MAHATMA GANDHI UNIVERSITY

PROGRAMME STRUCTURE & SYLLABUS FOR

M.Sc CLINICAL NUTRITION AND DIETETICS

(2019-20 ADMISSION ONWARDS)

TABLE OF CONTENTS

AIM OF THE PROGRAM

- Dietitians in hospitals
- Diet consultants in hotels, flight kitchens, railways and industrial canteens.
- Nutritionist in health clinics and food industries
- Member of teaching faculty in higher education
- Research assistants/ Associate in institutes undertaking research programmes in nutrition and health
- Project officers under different welfare programmes of governmental and non - governmental organizations
- Project officers in nutrition programmes FAO, WHO, UNICEF
- Freelance Registered Dietitians(RD)

OBJECTIVES

- To impart knowledge and develop capacities of the students in the area of Clinical Nutrition.
- To develop students to become health care professionals for services in various fields of clinical nutrition and related areas such as hospitals, academics, research, industry, community service.
- To develop capacities and abilities and enable them to pursue higher education and research in Clinical Nutrition and Food Science.

ELIGIBILITY CRITERIA FOR ADMISSION

- For admission to the PG course in Clinical Nutrition and Dietetics, the applicant must have a B.Sc degree from a recognized university with a minimum of 50% marks with any of the following as the main subject – Clinical Nutrition and Dietetics, Food and Nutrition, Food service Management & Dietetics, Food Science and Quality Control, Food Technology and Home Science. Graduates with PG Diploma in Nutrition and Dietetics are also eligible.
- Weightage of 45 marks will be given for those who have passed B. Sc with Clinical Nutrition and Dietetics and a weightage of 15 marks for the other above mentioned courses.
- Degree holders of Nursing, Zoology, Chemistry, Microbiology, Food Microbiology, Biotechnology and Biochemistry are also eligible.
- Eligibility for admission, norms for admission and reservation of seats for various postgraduate programme shall be according to the regulations framed/orders issued by the University in this regard, from time to time.

MEDIUM OF INSTRUCTION

- The medium of instruction must be English.

EVALUATION OF EXTERNAL EXAMINATION AND INTERNAL EVALUATION

The external theory examination of all semesters shall be conducted by the University at the end of each semester. Internal evaluation is to be done by continuous assessment. For all papers (theory and practical) total weight of external examination is 30 and total weight of internal evaluation is 5.

Weight distribution for external and internal assessments and the components for internal evaluation with their weights are shown below:

For all theory papers

a) **Weightage of external Examination : 30**

b) Weightage of internal evaluation : 5

PRACTICAL EXAMINATION

Practical examinations will be conducted only at the end of even semesters for all programmes.

a) **Maximum weightage of external Examination : 15**

b) **Weightage of internal evaluation : 5**

Internal Evaluation

Components Internal evaluation of Practical	**Weight**
Attendance	1
Written Lab Test	1
Record	1
Lab involvement	1
Viva	**1**
Total	**5**

Marks awarded for Record should be related to number of experiments recorded and duly signed by the concerned teacher in charge.

PROJECT EVALUATION

Marks of projects

c) weightage of external Examination : 15

d) Weightage of internal evaluation : 5

Components of External Evaluation of Project	Weight
Relevance of the topic & Analysis	3
Project content & presentation	7
Project viva	5
Total	**15**

Components Internal Evaluation of project	Weight
Experimentation/Data collection	1
Compilation	1
Content	1
Presentation	1
Viva	1
Total	**5**

PATTERN OF QUESTIONS

Questions shall be set to assess knowledge acquired, standard and application of knowledge, application of knowledge in new situations, critical evaluation of knowledge and the ability to synthesize knowledge. The question setter shall ensure that questions covering all skills are set. She/he shall also submit a detailed scheme of evaluation along with the question paper.

A question paper shall be a judicious mix of very short answer type, short answer type, short essay type /problem solving type and long essay type questions.

Pattern of questions for external examination for theory paper

Pattern	**Weight**	**Choice of questions**	**Total marks**
Short Answer	1	8/10	8
Problem/ Short Essay	2	6/8	12
Long Essay	5	2/4	10
Total		16/18	30

Each BOS shall specify the length of the answers in terms of number of words. Pattern of questions for external examination of practical papers will decided by the concerned Board of Studies/Expert Committees.

FACULTY UNDER WHICH THE DEGREE IS AWARDED

Faculty of Science

SCHEME

The P.G. programmes shall include Programme Core (C) Courses and programme Elective (E) Courses. There shall be a Programme Project (D) with dissertation to be undertaken by all students. The programme will also include assignments, seminars, practical (P), viva (V) etc. The fourth semester shall contain programme elective courses only.

