

THIRUVALLUVAR UNIVERSITY
MASTER OF SCIENCE
DEGREE COURSE
M.Sc. FOODS AND NUTRITION
UNDER CBCS
 [with effect from 2008-2009]

The Course of Study and the Scheme of Examinations

Year / Semester	Subject	Paper	Title of the Paper	Ins. Hrs/ Week	Credit	Exam hrs	Max.Marks		
							IA	Uni. Exam.	Total
I Year I Semester	Core	Paper I	Advanced Physiology	6	5	3	25	75	100
	Core	Paper II	Advanced Food Science	6	5	3	25	75	100
	Core	Paper III	Essentials of Macro Nutrients	6	5	3	25	75	100
	Core Practical		[out of papers I, II & III]	9	-	-	-	-	-
	Elective I	Paper I	Health and Fitness	3	3	3	25	75	100
I Year II Semester	Core	Paper IV	Essentials of Micro Nutrients	6	5	3	25	75	100
	Core	Paper V	Nutrition Through Life Cycle	5	5	3	25	75	100
	Core	Paper VI	Food Microbiology	5	5	3	25	75	100
	Core Practical	Practical I	[out of papers I, II & III]	-	4	3/6	40	60	100
	Core Practical	Practical II	[out of papers IV, V & VI]	9	4	3/6	40	60	100
			Human Rights	2	2	3	25	75	100
	Elective II	Paper II	Food STDS and Quality Control	3	3	3	25	75	100
II Year III Semester	Core	Paper VII	Nutritional Biochemistry	5	4	3	25	75	100
	Core	Paper VIII	Diet Therapy	5	4	3	25	75	100
	Core	Paper IX	Community Nutrition	5	4	3	25	75	100

M.Sc. Foods and Nutrition: Syllabus (CBCS)

Year / Semester	Subject	Paper	Title of the Paper	Ins. Hrs/ Week	Credit	Exam hrs	Max.Marks		
							IA	Uni. Exam.	Total
	Core Practical		(out of papers VII, VIII & IX)	9	-	-	-	-	-
	Elective III	Paper III	Nutrition in Emergencies	3	3	3	25	75	100
	Elective IV (Non-Major Subject)	Paper IV	Nutraceuticals	3	3	3	25	75	100
II Year IV Semester	Core	Paper X	Research Methodology and Applied Statistics	6	5	3	25	75	100
	Core Practical	Practical III	(out of papers VII, VIII & IX)	-	4	3/6	40	60	100
	Core Practical	Practical IV	Research Methodology and Applied Statistics	9	4	3/6	40	60	100
			Core Project / Dissertation with <i>viva voce</i>	12	10		50	150	200
	Elective V	Paper V	Food biotechnology	3	3	3	25	75	100
			Total	120	90				2200

THIRUVALLUVAR UNIVERSITY
M.Sc. FOODS AND NUTRITION

SYLLABUS

UNDER CBCS

[with effect from 2008-2009]

I SEMESTER

PAPER I

ADVANCED PHYSIOLOGY

Objectives

To enable the Students to :

Learn the Physiological conditions related to Nutrition

Understand the recent advances in Applied Physiology.

UNIT-I

Cellular basis of Physiology - Body fluid compartment, membrane potential, Inter cellular communication - Homeostasis.

Biochemical aspects of muscle tissue - structure, chemical composition, mechanism and energetics of muscle contraction, muscle fatigue.

Biochemical aspects of nerve tissue - structure, composition & functions of nerve tissue.

Special senses - only physiology of sense organs.

UNIT-II

Endocrinology and Reproduction

Anatomy of endocrine glands and Reproductive organs. Hormones - Mode of action, functions of hormones of the endocrine glands - Pituitary, Adrenal,

Thyroid, Gonadal hormones, Pancreas, Pineal body and Parathyroid, Hypo and Hyperfunctions of the glands.

UNIT-III

Respiration and Gastro - Intestinal

Oxygen requirement for nutrients, composition of inspired and expired gas, partial pressure of gas, diffusion gradient and gas flow, transport of oxygen and CO₂, Hemoglobin affinity for O₂ and dissociation. Anatomy and function of Gastrointestinal Tract, movement of intestine. Mechanism of secretion of gastric juice.

Hunger, Appetite, Satiety - physiological and psychological factors affecting food intake, circadian rhythm in GI tract secretions.

UNIT-IV

Circulation and Excretion

Blood - composition, functions of formed elements of blood and plasma proteins, origin and conduction heart beat, ECG-interpretation, Latest development in cardiac condition, cardio vascular mechanism and homeostasis.

Excretion - formation of urine, characteristics of urine, normal and abnormal constituents of urine, acid - base balance.

UNIT-V

Immunity - Properties, natural and acquired Immunity, features of immune responses, antigen - antibodies - types, properties, antigen - antibody interaction, Auto immune disorder and allergy.

References

1. Biochemical Aspects of Nutrition - Ed by Kurio yogi, Japan Scientific suppliers Univ.press.
2. Health Promotion - Cavol Jeans, Westsniter and Forbes Crowley, J.B.Lippin Cott & Co.

3. Human physiology by CC Chatterjee, Vol I & II.
4. Bacteriology, Virology and Immunity for Students of medicine by Steward FS & Besnic TSI.
5. Biochemistry - A case oriented approach by Montgomery. R, Conway, T.W and Spector A.A.
6. Medical Physiology by Anil Baran Singha & Mahapatra, Current Books International Kolkatta.
7. Living body by Best & Taylor.

