectures**

(a) Balance diet
(b) Food groups: Cereals, pulses, milk and meat products, fruits and vegetables, fats and sugars. Food composition table.
(c) The exchange list system
(d) Basic principles follows for preparation of diet.
(e) Formulation of diet chart of low and high cost for adult male and female.
(f) Diet in infancy, pre-school and school going children and adolescent.
(g) Principles and steps in planning menu.
(h) Vegetarian diet : different vegetarian diet and limiting nutrients.
(i) Socio - cultural and regional food habits in different age groups.

2.4 Community Nutrition **12 Lectures**

(a) Concept of community, types of community, factors affecting health of community.
(b) Malnutrition: Types, causes and preventive measures.

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(c) Concept of surveillance system: International, national, regional agencies and organization.
(d) Nutritional intervention programmes to combat malnutrition- Vit.-A & animea prophylaxis programme, iodine deficiency disorders control programme, balwadi programme. Mid-day meal & ICDS programme, public distribution system.
(e) Importance of dietitian in community.

Framing of questions and distribution of marks in each unit of theoretical question papers:

1. Five short answer type questions are to be answered from eight questions of 2 marks each (10 marks).
2. Four semi long answer type questions are to be answered from six questions of 5 marks each (20 marks).
3. One long answer type question is to be answered from two questions of 15 marks each which will be subdivided into two components: 8 marks and 7 marks.

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PART-II

(One year course)

Paper - II (Theoretical)

Full Marks - 100

(University Examination - 90 marks and Internal Assessment - 10 marks)

Unit - 03 **Marks: 50**

Physiological Aspect of Nutrition

3.1 Animal cell and tissue 6 Lectures

(a) Cytoarchitecture of eucaryotic cell and description of different component with function (cell membrane and cell organelles).

(b) Structure and functions of different types of tissues i.e., epithelial, connective, nervous and muscular tissue with special emphasis on blood and bone.

3.2 Basic idea of the functions of different system of human body 4 Lectures

(a) Cardiovascular system, respiratory system, excretory system, musculoskeletal system, nervous system, digestive system, endocrine and reproductive system.

3.3 Digestive system 10 Lectures

(a) Parts of digestive tract, structure of mouth, esophagus, stomach, small intestine, large intestine and their functions. Macro and micro histological structures of stomach and intestine.

(b) Digestive glands-their structures with special emphasis on liver and pancreas.

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(c) Composition of different digestive juices and their functions.
(d) Movements of digestive tract- their functions. .
(e) Gastro-intestinal hormones-sources, nature and functions. (f) Circulation in gastro-intestinal tract, with special reference to entero-hepatic circulation of blood and lymph.

3.4 Digestion **8 Lectures**

(a) Digestion of carbohydrates
(b) Digestion of proteins in general with special reference to digestion of some specific food items like egg, meat and milk.
(c) Digestion of fat.

3.5 Absorption **6 Lectures**

(a) Absorption of monosaccharides.
(b) Absorption of amino acids.
(c) Absorption of fatty acids and cholesterol.
(d) Absorption of mineral like calcium, iron, sodium, iodine and vitamins.
(e) Water absorption.
(f) Role of hormones on absorption of nutrients.

3.6 Metabolism **16 Lectures**

(a) General idea about catabolism and anabolism.
(b) Nitrogen balance, factors affecting nitrogen balance.
(c) Protein metabolism: Primary idea about protein synthesis, deamination, transamination and transmethylation, ornithine cycle. Amino acid requirements, importance of essential amino acids.
(d) Carbohydrate metabolism: Glycolysis, TCA cycle, glycogenolysis, glycogenesis, neoglucogenesis, and pentose phosphate pathway. Blood sugar level, hormonal controls of carbohydrate metabolism with special reference to blood sugar level.

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(e) Fat metabolism: Importance of essential fatty acids. Idea about saturated and unsaturated fatty acid (PUPA). Oxidation of fatty acids. Primary idea about fatty acid synthesis, ketone bodies, ketogenesis, hormonal control of fat metabolism.

(f) Interrelationship of protein, carbohydrate and fat metabolism and their interconversion, interaction of hormones and vitamins.