COURSE DESIGN

1	Programme Duration	4 Semesters
2	Total Credits of the Programme	80
3	Minimum attendance required	75%

DURATION OF THE COURSE

- The duration of P.G. programmes shall be 4 semesters.
- There shall be two Semesters in an academic year, the 'ODD' semester commences in June and on completion, the 'EVEN' Semester commences after a semester-break of three days with two months vacation during April and May. (The commencement of first semester may be delayed owing to the finalization of the admission processes.)

EXAMINATIONS

- The external theory examination of all semesters shall be conducted by the University at the end of each semester.
- There will be no supplementary exams. For reappearance/ improvement, the students can appear along with the next batch.
- A student who registers his/her name for the external exam for a semester will be eligible for promotion to the next semester.
- A student who has completed the entire curriculum requirement, but could not register for the Semester examination can register notionally, for getting eligibility for promotion to the next semester.
- A student who fail to secure minimum marks/grade for a pass in a course will be permitted to write the examination along with the next batch.
- The evaluation of each paper shall contain two parts:
  (i) Internal or Continuous Evaluation (CE)
  (ii) External or End-Semester Examination (ESE)

- Evaluation and Grading as per PG CSS 2019 Regulations

THE PROGRAM STRUCTURE - TOTAL CREDIT: 80

Semester	Course Type	Course Code	Course Title	Hours/ Week	Credit	Total Credits
I	Core Theory	HS030101	Applied Human Physiology	5	5	22
	Core Theory	HS030102	Clinical Biochemistry	5	5	
	Core Theory	HS030103	Therapeutic Nutrition	5	4	
	Core Theory	HS030104	Advanced Food Science	5	4	
	Core Practical	HS030105	Advanced Food Science Practical	5	4	
II	Core Theory	HS030201	Nutrigenomics & Pharmacogenomics	5	4	22
	Core Theory	HS030202	Public Health Nutrition	5	5	
	Core Theory	HS030203	Nutrition Through Life cycle	5	5	
	Core Theory	HS030204	Macro Nutrients	5	4	
	Core Theory	HS030205	Micro Nutrients	5	4	
III	Core Theory	HS030301	Nutrition in critical care	5	5	20
	Core Theory	HS030302	Research Methodology & Statistics	5	5	
	Core Theory Elective	HS830301	Organization and management of Dietary	5	3	
		HS830302	Food Microbiology	5		
	Core Theory	HS840301	Advanced Techniques in Food Preservation	5	3	

	Elective	HS840302	Food Safety and Quality Assurance			
	Core Practical	HS030303	Therapeutic Nutrition Practical	5	4	
IV	Core Practical	HS030401	Community Nutrition Practical	5	5	**16**
	Core Practical Elective	HS830403	Hospital internship	6 Months	3	
		HS840403	Industrial Training	6 Months		
	Core	HS030402	Project	-	4	
		HS030403	Comprehensive Viva- voce	-	4	

SYLLABUS

SEMESTER I
APPLIED HUMAN PHYSIOLOGY HS030101

Total Credits: 5

Total Hrs: 25

Objectives

To enable the students to:

- To learn the different physiological systems in our body and its functions.
- To gain knowledge about nutritional physiology.

MODULE I

Elementary Composition of Human Body: Proximate principles ñ Proteins, Lipids, Fats, Carbohydrates, Enzymes and Co-enzymes.

MODULE II

Blood: Introduction to haematology, Functions of blood, Functions of plasma proteins, Erythrocytes, Haemoglobin, Iron, Important indices of RBC and Hb, Leucocytes/ WBC Functions and blood groups. Blood Transfusion and Medical ethics, Importance of stem cells, Scientific and potential use of stem cells.

MODULE III

Cardiovascular System: Anatomical consideration of heart and CV system, cardiac cycle, Heart sounds, ECG and its interpretation, heart rate and regulation, Blood pressure ,Significance and physiological variations, Haemorrhage, Compensatory changes after haemorrhage, Cardiovascular modification during exercise, Pacemaker, Heart block, Ventillation, Ca++ Channel blockers.

MODULE IV

Respiratory System: Functional anatomy, Non respiratory functions of the lungs, resuscitation and its methods.

MODULE V

Digestive System: Anatomy, Composition and functions of salivary, gastric, intestinal & pancreatic secretions, Functions of bile salts, Mechanism of secretion of digestive juices and its regulation, movements of stomach. Small intestine- villi, defecation, emesis. Liver ñ anatomy and physiology, fatty liver, Jaundice and Liver function tests. Gastro intestinal hormones and related issues.

MODULE VI

Excretory System: Structure and functions of kidney, Reabsorption, Structure of nephron, GFR, Regulation of reabsorption and common kidney disorders.

MODULE VII

Nervous System: General aspects of neurology, Synapse conduction, Types of transmission, at synapse and reflex action.

MODULE VIII

Musculo-Skeletal System: Structure and functions of bone, Cartilage and connective tissue. Disorders of the skeletal system. Types of muscles ,structure and function.

MODULE IX

Endocrinology: Endocrine secretions, glands, role and regulatory function of endocrine, site of secretions, regulation of secretions.