PAPER II
ADVANCED FOOD SCIENCE

Objectives

To enable the Students to
Understand the principles of cooking
Learn the composition of various foods.
Study the effects of cooking on composition

UNIT-I

Food Groups

Cereals - Rice & wheat and other Millets - Composition and Nutritive Value.

Starch - Sources, Characteristics, Principles of Starch cookery.

Batter and Dough - Structure, Principle, Properties, Different types of flour, Gluten - properties, Gluten formation. **Flour** - Types, properties. **Bread** - yeast leavened, Quick bread, pastries, Role of ingredients & preparation **cakes** - Role of ingredients & preparation.

UNIT-II

Pulses - Composition, types, Cooking methods, factors affecting cooking quality, nutritive value, toxic constituents and its removal, Germination and factors affecting Germination .

Vegetables - Structure, Classification, Composition, Methods of Cooking, Changes on Cooking - pigments, Nutritive value.

Fruits - Structure, Classification, Composition, Ripening of fruits, changes on ripening, Pectic substances, Cooking changes.

UNIT-III

Egg - Structure, Composition, Nutritive value, Grading, Methods of Cooking and Role of egg in cookery.

Meat - Structure, Composition, Nutritive value, Classes and Grades of meat cuts, Changes on cooking and Rigor mortis. Poultry - Composition, Nutritive value, Grades, Methods of cooking, Effects of cooking.

Fish - Composition, Nutritive value, Types, Cuts, Selection, Spoilage, Cooking and Factors effecting cooking quality.

UNIT-IV

Milk and Milk Products - Composition, Nutritive value, Constituents, Properties of milk, Effects of acid, Salt, Heat on milk proteins and coagulation. Milk products - Ice cream, Types, Crystal formation and Dairy forms.

Fats & Oils - Types properties of fat relating to cooking, Rancidity, Tests for rancidity, Hydrogenation, Changes in fat during heating, Factors affecting fat absorption, Shortening, Use of fat in tenderness of cooked products.

UNIT-V

Sugar cookery - Types of sugar, Properties, Crystallization, Stages in Sugar cookery, Application in Indian recipes.

Beverages - Classification, Nutritive value, Preparation of milk based beverages.

Spices and Condiments - Uses and abuses.

References

1. Food Science and experimental foods, Swaminathan, N. (1987) Ganesh Publications, Madras.
2. Food chemistry, Meyer L.M.(1969) Van Nustrand Reinhold co., New York.
3. Foundations of Food Preparation, Peckham, C.G. (1979),The Macmillan co., London.
4. Food Theory and Applications, Paul P.C. and Palmer H.H. (1972), John wiley and Sons, New York.

5. The experimental study of foods, Griswald R.M. (1962), Houghton, Muffin Co., New York.
6. Introductory foods, Bennion M. and Hughes, D. (1975), Macmillan publishing Co., New York.
7. Food facts and principles, Sakuntala Manay and shadaksaraswamy, M (1987) Allied Publishers, New Delhi.
8. Food science, Potter N.N. (1996) CBS publishers & distributors, Delhi.

PAPER III

ESSENTIALS OF MACRO NUTRIENTS

Objectives

To enable the students to

Understand the role of macronutrients.

The metabolism of macronutrients.

UNIT-I : CARBOHYDRATES

History, classification, sources, functions, digestion, absorption, utilization and storage, hormonal regulation of blood glucose, role of carbohydrate in dental caries.

Dietary fiber - Development and concept, role of fiber in lipid metabolism, colon function, blood glucose level and GI tract functions - Disadvantages of Dietary fibre.

UNIT-II : LIPIDS

History, classification, sources, functions, digestion, absorption, utilization and storage, effects of deficiency and excess of fat, lipotropic factors, role of saturated fat, cholesterol, lipoprotein and triglycerides and EFA in the diet.

UNIT-III : PROTEINS AND AMINOACIDS

History, classification, sources, functions, digestion, absorption, utilization and storage, protein quality evaluation, nutritional classification of aminoacids, aminoacid balance, imbalance and toxicity, aminoacid pool.

UNIT-IV : ENERGY

History, energy value of foods, SDA, energy production, factors affecting thermogenesis, energy utilization by cells, energy output - BMR, physical activity, factors affecting energy input - hunger, appetite, energy balance, measurement of energy content of food.

UNIT-V

Inter relationship between carbohydrate, fat and protein, nutritional adaptation and hypotheses.

Reference

1. Food, nutrition and Diet Therapy by Krause and Mahan.
2. Modern Nutrition in Health and Disease by Young and Shills.
3. Nutrition Principles and Application in Health Promotion by Switor and Growley.
4. Fiber in Human Nutrition by Gene.A.Spitters and Fona D.J Aruen.
5. Text book of Biochemistry by G.R Agarwal, Kigan Agarwal And O.P.Agarwal.

CORE PRACTICAL I

(out of papers I, II & III)

ADVANCED PHYSIOLOGY

1. Microscopic Examination of various tissues and blood vessels
 - a. epithelial
 - b. Muscular
 - c. Connective
 - d. Bone
 - e. Artery
 - f. Vein
2. Estimation of haemoglobin by cyanmet haemoglobin method.
3. Determination of clotting and bleeding time
4. Enumeration of RBC and WBC
5. Determination of blood group and Rh factor
6. Fragility of RBC
7. Measurement of BP, Pulse rate - before and after exercise
8. Demonstration of ECG, Dialysis
9. PCV - determination
10. Tests for physical fitness - Flexibility Endurance & Muscular strength tests.
11. Measurement of ht, wt, BMI, Body fat, Waist to hip ratio.
12. Assessment of lung capacity - Demonstration / visit to hospital.