(g) Water metabolism with special reference to water balance, its hormonal control, electrolyte balance - Na^{+}, K^{+}, Ca^{2+}, Cl^{-}, PO_4^{3-}.

Unit – 04 **Marks 50**

Food, Nutrition and Health

4.1 Food Commodities and Food Hygiene 12 Lectures

(a) Basic food commodities: Rice, wheat and their products. Bakery products, pulses and their products, milk and milk products, poultry, beverages, food adjuncts, convenience food, fast food, genetically modified food.

(b) Interaction among food, nutrition and health.

(c) Food hygiene: Milk hygiene, meat hygiene, food and vegetable hygiene.

(d) Food borne diseases and their prevention

4.2 Food toxicants 10 Lectures

(a) Different types of food toxicants - Natural and artificial.

(b) Food additives, food fortification and food adulteration.

(c) Prevention of food adulteration act-1954, food laws, consumer's protection rights.

(d) Food standards.

4.3 Food processing and food preservation 12 Lectures

(a) Different methods of cooking food with their advantages and disadvantages.

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(b) Effects of cooking on nutrients and its management.
(c) Types of food preservation: Home preservation and commercial preservation, advantages and disadvantages.
(d) Preservation of fish, meat, egg and mille
(e) Losses of food and nutrients in food processing.

4.4 Nutritional education and health care 10 Lectures

(a) Necessity of health and nutritional education at different levels of formal education starting from school to university.
(b) Nutritional education and health care.
(c) Child health care, immunization programme, growth monitoring programme and national nutrition policy.
(d) Common nutritional diseases among infants and children.
(e) Basic idea about community health, national and international health programmes.

4.5 Nutrition and Infection 6 Lectures

(a) Infection, a cause of malnutrition and vice-versa.
(b) Nutrition and immunity during childhood and in adult.

Framing of questions and distribution of marks in each unit of theoretical question papers:

1. Five short answer type questions are to be answered from eight questions of 2 marks each (10 marks).
2. Four semi long answer type questions are to be answered from six questions of 5 marks each (20 marks).
3. One long answer type question is to be answered from two questions of 15 marks each which will be subdivided into two components: 8 marks and 7 marks.

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Paper -III (Practical)
Full Marks - 100

Unit - 05 **Marks: 50**

Qualitative detection of nutrients and adulterants

5.1 General qualitative tests for carbohydrates, reducing and non-reducing sugars, monosaccharides, aldoses and ketoses, disaccharides and polysaccharides.
5.2 Qualitative tests for simple proteins and derived proteins.
5.3 Qualitative tests for bile salts. .
5.4 Qualitative tests for fats, glycerol, cholesterol.
5.5 Qualitative tests for detection of calcium, phosphorus, iron in food stuffs.
5.6 Sequential test for detection of an unknown nutrients (only from above mentioned nutrien,ts).
5.7 Qualitative tests for detection of saccharine, mentanil yellow, kessari flour, banaspati in different food stuffs and starch in milk.
5.8 Laboratory note book.
5.9 Viva - voce.

Distribution of marks in the question paper of Unit - 05

1. Identification of two unknown nutrients (as mentioned in Unit 05) by sequential biochemical tests with a confirmatory test. 10 x 2 = 20
2. Identification of anyone nutrient (as mentioned in Unit-05) which will be selected by the candidate by lottery 5
3. Identification of any two-food adulterants by biochemical test. 5 x 2 = 10
4. Laboratory note book. 5
5. Viva – voce 10

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Total - 50

Unit - 06 **Marks: 50**

Quantitative Aspects of Nutrients

6.1 Titration of acids and bases.

6.2 Estimation of haemoglobin by Sahli's hemoglobinometer.

6.3 Quantification of glucose, fructose, lactose in a sample by Benedict's quantitative reagent.

6.4 Computation of energy requirement of an individual per day on the basis of BMR and physical activity.

6.5 Assessment of nutritional status by anthropometric methods height, weight, BMI, circumferance - chest, upper arm, waist, hip & BSA.