References:

- Best, H. And Taylor, B (1991)íThe Physiological Basis for Medical Practiceí, 8th Edition, The Williams and Wildins Company.
- Berne, M.R.,(1998):Physiology.Amazon.UK. • Burke and Taylor (1986) The Living Body, Saunders Company .
- Samson and Wright (1989), ëApplied Physiologyí, Tandon Publications.
- Michael J Gibney (2003) Ian A MacDonald, Helan M Roche, Nutrition and Metabolism, Blackwell Publishing.

- Samson and Wright (1989), 'Applied Physiology', Tandon Publications.
- Chatterjee, C.C. (2005), Human Physiology, Medical Allied Agency, 82/1, Mahatma Gandhi Road, Kolkata – 700009.
- Guyton and Hall (2000), Text book of Medical Physiology, 10th edition , Harcourt Asia, Singapore.
- Hole, J.W (1989), Essentials of Human Anatomy and Physiology, 3rd edition, WCB publishers, Dubuque , Iowa.
- Subramanyam , S , Madavankutty, K and Singh , H.D (2001) Text book of Human Physiology, S. Chand and Co. Ltd , Ramnagar , New Delhi.
- Wilson, K.J. and Waugh , A. (1999) , Ross and Wilson Anatomy and Physiology in Health and Illness.
- Chandra Sekhar C.N, (2007), Manipal Manual of Physiology, 1st Edition, CBS Publishers and Distributors, New Delhi.
- Indu Khurana and Arushi (2009), Text Book of Anatomy and Physiology for Health Professionals, CBS Publishers and Distributors, New Delhi.
- Sembulingam. K and Sembulingam, P (2006), Essentials of Medical Physiology, JAYPEE Brothers Medical Publishers.

SEMESTER I

CLINICAL BIOCHEMISTRY HS030102

Total Credits:5
Total Hrs: 25

Objectives

To enable the students:

- To understand the biochemical and pathological changes in diseases.
- To acquire skills to estimate selected body metabolites.

MODULE I

Disorders of Carbohydrate Metabolism: Normal carbohydrate metabolism- Review, Decrease of plasma glucose concentration and increase of glucose concentration, Disorders associated with hyperglycemia, hypoglycemia and reducing sugars in the urine.Estimation of serum glucose concentration, chemical methods, enzymatic methods, Urine glucose concentration, Glucose in cerebro spinal fluid, Ketone Bodies in urine, Identification of reducing bodies in urine- Anti diuretics.

MODULE II

Abnormal Lipid Metabolism: Review of normal metabolism, Serum total Cholesterol, Triglyceride and lipo proteins, phospholipids, and glycolipids, plasma lipids in various diseases- Atherosclerosis, hypertension, hypolipidemia, and ketosis. Factors associated with development of heart diseases, anti hypertensives, Diuretics, lipid lowering drugs.Plasma lipoprotein levels in various diseases, chemical and enzymatic estimations of cholesterol and other lipids, beta blockers.

MODULE III

Protein Metabolism: Clinical significance of protein concentration in blood, Cerebrospinal fluid and other body fluids- urine, synovial fluid, pleural fluid, transudate and exudate, Nitrogen metabolism with reference to urea, uric acid, creatinine, creatine, plasma protein in PEM, pregnancy and other diseases. Estimation of protein body fluids.

Module IV

Disorders Associated With Gastric Mucosa: Chemical pathology, gastric function tests, endoscopy, gastric stimulation tests, antinausea drugs. Drugs acting on the digestive system- Constipation, antacids, antidiarrhoeal drugs, drugs modifying secretory functions.

Module V

Liver, Gall Bladder and Pancreas: Bilirubin and liver function, Clinical significance of altered bilirubin levels, ammonia and liver, hepatitis and liver damage, alcohol and liver damage, Reyes syndrome. Disorders of gall bladder, bile salts and bile pigments. Disorders of pancreas, liver, gall bladder and pancreas function tests.

Module VI

Intestinal Disorders: Disorders associated with intestine - diarrohea, constipation diverticulitis, diverticulosis, flatulence, gluten- sensitive enteropathy, inflammatory bowel disease, irritable bowel syndrome, lactose intolerance, short bowel syndrome, steatorrhoea, ulcerative colitis ñ colonoscopy.

Module VI

Kidney Disorders: Pathological conditions involving kidney, Concept of renal clearance, excretion of creatinine, urea, uric acid, laboratory diagnosis of renal diseases ñ nephrosis, nephrotic syndrome, acute renal failure, renal tubular disorders. Artificial kidney, principles of dialysis, type of dialysis; Drug interactions ñ inhibition of renal eliminations.

Module VII

Blood Picture: Different types of anemia, blood coagulation ñ normal and abnormal, clinical changes in AIDS.Anti anemic, immune suppressant drugs.