ADVANCED FOOD SCIENCE

1. Cereal cookery - Preparation of rice based products - Idkli, Dosai, Appam to study the effect of fermentation and soaking.

Preparation of wheat based products - Chappathi, phulkas, poories - with different proportion of wheat flour - study the development of gluten.
2. Pulse cookery - Effects of soaking, acid , alkali and sprouting and different methods of cooking on cooking time and quality of pulses.
3. Vegetable cookery - Effect of acid, alkali and methods of cooking on pigments.
4. Egg, meat, fish, poultry - Methods of cooking on acceptability of the various fleshy foods, foam formation and factors affecting foam formation. Special effect on colour and tenderness.
5. Fats and oils - Smoking point of different fats and oils - Determination of best frying temperature for different oils, factors affecting fat absorption.

6. Sugar cookery - Stages of sugar cookery, use of sugar in Indian recipes. Crystallization and factors affecting crystallization.

MACRO NUTRIENTS (Processed and unprocessed sample)

1. Qualitative analysis - Reaction of pentoses, hexoses, Dextrin, starch, glycogen.
2. Quantitative analysis
 - ❖ Estimation of fat by Soxhlet method
 - ❖ Estimation of Total protein by Microkjeldhal method
 - ❖ Extraction of lipids from egg yolk

ELECTIVE

PAPER I

HEALTH AND FITNESS

UNIT-I

Definition of Health and wellness - Factors affecting health and wellness. Physiological, psychological and social health.

UNIT-II

Fitness - Definition, basic components of physically active life style in preventing obesity, osteoporosis, heart disease, and diabetes, Physical fitness tests - for flexibility, muscle endurance (any 3 tests for each) and cardio vascular endurance.

UNIT-III

Nutrition and exercise - energy requirement for, aerobic and anaerobic exercises, carbohydrate loading, water and dehydration, special foods. Importance of exercise in preventing life style diseases - Diabetes, CVD, hypertension, obesity and osteoporosis.

UNIT-IV

Sports nutrition - special foods - Nutrition and performance of athletes and players, dietary modifications and diet plan, sports supplementation.

UNIT-V

Special nutritional needs for monitoring, space, military and sea voyage.

References

1. Wardlow and Insell - Perspectives in Nutrition.
2. Mary Bronsow Merki and Dow Merki - Health - a guide to wellness
3. Jangalaw Bishop - fitness through aerobic dance.
4. Eleanor Whitney - understanding nutrition.

II SEMESTER

PAPER IV

ESSENTIALS OF MICRO NUTRIENTS

Objectives

To enable students to :

gain a deeper understanding of principles of nutrition.

develop competence to carry out investigations in nutrition.

UNIT-I : HOMEOSTASIS MAINTENANCE

Water - Distribution of water in the body, role of water, Water balance, Fluid balance .

Electrolytes - Electrolyte content of fluid compartments, Functions of electrolyte, Sodium, Potassium and Chloride, Absorption, Transport and balance, Factors affective electrolyte balance and hydrogen ion balance.

UNIT-II : FAT SOLUBLE VITAMINS

Vitamins A,D,E, K - Chemistry, Functions, Physiological action, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Source, RDA, Deficiency, Diagnosis of deficiency, Toxicity, Interaction of fat soluble vitamins with other nutrients. Hypo and hyper vitaminosis.

UNIT-III : WATER SOLUBLE VITAMINS

Thiamine, Riboflavin, B₁₂, Folic acid, Pyridoxine, Pantothenic acid, Niacin, Biotin, Ascorbic acid - Chemistry, Functions, Physiological action, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Source, RDA, Deficiency, Diagnosis of deficiency, Toxicity, Interaction of fat soluble vitamins with other nutrients.

UNIT-IV : MACROMINERALS

Calcium - Distribution in the body digestion, Absorption, Utilization , Transport, Excretion, Balance, Dificiency, Toxicity, Sources, RDA, Regulation of calcium concentration, Calcium interaction with other nutrients.

Phosphorus - Distribution, Concentration in the body, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Sources, Calcium: Phosphorus ratio.

Iron - Distribution, Concentration in the body, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Sources, RDA, interaction with other nutrients, Role of iron in prevention of anaemia.

UNIT-V : MICRO MINERALS

Iodine, Fluoride, Mg, Cu, Zn, Se, Manganese, Chromium, Distribution in the human body, Physiology, Function, deficiency, Toxicity and Sources.

References

1. Advanced Nutrition and human metabolism by James L. Groff & Sareen Gropper
2. Basic Nutrition & Diet Therapy by Sue Rodwell Williams
3. Fundamentals of Nutrition by Lloyd, L.F. and Mc. Donald & Crompton
4. The vitamins Fundamental aspects in Nutrition and Health by Convlos F.G.
5. Absorption & Malabsorption of Mineral elements by Alan R. Lisy, Noel. W. Solomons.
6. Human Nutrition and Dietetics by Davidson & Passmore
7. Nutrition and Integrated Approach by Pike & Brown.

PAPER V

NUTRITION THROUGH LIFE CYCLE

Objectives

To know the computation of allowances.

To impart knowledge on the importance of nutrition during life span.

To enlighten on the dietary modifications.

UNIT-I

Recommended allowances - RDA for Indians, basis for requirement, computation of allowance based on energy expenditure, components of energy expenditure. General concepts about growth and development through different stages of life.

UNIT-II

Nutrition in Pregnancy

Stages of gestation, maternal weight gain, complications of pregnancy, maternal physiological adjustments, nutritional problems and dietary management, importance of nutrition during and prior to pregnancy, teenage pregnancy - nutritional problems and dietary management, planning a menu.