6.6 Preparation of low-cost and middle-cost school tiffin (ingredients are to be supplied by the examination centre).

6.7 Laboratory note book.

6.8 Viva-voce.

Distribution of marks in the question paper of Unit - 06

1. Estimation of anyone nutrient mentioned in 6.1 and 6.2	5
2. Estimation of anyone nutrient mentioned in 6.3.	15
3. One question from 6.4	10
4. Anyone question from 6.5 and 6.6	5
5. Laboratory note book	5
6. Viva – Voce	10
	Total 50

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Recommended Text and Reference Books (Part-I and Part-II)

(The latest edition available should be used for all books)

1. Asten, G. and Tiffiley: GuidetoimprovingfoodHygiene: North World, London.
2. Bhatia, A. : Food and Community Nutrition.
3. Central food laboratory, Kolkata : Adulteration in food: Simple test for consumers.
4. ChatteIjee, C.C. : Human Physiology, Medical Allied Agency, Kolkata.
5. সমর রায় চৌধুরী : খাদ্য ও পথ্য, পশ্চিমবঙ্গ রাজ্য পুস্তক পর্ষদ।

৬. যোগেন দেবনাথ : শরীর বিজ্ঞান, প্রথম ও দ্বিতীয় খণ্ড, শ্রীধর প্রকাশনী।

7. Das, D. : Biochemistry, Academic Publishers, Kolkata.
8. Das, D. : Biophysics and Biophysical Chemistry. Academic Publication, Kolkata.
9. Desrosier, N. W. : The technology of food preservation, Westport, AVI.
10. Gopalan, G., Rama Sastri, B.Vand Balasubamanian, S.c. : Nutritive value of Indian foods, NIN. ICMR, Hydrabad.
11. Guyton, A.C.: Text book of Medical Physiology, W.B. Saunders Co., Philadelphia.
12. Hawk, P. B.: Physiological Chemistry, Edited by B. L, Oser, Tata Mc Graw-Hill, New Delhi.
13. Hughes, O. and Bennion, M. : Introductory foods, Macmillan and Co., New York.
14. Kaushik, V K. : Problems on nutrition and children.
15. Lavies, S. : Food commodities.
16. Lhninger, A.L. : Principles of Biochemistry edited by Nelson, D.L. and Cow, M.M. Worth publisher inc.
17. Muller, H. G. : Nutrition and food processing. Croom Helm, London.
18. Park, K. : Test Book of Preventive and Social Medicine. M/s Bamarsidas Bhanot, Jabalpur.
19. Passmore, R. and Eastwoed, M. S. : Human Nutrition and dietetics, ELBS Churchill, Edingburgh.

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20. Srilakshni, B. : Food science, New age International (P) Ltd. Publishers, New Delhi.
21. Stryer, L. Biochemistry, Freman W.H. and Co.
22. Swaminathan, M. : Food and Nutrition, Vol-I and II Ganesh and Co. Madras.

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PART-III

(One-year course)

Paper-IV

Full Marks: 100

Theoretical

(University Examination - 63 marks and Internal Assessment - 07 marks)

Unit – 07 **Marks 70**

Applied Nutrition

7.1 Nutrition in specific physiological state **20 Lectures**

(a) Nutrition in Pregnancy and Lactation

(i) Nutritional demands of pregnancy.
(ii) Food selection in pregnancy.
(iii) Complication of pregnancy due to diet.
(iv) Diet following delivery.
(v) Nutritional demand during lactation.
(vi) Basic concept and methods of oral feeding, tube feeding, potential nutrition and intravenous feeding.

(b) Geriatric Nutrition

(i) Nutrition of aged individual.
(ii) Food habits and requirements of older people.
(iii) Dietary modifications needed in aged.
(iv) Planning meals for older people.
(v) Importance of anti-oxidative nutrients for the prevention of aging.

(c) Nutrition of Athletes

(i) Nutritional requirements of an athlete.

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(ii) Dietary management in different sports and athletes.
(iii) Meal planning of an athlete with special demand of female athlete.

7.2 Causative nutritional factors in diseases 10 Lectures

(a) Nutritional factors involved in cardio-vascular disease, diabetes, obesity, cancer and gout.
(b) Causative nutritional factors for endemic goiter, rickets, oesteomalacia, anorexia nervosa.