Module VIII

Body Electrolytes: Law of electron neutrality, maintenance of PH, buffer system in the body, regulation of acid base balance, respiratory control and renal control. Role of sodium, potassium and chlorine. Estimation of body electrolytes. Drug and nutrient interactions.

References

- Basu, D.K, Essentials of pharmacology, CBS Publishers Asia, Printograph ñ Shahdara, Delhi.
- Chatterjee, M.N and Shinde, R.(1994): Text book of Medical Biochemistry, Jay Ree BrothersMedical pub Pvt Ltd, New Delhi.
- Lahninger, A.L, Nelson,D.C and Cox, M.M., Principles of Biochemistry, CBS PublishersandDistributors, Jain Bhawan Bhala Natu Nagar.
- Mukherjee, K.L.(1994): Medical Laboratory Technology, Tata McGraw Hill Publishing Co.Ltd, New Delhi.

Journals :

- Current Science
- Indian journal of nutrition and dietetics
- Trends in biochemical science

SEMESTER I

THERAPEUTIC NUTRITION HS030103

Total Credits: 4

Total Hrs: 25

Objectives

To enable the students :

- To impart advanced knowledge in the field of dietetics.
- To develop capacity and aptitude for taking up dietetics as a profession.

MODULE I

Nutrition Care Process: Nutritional care plan- setting goals and objectives- short term and long term. Assessment and therapy in patient care; Implementation of nutritional care- counselling and patient education, diet prescription. Role of dietitian in hospital and community- Types, professional ethic, responsibilities. Indian Dietetic Association- Origin, objectives, membership, chapters, registration.

Basic concepts of Diet Therapy: Routine hospital diets - regular diets, clear fluid diet, full fluid diet, soft diet, Modified diets – high calorie and low calorie diet, high residue and low residue diet.

MODULE II

Nutrition Support Techniques: Enteral Nutrition: Enteral access – Nasogastric, nasoduodenal, nasojejunal route, PEG, PEJ, Surgically placed enterostomies, Enteral formula composition, Enteral formula categories, Administration, Monitoring and complications, Advantages, Medication and enteral nutrition incompatibility.

Parenteral Nutrition**:** Indications for use of TPN, Parenteral access - central and peripheral access, parenteral nutrition solutions, Administration, Monitoring and complications. Refeeding syndrome, Transitional feeding.

MODULE III

Dietary management in Fever: Types, metabolic changes, dietary management.

Dietary management in Human Immunodeficiency Disease (AIDS): pathophysiology, etiology and classification, manifestations and stages of HIV infection, opportunistic infections and other complications, pediatric consideration, relationship between malnutrition and AIDS, medical nutrition therapy

MODULE IV

Diet in Overweight/Obesity: Aetiology, assessment, types, complications, management of obesity – medical, nutritional, lifestyle management, Metabolic surgery.

Diet in underweight: Aetiology, dietary management, metabolic consequences of underweight and dietary management.

Management of eating disorders: Anorexia, bulimia, binge eating, anorexia athletic, body dysmorphic disorder, muscle dysmorphic disorder (bigorexia), orthorexia nervosa, pregorexia, drunkorexia, infection-triggered, night eating syndrome, rumination syndrome, Gourmand syndrome, Prader-Willi syndrome, cyclic vomiting syndrome, chewing and spitting.

MODULE V

Diet in Diabetes Mellitus - Types, GDM, aetiology, symptoms, prevention of MODY diagnosis, treatment- insulin, oral hypoglycemic agents, dietary modifications, glycemic index, factors affecting glycemic index, glycemic load, sweetners, complications of diabetes.

MODULE VI

. **Diet in Gastrointestinal disease**: Aetiology, Symptoms and dietary management of Oesophagitis, Gastro Oesophageal Reflux Disease (GERD), Dyspepsia, Gastritis, Peptic ulcer, Constipation, Diarrhoea, Ulcerative colitis, Crohn's disease, Flatulence,

Irritable bowel syndrome, Inflammatory bowel disease, short bowel syndrome, Diverticulitis, Dumping syndrome, Malabsorption syndrome – Lactose intolerance, Steatorrhoea, Celiac disease, Tropical sprue.

MODULE VII

Food Allergy: Definition, symptoms and mechanism of food allergy, diagnosis – biochemical, immunotesting, history and food record, elimination diets, food selection, medication, food allergy in infancy.

References

- RAntia P. Clinical Dietetics and Nutrition, 2nd edition, Oxford University press.
- Garrrow J.S, James W. P.T, Ralph A, (2000), Human Nutrition and Dietetics, 10th edition, Churchill Livingston, London.
- Guthrie H. A, Picciano M. F (1995), Human Nutrition, Mosby, St. Louis missionary.
- Michael Sharon (1994), Complete Nutrition, Avery publishing group. New York.
- Mohan K. L, Krause M.V (2002), 2nd edition Food , nutrition and Diet Therapy, W.S. suders Co, Philadelphia.
- Srilakshmi B, Dietetics (2006), New age International publishing Ltd.
- Robinson C.H., Lawler M..R, Cheweth W.L; and Gaswick A.E, Normal and Therapeutic Nutrition ,17th edition, Mac Milan Publishers.
- Shills M.E.,Olson J:-Shike,M and Roos,C(1998)Modern Nutrition in Health andDisease 9thEdition. Williams and Williams A Beverly Co. London.
- Srilakshmi B. (2008): Nutrition Science, New age international P.Ltd. Publishers, New Delhi.