UNIT-III

Nutrition during Lactation

Physiology of lactation, hormonal control and reflex action, efficiency of milk production, problems of breast feeding, nutritional composition of breast milk, nutritional concerns during lactation, special foods during lactation, dietary modification, planning a menu.

Nutrition in Infancy

Infant feeding, nutritional needs, premature infant and their feeding, weaning foods. Feeding problems, infant formulae lactose intolerance, planning menu.

Nutrition in Pre-school - Physiological development related to nutrition, feeding problems, behavioural characteristics, nutritional requirement and planning diet.

UNIT-IV

Nutrition in school children - feeding school children and factors to be considered. Planning a menu, feeding problems, packed lunch.

Nutrition during Adolescence - changes in growth and development, hormonal influences, Age at menarche - factors affecting age at menarche, psychological problems, body image, disordered eating behaviour, nutritional problems, planning a menu.

UNIT-V

Nutrition in Adult and Elderly

Nutrition and work efficiency, Menopausal and post menopausal women, hormonal changes, nutritional requirement, planning a menu.

Physiological changes in aging - Psycho-social and economical factors affecting eating behaviour, social situation, knowledge and belief, institutionalization, common health problems, nutritional requirement, modification in diet, feeding old people.

References

1. Robert's Nutrition Work with Children, Martin S.R., 1963, The University of - Chicago Press, Chicago.
2. Assessment of Nutrition Status of the Community, Jelliffe D.B. 1966, WHO, Geneva.
3. Nutrition in the Sub-Tropics and Tropics, Jelliffe D.B. 1968

PAPER VI
FOOD MICROBIOLOGY

Objectives

To enable the students to :

learn about the morphology of different microorganisms.

study the spoilage caused by microorganism

understand the various types of poisoning and infection caused by microorganism.

UNIT-I

Classification of microorganism, morphology of yeast, mould, bacteria, virus, algae and protozoa.

UNIT-II

General principles underlying spoilage of food, fitness and unfitness of food for consumption, contamination and spoilage of non perishable and perishable foods.

UNIT-III

Food in relation to disease - food born diseases, food infection, intoxication, microbial toxins - types, bacterial poisoning and infection - causative agents and sources , symptoms and prevention of Staphylococcal food poisoning, botulism, salmonella, bacillus infection, E.coli, food poisoning of fungal origin - ergotism, aflatoxin.

UNIT-IV

Control of microorganism - Principles of preservation, Preservation by high and low temperature, chemical preservatives, salt, sugar as preservative, new trends in preservation.

UNIT-V

Sterilization by Physical agents - Heat, moist heat, fractional sterilization, pasteurization, other types of sterilization, chemical sterilization. Microbiology of water, typical organisms in water, types of bacterial examination for water, water treatment.

References

1. Food microbiology - Adams, M.R. and Moss M.O.
2. Foundations in Microbiology - Kathleen Talaro and Arthur Talaro
3. Industrial Microbiology - Patel, H.P.
4. Industrial Microbiology - Casida
5. Industrial Microbiology - Prescott and Dunn
6. Microbiology - Concepts and Applications - Paul A. Ketchum
7. Microbiology - Concepts and Applications - McKane and Kandel
8. Bergeys Manual of Determinative Bacteriology - IX edition
9. Elements of Biotechnology - Gupta
10. Elements of Biotechnology - Singh
11. Food Technology - Latest Issues

CORE PRACTICAL II
(out of papers IV, V & VI)

MICRO NUTRIENTS

1. Ashing of food and preparation of ash solution.
2. Estimation of calcium in food.
3. Estimation of phosphorus in food.
4. Estimation of iron in food.
5. Estimation of ascorbic acid in cabbage by dye method.
6. Estimation of thiamine in food by fluorimetry.

FOOD MICROBIOLOGY

1. Identification of microorganism - Yeast, mould, algae.
2. Simple staining, grams staining and hanging drop preparation.
3. Identification of microorganisms in curd.
4. Identification of mould in bread.
5. Bacteriological testing of milk.
6. Observation of culture characteristics and preparation of culture media.
7. Preservation using low temperature, high temperature and chemical preservatives.

NUTRITION THROUGH LIFE CYCLE

Menu planning, Preparation and Presentation for the following

Pregnancy

Lactation

Infants

Pre-schoolers

School going children

Adolescence

Adult of different working category

Old people

Menu of different variation - age specific, income specific and condition specific.

Menu of different variation under each:

Age category mentioned above

Weight (underweight, obesity).

Any special condition.

Based on type of work.

Menu planning for sports persons

Menu planning for Mountaineering, sea voyage and space travel.

HUMAN RIGHTS

COMPULSORY PAPER

UNIT-I

Definition of Human Rights - Nature, Content, Legitimacy and Priority - Theories on Human Rights - Historical Development of Human Rights.

UNIT-II

International Human Rights - Prescription and Enforcement upto World War II - Human Rights and the U.N.O. - Universal Declaration of Human Rights - International Covenant on Civil and Political Rights - International Covenant on Economic, Social and Cultural Rights and Optional Protocol.

UNIT-III

Human Rights Declarations - U.N. Human Rights Declarations - U.N. Human Commissioner.

UNIT-IV

Amnesty International - Human Rights and Helsinki Process - Regional Developments - European Human Rights System - African Human Rights System - International Human Rights in Domestic courts.

UNIT-V

Contemporary Issues on Human Rights: Children's Rights - Women's Rights - Dalit's Rights - Bonded Labour and Wages - Refugees - Capital Punishment.

Fundamental Rights in the Indian Constitution - Directive Principles of State Policy - Fundamental Duties - National Human Rights Commission.