7.3 Diet therapy in specific pathophysiological conditions 20 Lectures

(a) Hospital diets- liquid, clear fluid, soft & normal diets.
(b) Diet therapy in diabetes mellitus and obesity.
(c) Dietary management in cardiovascular disease like atherosclerosis, hyperlipidemia, hypertension.
(d) Diet therapy in peptic ulcer, gastritis, diarrhea, colitis, constipation, flatulence and jaundice.
(e) Diet during febrile condition, infection, surgical condition, nephritis, and nutritional anemia.
(f) Therapeutic uses of dietary fibers with special reference to chronic constipation, diverticular disease, irritable bone syndrome, obesity and diabetes, possible adverse effects of dietary fibers.

7.4 Rehydration therapy 5 Lectures

(a) Elementary idea about rehydration.
(b) Conditions for rehydration.
(c) Different types of rehydration therapy with special emphasis on ORS - its types and importance.
(d) Age dependent ORS quantity for rehydration therapy.

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7.5 Antioxidative nutrients: **5 Lectures**

(a) Preliminary idea about oxidative stress.
(b) Elementary idea about antioxidative nutrients
(c) Food items containing antioxidative nutrients.

7.6 Diet survey and Nutritional assessment of the community 10 Lectures

(a) Different methods used in diet survey - their merits and demerits.
(b) Importance of diet survey in community.
(c) Methodology followed for the assessment of nutritional status of the community with their merits and demerits.
(d) Nutritional anthropometry

Framing of questions and distribution of marks in the question paper-IV, Unit-07 :

1. Eight short answer type questions are to be answered from fourteen questions of 2 marks each (16 marks).
2. Five semi long answer type questions are to be answered from eight questions of 5 marks each (25 marks).
3. Two long answer type questions are to be answered from four questions of 11 marks each (22 marks).

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Paper - IV (Practical)

Unit - 08 **Total Marks - 30**

8.1 Preparation of ORS solution. ORS bicarbonate and ORS citrate.
8.2 Measurement of systolic and diastolic pressure by sphygmomanometer.
8.3 Normal diet chat preparation for adult male & female pregnant lactating mother.
8.4 Preparation of therapeutic diet chart - menu planning for diabetes mellitus, obesity, hypertension, peptic ulcer.
8.5 Field based excursion report on diet survey of a family by questioner method. Clinical signs of malnutrition are to be included in the report.
8.6 Laboratory note book
8.7 Viva - voce

Distribution of marks in question paper of Unit - 08

1.	Anyone question from 8.1 & 8.2	07
2.	Preparation of menu for anyone therapeutic diet (to be selected by lottery from 8.3 & 8.4)	08
3.	Field based excursion report	05
4.	Laboratory note book	05
5.	Viva – voce	05
	Total - 30	

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Recommended Ten and Reference Books (Part-III)
(The latest edition available should be used for all books)

1. Anderson, L., Dibble, M., Turkki, P. R., Mitchall, H.S. and Rynhergin, H. J.: Nutrition in helath and disease, J.8. lippinCott, Philadelphia.
2. Antia, F. P. and Abraham, P. : Clinical Dietetics and Nutrition. Oxford University Press, New Delhi.
3. Goodhart, R. S. and Shils M. E. : Modern Nutrition in health and disease diet therapy. Lea and Febigar, Philadelphia.
4. Joshi, SA. : Nutrition and dietetics. Tata McGraw-Hill Publishing Co. Ltd., New Delhi.
5. Pasricha, S. : Some therapeutic diets, National Institute of Nutrition, Hyderabad.
6. Rajalakshmi, R. : Applied Nutrition, Oxford and IBH publishing Co., New Delhi.
7. Srilakshmi, 8. : Dietetics. New age international (P) Ltd. Publishers, New Delhi.
8. Swaminathan, M. : Human Nutrition and diet. Bappco publication, Bengalore.
9. Venkatachalam, P.S. and Rebello, L. M.: Nutrition for mother and child, NIN, Hydrabad.

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