Journal

- Indian journal of nutrition and dietetics
- American journal of Clinical nutrition .
- Journal of nutrition

SEMESTER I

ADVANCED FOOD SCIENCE HS030104

Total Credits: 4
Total Hrs: 25

Objectives

To enable the students to

- Gain knowledge on sources and properties of food.
- Develop skills to judge the quality of cooking food.

MODULE I

Introduction to Food Science: Food as a source of nutrients**,** Functions of food, Food intake and its regulation, physical and physio- chemical changes in food in relation to cookery, denaturation of protein, properties of colloids, enzymatic and non enzymatic changes in cookery.

Evaluation of food quality: Sensory evaluation, sensory tests, types of tests.

MODULE II

Cereals: Wheat - Structure and composition, wheat types, milling of wheat, functions and behaviour of flour component in dough, flour improvers, leavening agents – physical, chemical and biological, tests for flour quality.

Rice - Processing, parboiling, and rice products, nutrient losses during processing

Starch: Gelatinisation, gelation, syneresis, retrogradation, dextrinisation, factors affecting gelatinization and gelation.

Pulses: Composition and nutritive value, processing, anti nutritional factors. Edible flours- protein concentrates and protein isolates, Novel proteins.

MODULE III

Milk: Composition, nutritive value, physical properties, milk cookery and processing.

Egg: Structure, composition and nutritive value, quality, egg white foams, egg cookery.

MODULE IV

Meat: Structure, composition and nutritive value, classification, Post mortem changes, ageing, tenderizing, curing, meat cookery.

Fish: Composition and nutritive value, classification, selection, spoilage, fish cookery.

Poultry: Composition and nutritive value, classification, processing.

MODULE V

Vegetables: Composition, nutritive value, changes and loss of nutrients during cooking, effect of cooking on pigments.

Fruits: composition and nutritive value, post harvest changes, ripening of fruits, jam, jelly, marmalade.

MODULE VI

Fatsandoils: Classification, physical and chemical properties,Changes during frying and t rans fatty acids, changes during fat storage ,rancidity, reversion , Antioxidants and synergists, Use of fats and recent developments.

MODULE VII

Beverages : Tea : Types, processing, grading, factors affecting quality of tea.

Coffee – Types, Processing, Grading, types of coffee beverage, staleness.

Cocoa – Processing and products.

Spices and Condiments: General functions, role of spices in cookery.

MODULE VIII

Salt: Types and uses.

Sugar- Types, uses, sugar cookery, crystallization, factors affecting crystallization.

Convenience foods – Role, types, advantages and uses.

MODULE VIII

Food Adulteration: Type and pattern of adulteration, food laws and standards.

References

- Sharma,D,(2019), Text Book on Food Science and Human Nutrition Asral International Publishing.
- Christian E.W (2014), Essentials Food Science, 4th Edition, Springer Publishing, Texas.
- Roday,S,(2018),Food Science and Nutrition, 3rd edition, Oxford University Press.
- Potter, N. N., Hotchkiss H. J.,(1996), Food Science, 5th edition, CBS Publishers and distribution, New Delhi.
- Manay, S. N.and Shadaksharasvvami M., (1987), Food Facts and Principles, Wiley, Eastern LTD, New Delhi.
- Sreelakshmi, B. (1997), Food Science, New Age International Pvt. Ltd., Chennai.
- Fox B.A.(1997): Food Science, Nutrition and Health, Edward Arnold, London, V I Edition.

Journal

- Indian journal of food science
- International journal of food science

SEMESTER I

ADVANCED FOOD SCIENCE PRACTICAL HS030105

Total Credits: 4
Total Hrs: 25

Objectives

To enable the students to:

- Apply the theoretical knowledge of food chemistry in practice.
- Develop insight on the practical aspects of experimental cookery

MODULE I

Physico Chemical Changes in Cookery

a)Gelatinization of starch

b)Gluten formation and baking quality of gluten.

c) Stages of sugar cookery.

MODULE II

Cereal Cookery

a) Effect of mechanical action and ingredients (milk, fat and hot and hard water) in development of gluten.(variations in chappathis).

b) Development of bread.

MODULE III

Pulse Cookery

a) Effect of fermentation in the development of batters -
development of idli /dosa batters with variation in the cereal pulse ratio.

b) Development of recipes using sprouted green gram.