Books for Reference:

1. International Bill of Human Rights, Amnesty International Publication, 1988.
2. Human Rights, Questions and Answers, UNESCO, 1982
3. Mausice Cranston - What is Human Rights
4. Desai, A.R. - Violation of Democratic Rights in India
5. Pandey - Constitutional Law.
6. Timm. R.W. - Working for Justice and Human Rights.

7. Human Rights, A Selected Bibliography, USIS.
8. J.C.Johari - Human Rights and New World Order.
9. G.S. Bajwa - Human Rights in India.
10. Amnesty International, Human Rights in India.
11. P.C.Sinha & K. Cheous (Ed) - International Encyclopedia of Peace, Security Social Justice and Human Rights (Vols 1-7).
12. Devasia, V.V. - Human Rights and Victimology.

Magazines:

1. The Lawyer, Bombay
2. Human Rights Today, Columbia University
3. International Instruments of Human Rights, UN Publication
4. Human Rights Quarterly, John Hopkins University, U.S.A.

ELECTIVE

PAPER II

FOOD STDS AND QUALITY CONTROL

Objectives

To enable the students to :

be aware of fundamental food quality control procedures.

aware of common food standards

know about food laws.

UNIT-I

Principles of quality control - Raw material process control and Product inspection.

Food adulteration and hygiene - definition, Common adulterants in different foods, method of detecting adulterated foods.

UNIT-II

Food additives - Definitions, Types, Action.

Leavening agents - Definitions, Classifications.

Colour of foods - Natural colours, certified artificial colours, Non-certified colors, Use and Optimum levels.

UNIT-III

Enzymes of importance in food processing - Carbohydrates, Proteases, lipases, oxidoreductases, hydrolases.

Standards for foods - Milk and milk products, Fruits and Vegetables, Beverages and Fleshy foods.

UNIT-IV

Food Laws, Consumerism - Definition, Consumer protection, Consumer Education, Legal modes of protection and Machinery for redressal of consumer grievances.

UNIT-V : EVALUATION OF QUALITY OF FOODS

Sensory Evaluation of foods - Requirement for conducting sensory tests, Types of test, limitation of sensory evaluation.

Objective methods of evaluation of food.

Improvised instruments used for Indian recipes.

References

1. Food chemistry by H.D. Belitz,
2. Food Additives - R.J. Taylor
3. Enzymes in food processing by G.G. Brich, N. Blakerbrough & K.J. Parker
4. Natural colour for food & other uses - J.N. Counsell.
5. Marketing Managements - Concepts and practice - by T.N. Chhabra & S.K.Grover.
6. Food Science, Chemistry and Experimental foods by M. Swaminathan.
7. Food Science by Sri Lakshmi .B.

III SEMESTER

PAPER VII

NUTRITIONAL BIOCHEMISTRY

Objectives

To enable the students to :

- understand the need for the study.
- learn the various metabolic cycles.
- analyze the significance of biochemical findings.

UNIT-I : BIOLOGICAL OXIDATION

Enzymes and co-enzymes involved in oxidation and reduction, respiratory chain, phosphates in biologic oxidation and energy capture, role of respiratory chain and mechanism of phosphorylation.

UNIT-II : METABOLISM Of CARBOHYDRATE

Glycolysis, Gluconeogenesis, TCA cycle, HMP shunt, bioenergetics, disorders of carbohydrate metabolism - galactosemia, glycogen storage disease, pentosuria, abnormal level in blood glucose.

UNIT-III : METABOLISM OF LIPIDS

Biosynthesis and oxidation of saturated and unsaturated fatty acids, glycerides, phospholipids and cholesterol, bioenergetics, disorders of lipid metabolism, lipoproteins and their significance.

UNIT-IV : PROTEIN And AMINOACID METABOLISM

Biosynthesis of protein, general catabolism of aminoacids, deamination, transamination, urea cycle, disorders of aminoacid metabolism - phenyl ketonuria, cystinuria, albinism, alkaptonuria, maple syrup disease.

UNIT-V : METABOLISM OF NUCLEIC ACIDS

Biosynthesis of purine and pyrimidine nucleotides, DNA replication and repair, biochemical importance of cyclic AMP. Disorders of purine and pyrimidine metabolism - gout, aciduria, xanthinuria. Structure and properties of DNA, RNA - mRNA, tRNA, rRNA.

Functional tests - Gastric, liver, renal and endocrine.

References

1. Review of Physiological Chemistry, Harper H.A. (1997), Lange Medical Publications, Los angeles.
2. Text book of Clinical Biochemistry, T.A. Ramakrishnan (1994), Publications, Chennai.
3. Text book of Biochemistry and Human Biology, Talwar G.P.,Srivatsava LN. and Mondgil K.D., New Delhi, Prentice Hall.
4. Clinical Chemistry in Dignosis and Treatment, Jean E Zilwa, Peter A. Pannale, Philip R. (1988), New York.
5. Text book of Biochemistry with Clinical Correlations, Devlin D.T. (1997), New York, John wiley and Sons.
6. An Introduction to Practical Biochemistry, Plummer D.T. (1997) New Delhi, Tata Mc Graw Hill Publishing Company.
7. Biomedical Instrumentation and Measurements, Cromwell L.Weibel F.J. and Pfeiffer E.A. (1996), New Delhi, Prentice Hall.
8. Electrolytes , Body fluids and Acid Base balance, Eccles R. (1993), London, Edward Arnold - A division of Hodder and stoughton.
9. DNA Protein interactions, Andrew Travens, (1993), Chapman and Hall Pub. London.

PAPER VIII

DIET THERAPY

Objectives

To enable the students to :

understand the principles of diet and Nutrition in the cause and treatment of disease.

understand the modifications in nutrients and dietary requirements for therapeutic condition.

learn recent concepts in dietary management of different diseases.

UNIT-I

Principle of Nutritional care, Types of hospital diets.

Nutrition Support Techniques, Enteral feeding - indications, Types - Nasogastric, Gastrostomy, Jejunostomy and Rectal feeding - requirements and advantages.

Parenteral feeding - Nutritional Support, Formula feeds and Complications in TPN.

UNIT-II

Diet in Febrile condition

Short duration - Typhoid, Influenza, Malaria, Long duration Tuberculosis.

Diet in deficiency diseases - PEM, Vitamin A, Anaemia

Surgery - Physiological response, Metabolic Consequences, Stage of Convalescence, pre and post operative diets.

Burns - Metabolic changes in protein and electrolytes and Nutritional support.

Diet in Energy Imbalance - Underweight and obesity, Etiology and dietary management.

Diet in allergy - Common food allergens, test for allergy - Skin test and Elimination diet and Treatment for allergy.

UNIT-III

Diseases of cardio vascular system - Risk factors of CVD, Etiology, Symptoms, and dietary management of atherosclerosis, Ischemic heart disease, dislipidemia, prevention through life style modifications.

Hypertension - Classification, prevalence, Diet related factors influencing hypertension , Management of hypertension.

UNIT-IV

Diseases of the Gastro intestinal system- Disorders, Etiology, Symptoms and dietary management of Acute gastritis, Chronic gastritis, Peptic ulcer - duodenal & gastric Intestinal disease - Flatulence, Diarrhoea and Dysentery, Constipation, Celiac disease, Tropical sprue, Irritable bowel syndrome, diverticular disease, colon cancer, Ulcerative colitis.

Liver disease - Hepatitis, cirrhosis, Jaundice, fatty liver, cholecystitis and cholelithiasis, Hepatic coma.

Pancreas - Pancreatitis, Acute and chronic

Diabetes Mellitus - Etiology, Types, Symptoms, Diagnosis, metabolic alterations, complications and treatment.

UNIT-V

Diseases of the Kidney - Etiology, Symptoms and Dietary modification, Nephritis, Nephrosis, Acute and chronic renal failure, Nephrolithiasis, Transplantation and dialysis, Dietary Modification.

Dietary modification and Nutritional Support for cancer and HIV.

References

1. Hypertension assorted topics, Hedge et al., [1995], Bharatiya Vidya Bhavan, Bombay.
2. Manual of Nutritional Therapeutics, 2nd edition, Alpers [1991], Little Brown Publications, Washington.

Journals

1. IJND
2. JADA
3. Arogya journal of health science - Mysore
4. Lancet
5. BMJ
6. AJCN
7. ICMR bulletin
8. Proceedings of the Nutrition Society of India.

PAPER IX

COMMUNITY NUTRITION

Objectives

To enable the students to :

understand the malnutrition problems and prevalence in India.

gain knowledge on the national effort in combating malnutrition.

UNIT-I

Definition and brief study of community, family, village and block.

Malnutrition - causes, ecological factors, effects of malnutrition, protein deficiency diseases - PEM, Kwashiorkor - incidence, prevalence, epidemiology. The package programmes of immunization, nutrition education, feeding programmes, and measures to overcome malnutrition.

Vitamin deficiency - A, B₁, B₂, Niacin, C, D - prevalence, programmes to combat.

Nutritional Anaemia - Prevalence, programmes to control.

IDD and fluorosis - Prevalence, causes, symptoms and programmes to control.

UNIT-II

Assessing the food and nutrition problems in the community - socio economic diet survey, anthropometry, clinical examination, laboratory examination for common nutrition problems.

UNIT-III

Nutrition and National Development, National nutritional policy - Aim, objectives, guidelines and thrust areas. PDS - Public distribution system, Agricultural planning - New strategies.

UNIT-IV

Nutrition intervention Programmes - Objectives, operation of feeding programmes. ICDS, TINP, NNMS, IRDP, DWACRA.

National organizations - ICMR, NIN, NNMB, ICAR, CFTRI, NIPCCD.

International organizations - FAO, WHO, UNICEF, UNESCO, World Bank.

UNIT-V

Demographic changes due to malnutrition. IMR, MMR, Mortality, morbidity rate, birth rate, sex ratio, poverty level.

Nutrition education - Merits, planning, evaluation and conduct.

Health care delivery - PHC, School Health services and their role in preventing communicable diseases.

References

1. Health and hygiene - A Lesties Banks and Hislop J.A, Universal Tutorial Press, London.
2. Challenges in Rural Development - Senha H.K, Discovery publishing.
3. Food consumption and planning - Vol 5, International encyclopedia.
4. Theory and Practice of Public Health, Oxford university press, London.
5. Applied Nutrition and Health Education, Sabarwal .B, Common wealth publishers, New Delhi.
6. Foundations of Community Health Education, Mc Graw Hill, London.
7. Nutritional Problems of India, P.K.Shukla, Prentice Hall, India.

CORE PRACTICAL III
(out of papers VII, VIII & IX)

DIET THERAPY

1. Types of diet - Full liquid, clear liquid, soft, light, bland and regular diet.
2. Diet for - obesity, underweight, febrile conditions.
3. Diet in gastro intestinal disorders - peptic ulcer, diarrhea, constipation.
4. Diet in liver disorders - jaundice, hepatitis, cirrhosis, hepatic coma, fatty liver and gall stones.
5. Diet in kidney disorders - Glomerulo nephritis, nephritic syndrome, renal failure, and urolithiasis.
6. Diet in Diabetes mellitus - Insulin dependent diabetic mellitus, non- insulin dependent diabetes mellitus, diabetes with complications.
7. Diet in Cardio vascular disease - Hypertension, atherosclerosis, congestive heart failure.
8. Visit to a hospital to observe - Enteral Feeding and formula diet for tube feeding. Visit to a health club.
9. Diet in deficiency diseases - Anaemia, underweight, obesity.