MODULE IV

Milk Cookery

a) Development of paneer and khoa.

b) Development of ice creams.

MODULE V

Egg Cookery

a) Factors affecting formation of egg white foams (beating time, vessel temperature acid,fat,salt, water, sugar).

b) Development of cakes.

MODULE VI

Sugar Cookery

Development of recipes with the different stages of sugar cookery.

MODULE VII

Food Preservation Methods

a) Demonstrate the different stages of jam preparation.

b) Blanching

C) Preparation of pickles squashes and jellies.

MODULE VIII

Fat Cookery

a) Determination of smoking point.

b) Iodine value

c) Preparation of an emulsion- mayonnaise.

MODULE VIII

Subjective Evaluation of Food Quality

a) Sensitivity tests

b) Acceptability of a new product

c) To know likes and dislikes

References

- Christian E.W (2014), Essentials Food Science, 4th Edition, Springer Publishing, Texas.
- Roday, S,(2018),Food Science and Nutrition, 3rd edition, Oxford University Press.
- Potter, N. N., Hotchkiss H. J.,(1996), Food Science, 5th edition, CBS Publishers and distribution, New Delhi.
- Manay, S. N.and Shadaksharasvvami M., (1987), Food Facts and Principles, Wiley, Eastern LTD, New Delhi.
- Sreelakshmi, B. (1997), Food Science, New Age International Pvt. Ltd., Chennai.
- Fox B.A.(1997): Food Science, Nutrition and Health, Edward Arnold, London, VI Edition.

SEMESTER II

NUTRIGENOMICS AND PHARMACOGENOMICS HS030201

Total Credits: 4
Total Hrs: 25

Objectives:

- To help the students to understand the concepts in the field of nutrigenomics.
- To enable the students to understand nutraceuticals, phytochemicals and functional foods.

MODULE I

Nutrigenomics: Definition, functions, rationale and aims of nutrigenomics, benefits and risks. ISSN- International Society of Nutrigenomics.

Nutraceuticals: Definiton, concept, history, evolution of nutraceuticals in market, classification, significance, relevance in the management of diseases and disorders, effect of processing conditions and storage of neutraceuticals.

Natural occurrence of certain phytochemicals: Antioxidants and flavonoids, omega -3 fatty acids, carotenoids, dietary fibre, phytoestrogens, glucosinolates, organosulphur compounds.

MODULE II

Functional foods: Definition, development of functional foods, use of bioactive compounds in appropriate form with protective substances and activators, research frontiers in functional foods, delivery of immunomodulators/vaccines through

functional foods, use of nanotechnology in functional food industry.

MODULE III

Prebiotics, probiotics and symbiotic : Probiotics: Definition, types and relevance; Usefulness in gastro intestinal health and other health benefits, development of probiotic products; recent advances in probiotics, Prebiotics, Prebiotic ingredients in foods; types of prebiotics and their effects on gut microbes; health benefits of prebiotics, recent development in prebiotics, Symbiotic.

MODULE IV

Nutrition and pharmacogenomics: Definitions, pharmacokinetics and pharmacodynamics, immunostimulants, Immunosuppressants, Drug –nutrient interaction, drug-drug interaction, effect of drug on nutritional status.

MODULE V

Therapeutic implications: Monitoring therapeutic levels of drugs, concepts of half-life, volume of distribution, peak and trough concentrations, area under the curve (AUC) and dosing intervals, toxicity levels. Symptoms and signs of overdose, use of antidotes. Detecting and quantifying poisons: e.g. methanol, ethylene glycol, lead, monoxide, organophosphorous compounds (cholinesterase).

References

- Lopez, G.F.G. and Canovas, G.V.B.9, (2003), "Food Science and Food Biotechnology", CRC Press, Florida, USA.
- Mani,A., Selvaraj.A.M ., Narayanan.L.M , Arumugham.N.(1999), Microbiology- General and Applied, Sara's publications , Nagarcoil.
- Michael Sharon (1994), Complete Nutrition, Avery publishing group. New York.
- Satoskar R S, Nirmala Rege, SD Bhandarkar, (2015), "Pharmacology and Parmacotherapeutics", Elsevier Health Sciences.

SEMESTER II

PUBLIC HEALTH NUTRITION HS030202

Total Credits: 5

Total Hrs: 25

Objectives

To enable the students to:

- Assess the health status of the community and relate nutrition and health in the community.
- Keep abreast to the changes in health care administration and policies

MODULE I

Nutrition in the national perspective: Role of nutrition and health in national development, national nutrition policy, need for nutrition policy, policy strategies and their implementation, Hunger in India, India state Hunger Index (ISHI),Food and Nutrition security, production and availability of foods in India, consumption pattern, Levels of health care system Anganwadi – management, role in implementation of nutrition policy programme, function of PHC.

MODULE II

Principles of epidemiology and epidemiological methods: Introduction to epidemiology, aims, classifying epidemiological study methods, nutrition epidemiology and public health nutrition.