BIOCHEMICAL ANALYSIS

1. Determination of Saponification Number.
2. Determination of Acid Number
3. Determination of Reichert Meissl Number.
4. Estimation of Creatinine in urine - Jaff's method.
5. Estimation of Serum cholesterol - Zak's method.
6. Estimation of Blood glucose - O -Toluedene method.
7. Estimation of Serum proteins by Biuret method.
8. Estimation of Albumin / Globulin ratio by biuret method.

COMMUNITY NUTRITION

Conduct of socio - economic survey

Conduct of Diet survey

Conduct of Clinical Examination

Planning, conducting and Evaluating Nutrition Education Programme.

ELECTIVE

PAPER III

NUTRITION IN EMERGENCIES

UNIT-I

Natural / manmade disasters resulting in emergency situations.

- Famine, drought, flood, earthquake, cyclone, war, civil and political emergencies.
- Factors giving rise to emergency situation in these disasters.
- Illustration using case studies from Indian Subcontinent.

UNIT-II

Nutritional problems in emergencies in vulnerable groups.

- Causes of malnutrition in emergency situations.
- Major deficiency diseases in emergencies.
- Protein – energy malnutrition.
- Specific deficiencies.

UNIT-III

Communicable diseases: Surveillance and treatment.

- Control of communicable diseases in emergencies
- Role of immunisation and sanitation.

UNIT-IV

Assessment and surveillance of nutritional status in emergency affected populations.

- Scope of assessment of malnutrition in emergencies.
- Indicators of malnutrition clinical signs for screening acute malnutrition.
- Anthropometric assessment of nutritional status – Indicators and cut – offs indicating seriously abnormal nutrition situation weight – for – height based indicators, MUAC, social indicators.
- Organization of nutritional surveillances and individual screening.

Nutrition Relief and Rehabilitation

- Assessment of food needs in emergency situations.
- Food distribution strategy – identifying and reaching the vulnerable group – Targeting Food Aid.
- Mass and supplementary feeding.
- Special foods / rations for nutritional relief.
- Local production of special foods.
- Local food rehabilitation.
- Organization of mass feeding / general food distribution
- Feeding centres
- Transportation and food storage.
- Sanitation and hygiene
- Evaluation of feeding programmes.
- Household food security and nutrition in emergencies.

UNIT-V

Public nutrition approach to tackle nutritional problems in emergencies.

REFERENCE BOOKS

1. Goyet, Fish V, Seaman, J. and Geijaer (1978). The management of nutritional emergencies in large populations, WHO, Geneva.
2. Refuge Nutrition Information system (RNIS). Newsletters UNACC / SCN Sub-Committee on Nutrition.
3. Bradley, A. Woodruff and Arabella Duffield (July, 2000), Assessment of Nutritional status in emergency affected populations – Adolescents, special supplement, UNACC/SCN sub-committee on nutrition.
4. Young, H, Mears, C (1998): Acceptability and use of cereal – based foods in refugee Camps. Oxfam working paper, Oxfam publishing Oxford, U.K.
5. UNHCR (1999) UNHCR Hand Books of emergencies 2nd edition Geneva, UNHCR.

ELECTIVE

PAPER IV

(NON MAJOR SUBJECT)

NUTRACEUTICALS

UNIT-I

Introduction - Definition, history, classification - Type of classification (Probiotics, Probiotics and Synbiotics; Nutrient Vs Non-Nutrient: according to target organ, according to source of origin)

UNIT-II

Probiotics

Taxonomy and important features of probiotic micro-organisms.

Health effects of probiotics including mechanism of action.

Probiotics in various foods: fermented milk products, non-milk products etc.

Quality assurance of probiotics and safety.

UNIT-III

Prebiotics

Definition, Chemistry, Sources, metabolism and bioavailability, effect of processing, Physiological effects, effects on human health and potential applications in risk reduction of diseases, Perspective for food applications for the following.

- Non-digestible CHO / Oligosaccharides.
- Dietary fibre, resistant starch, gums.

UNIT-IV

Other Food components with potential health benefits:

- Polyphenols: Flavonoids, Catechins is flavones tanning.
- Phytoestrogens
- Phytosterols

- Glucosinolates
- Pigments: Lycopene, Curcumin etc.
- Organo Sulphur Compounds
- Other Components - Phytates, Protcase inhibitions, saponins, anylase inhibitions, harmagglutinims.
- Active biodynamic principles, in spices, condiments and other plant materials.

UNIT-V

Non-nutrient effect of specific nutrients:

Proteins, peptides and nucleotides, conjugated linoleic acid and n-3 fatty acids, vitamins and minerals.

REFERENCE BOOKS

- 1.Cho S.S. and Dreher, M.L (2001) Hand book Dietary Fibre, Marul Dekker Inc., Ney York
2. Wildman R.E.C. ed (2000) Hand book of Nutraceuticals and functional Foods, CRC. Press Boca Raton.
3. Fuller R. ed (1992) Probiotics the Scientific basis London, Chapman and Hall, New York.
4. Gihsm G, Williams, C-ed (2000) Functional foods, Woodhead Publishing Ltd. U.K.
5. Frei, B, (1994) Natural anti oxidants in human health and disease. Academic Press, San Diego
6. Tannock G.W (1999): Probiotics: A Critical review, Horizon Scientific Press. U.K.

IV SEMESTER

PAPER X

RESEARCH METHODOLOGY AND APPLIED STATISTICS

Objectives

To enable the students to :
understand the importance of Research.
learn about the various applications of statistics in the research.
familiarize on writing the project report.

UNIT-I

Meaning of research, Types of research, Objectives of research.

Collection of Data - Methods of collecting data.

Primary and Secondary data - Sources of Primary and Secondary data, Editing the data and precautions used in the use of data. Different types of research tools for collecting research data, defining and determining a problem.

UNIT-II

Sampling Design - Census and sampling survey, Methods of sampling - Probability and non-probability sampling methods size of the sample, Merits & Demerits of each sampling method, Sampling errors and methods of Reducing the error.

UNIT-III

Classification and Tabulation of Data - Meaning, Objective, Types of Classification, Formation of frequency distribution, Tabulation of data - Schemes general rules, Types of tables and preparation of tabular forms.

Representation of data - Diagramatic and Graphic significance, Types of diagrams, Types of graphs.

UNIT-IV

Measures of central tendency - Mean, Median, Mode, their relative advantages and disadvantages. **Measures of dispersion** - mean deviation, standard deviation, Quartile

deviation, Co-efficient of variation, percentile, Association of attributes, Contingency table, correlation - coefficient of correlation and its interpretation, Rank correlation, Regression equation and predictions.

UNIT-V

Probability - Theorems, Simple Problems, Distributions - Binomial Poisson distribution, normal distribution, their properties and simple problems.

Testing of significance - Large and Small sample tests - 't' test, Chi square test, and 'F' test - simple problems.

Writing a research report - format of thesis writing with eg.

References

1. "Research in Education", John W. Best and James V. Kahn, Seventh Edition, Prentice Hall of Pvt. Ltd., New Delhi - 110001, 2000.
2. "Statistical Method", S.P. Gupta, Sultan Chand & Sons, Educational Publishers, 23, Drayage, New Delhi - 110002, 2001.
3. "Research Methodology in Social Sciences", AN. Sash and Amorite Singh, Himalaya Publishing House, "Ramrod", Dr. Baler Margi, Gorgon, Bombay - 400 004, 1992.
4. "Methodology of Educational Research", Likes Kohl, "Third Edition", Vices publishing House Ltd., 576, Misfit Road, Jaguar, New Delhi 110014.
5. "A Handbook of Methodology of Research", Pajama P. Decades, Sri.Ramakrishna Mission Vidyalaya Post, 1983, Coimbatore District, South India, Latest edition.
6. "Form and style in Thesis Writing", Villiam Giles Campbell, Houghton Mifflin Company, Bostol 1954 [Latest Edition].
7. "Research Methods", Kothari.
8. Wilkinson & Bandrekar
9. Johngeltuns
10. Saravanavel
11. O.D. Krishnasamy
12. Pauline and Young
13. Goode and Batte

CORE PRACTICAL IV
RESEARCH METHODOLOGY AND STATISTICS

1. Collection of Primary and Secondary data
 - i. Direct personal Interview - schedule
 - ii. Drafting questionnaire
 - iii. Pilot study for validating
2. Sampling Techniques
 - i. Judgement Sampling
 - ii. Quota Sampling
 - iii. Convenience Sampling
 - iv. Random Sampling
 - v. Stratified Sampling
3. Classification of data
4. Formation of frequency distribution
5. Tabulation of data - Types of Tables (eg)
6. Diagrammatic Representation of data
 - i. Graphs - Different types
 - ii. Bar diagrammes
 - iii. Pie diagram
 - iv. Histogram
7. Calculation of Mean, Median, Mode and SD
8. Correlation Analysis
9. 't' test and chi-square test

ELECTIVE

PAPER V

FOOD BIOTECHNOLOGY

Objectives:

To be aware of the growing
Importance of Biotechnology
To know the applications of Biotechnology in food

UNIT-I

Biotechnology - Definition, Scope , Application.

Gene cloning - Definition, Basic concepts, Characteristics of ideal cloning vector, Plasmid, Bacteriophages, Cosmid and Phasmid Eg. PBR 322.

UNIT-II

Fermentation Technology - Definition, Steps in fermentation, Design of bio reactors, Medium & Micro organism.

Microbial products - Primary, secondary metabolites, Vit B12, Citric Acid, Penicillin & alcohol.

UNIT-III

Enzyme Technology - Production of enzymes - Amylase, Protease, Lipase, Lactase and pectinase, Use of enzymes in food & beverage industry (eg Cheese, fruit, juice, Wine, Meat tenderizing & dairy)

UNIT-IV

Plant tissue culture - Basic requirement for tissue culture Lab, Media & Techniques (Basics only)

Animal cell culture - Primary culture cell line, media requirement & application (only outline)

UNIT-V

Biotechnology & Health care

Vaccines - Types, Biogas & Bio ethanol production, Concept of Bio - remediation, Hazards of genetic engineering.

References

1. Biotechnology, Kumar's V. Saris Publications, Kanyakumari.
2. Biotechnology, Singh B.D. Kalyani Publications, New Delhi.
3. A text book of Biotechnology, Dubey , R.C. S Chand & Co, New Delhi.
4. Gene Technology, Davson, M.T., Powel, R., and Gannon F. Bios scientific publishers Ltd U.K.
5. Basic Biotechnology, Rev, Fr, Dr. Ignasimuthu, S.J. Tata Mc Graw Hill Publication Co Ltd., New Delhi.