MODULE III

Assessment of nutritional status: Nutritional assessment, Importance and Objectives, Indirect assessment of Nutritional status ñ Age, specific mortality rates, cause specific mortality rates, nutritionally relevant morbidity rates, ecological factors. Direct assessment of nutritional status - Nutritional Anthropometry-Height, length, weight, waist circumference, waist hip ratio, body fat, skin fold measurements. Clinical assessment of Nutritional disorders, Biochemical assessment for nutritional deficiencies and Dietary assessment-Family diet survey, Individual diet survey, quantitative diet surveys, Institutionalised surveys and Food balance sheet

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MODULE IV

Nutritional Problems in India:, Prevalence, Aetiology, Consequences and treatment of- PEM-Clinical syndromes, prevention of malnutrition,managing PEM; Vitamin A Deficiency- Consequences,epidemiology,aetiological factors, intervention strategies for preventing Vitamin A deficiency disorders(VADD)

Iron Deficiency Anaemia-Epidemiology,Prevalence,aetiological consequences,approaches for prevention and control of anaemia, National Nutritional Anaemia Control Programme; Iodine Deficiency Disorders-Epidemiology,aetiological factors,consequences of IDD,IDD as a public health problem,elimination of IDD-An International focus,National Iodine Deficiency Disorders Control Programme Of India; Zinc Deficiency-Epidemiology, public health significance, clinical manifestations of zinc deficiency, Zinc supplementation in pregnancy, Flourosis.

MODULE V

Improvement of nutrition of a community: Modern methods of improvement or nutritional quality of food, food fortification, planning food fortification intervention, fortification of selected food items, enrichment, GM foods and nutrient supplementations.

MODULE VI

Nutrition Policies and Programmes in India: ICDS, SLP, ANP,PDS, TPDS, AAY, SGRY,NREGA NFFWP, Right to Food Act,Natonal Social assistance

Programme,Annapoorna scheme,Village Grain Bank Scheme,nutritional programmes for adolescent girls, mid day meal programme .

MODULE VII

Nutrition education: Definition, Importance of nutrition education to the community, principles of nutrition education and opportunities, objectives, strategies and approaches for community participation, methods of nutrition education, theories of nutrition education, integration of nutrition education with education and extension work, principles of planning, implementation and evaluation of nutrition education.

MODULE VIII

Nutrition related non communicable chronic disorders: Prevalence at global and national level, cardiovascular disease, hypertension, obesity, diabetes mellitus, cancer. Risk factors for Non Communicable Diseases-Community based programmes for primary prevention, Health education and role of mass media, secondary and tertiary prevention.

References:

- Dandiya, P.C, Zafer, Z.Y.K and (2003), Health education and community pharmacy, Vallabh Prakashan Printers, New Delhi.
- Khader, V. (2003), Foods – Nutrition and Health, Kalyani Publishers, New Delhi.
- Park, K.(2005), Park's Textbook of Preventive and Social Medicine, Banarsidas Bhanot Publishers, Jabalpur.
- Modern Nutrition in Health and Disesase edited by Maurice B Shils,Moshe Shike.A,Catherine Ross,Benjamin Cabellero,Robert J Cousins, Lippincott Williams al Wilkins 2006.
- Nutrient Requirements and Recomended Dietary allowances for Indians.A report of the expert group of the Indian Council of Medical Research ICMR 2010.
- Public Health Nutrition in Developing Countries Edited by Sheila Chander Vir Woodhead Publishing India.Part I & II. 2011
- Bamji, M.S., Rao, N.P and Reddy, V. (2003), Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

- Gibney, M.J, Margetts, B.M, Kearney, J.M and Arab, L. (2005). Public Health Nutrition, Blackwell Publishing, USA.

SEMESTER II

NUTRITION THROUGH LIFE CYCLE HS030203

Total Credits: 5

Total Hrs: 25

Objectives

- To impart knowledge on the importance of nutrition during life span.
- To enlighten on the dietary modification.

MODULE I

Recommended Allowances: Recommended allowances for Indians. Approaches for deriving nutritional requirements and Recommended Dietary Allowances.Concept of reference man and woman, Reference body weights ,Basis for requirements for energy,protein ,fats,minerals and vitamins.. Different food groups, Dietary guide lines and basic principles of meal planning.

MODULE II

Nutrition in Infancy: Growth and development, Nutritional requirements, Breast feeding and Artificial feeding, Compositional differences between human milk and cow's milk, Milk substitutes and their suitability for infant feeding, Pre term and Low Birth Weight Infants - Nutritional Management, feeding of pre–term and LBW infants, gavage feeding, Weaning, ARF, low cost supplementary foods, growth monitoring, National immunisation schedule and immunization chart. .

MODULE III

Nutrition for Pre-schoolers/toddlers: Normal pattern of growth and development, norms/standards for growth in children, growth chart, nutritional requirements, nutritional problems – food hypersensitivities, growth failure, childhood obesity and eating disorders, malnutrition and mental development, Attention Deficit Hyperactivity Disorder.

MODULE IV

Nutrition for school children: Growth and development, Nutritional requirements, RDA, nutritional problems, factors influencing food habits, importance of breakfast, packed lunch.

MODULE V

Nutrition in adolescence: Changes in growth and development, hormonal influences, psychological and nutritional problems, nutritional requirements, eating disorders.

MODULE VI

Nutrition in adulthood: RDA, Nutrition and work efficiency, nutritional requirements, health problems of adults.

MODULE VII

Nutrition for elderly: Physiological changes in ageing, theories of ageing, psycho-social and economic factors affecting elderly, nutritional requirements, nutritional and health problems, dietary modifications, institutionalization.

MODULE VIII

Nutrition in Pregnancy: Physiological changes in pregnancy, Maternal weight gain, Placenta, Foetal growth and development, Importance of pre conceptual nutrition, RDA for a pregnant woman, Nutritional requirements, Relationship between maternal and foetal nutrition, General dietary problems, Consequences of under nutrition on outcome of pregnancy, Complications, Effects of alcohol and smoking on foetal growth.

MODULE IX

Nutrition in lactation: Structure of mammary gland, Role of hormones in milk production, Let down Reflex, Factors affecting volume and composition of breast milk, Advantages of breast feeding, effect of breast feeding on maternal and child health, Nutritional requirement,

dietary guidelines, Lactation failure, Factors responsible for lactation failure,Baby Friendly Hospital Initiative, Kangaroo Mother Care programme (KMC), Milk banking.

References

- Robinson C.H., Lawler M.R., Chenoweth W.L., Garwich A.E. (1986), Normal and Therapeutic Nutrition, 17th ed., Mac Millan Publishing Co., New York.
- Guthrie H. A., Picciano M.F. (1995), Human Nutrition, Mosby Year Book Inc., St. Louis, Missouri.
- Davidson, Passmore, Brock J.F.(1993), Human Nutrition and Dietetics, F&S Livingston Ltd., Edinburgh and London.
- Robinson C.H and Winely E.S, (1984). Basic Nutrition and Diet Therapy, 5th Edition, Macmillan Pub. Co. New York.
- Swaminathan M (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing Company Ltd.
- Srilakshmi, B. (2005). Dietetics, 5th edition, New Age International Publishers, New Delhi.
- Wardlaw. G, M and Insel, P.M (1993). Perspectives in Nutrition 2nd edition, Mosby Publishing Co, London.

SEMESTER II

MACRO NUTRIENTS HS030204

Total Credits: 4
Total Hrs: 25

Objectives:

- To understand advances in the study of major nutrients..
- To enable them to translate the knowledge into practical guidelines for dietary needs of human at different stages of life.

MODULE I

Carbohydrates: Classification, functions, digestion, absorption, transport and metabolism, hormonal control of carbohydrate homeostasis, disorders of carbohydrate metabolism.

Dietary fibre - Components, classification, physiologic and metabolic effects of fibre, role of fiber in prevention of diseases. Resistant starch – physiological functions.

MODULE II

Proteins: Specific functions of amino acids, classification, functions, digestion, absorption, transport and metabolism of protein, protein synthesis and storage in body, protein quality evaluation methods, effect of protein deficiency, Nitrogen balance, disorders of protein metabolism.

MODULE III

Lipids: Classification, functions, properties, digestion, absorption, transport and metabolism of lipids, fat in food, fat in the body, dietary fat and health issues, Role of lipoprotein, cholesterol and triglycerides in health, deficiency of fat, disorders of lipid metabolism. Role of leptin.

MODULE IV

Energy balance and body composition: Energy measurement, direct and indirect calorimetry, thermic effect of food, Basal and resting metabolism, influencing factors, determination of BMR, latest concepts in energy requirements and recommendations for different age groups, Physical activity level (PAL). Body composition-Methods of studying body composition-under water weighing, air displacement technique, DEXA, skin fold calliper, Bio Electric Impedence Analysis (BIA).

MODULE V

Water: Distribution and function, water balance (maintenance and determination), Physiological variations in intake and output, Water depletion and retention, regulation of water intake and excretion.

Electrolytes: Sodium and potassium: Distribution, functions, sources, requirement, utilization, deficiency and toxicity, sodium – potassium balance.

References

- Antia, F.P and Abraham Philip (1998), Clinical Nutrition and Dietetics, 4th edition, Oxford Publishers.
- Robinson C.H., Rawler M.R., Chenoweth W.L., Garwich A.E (1986) Normal and Therapeutic Nutrition, 17th edition, Mac Millan Publiushing Co, New York.
- Swaminathan M. (1974), Adavanced Text Book On Food and Nutrition. Volume 1
- Manay, S.N., Sadaksharaswami M. (1998), Food Facts and Principles. New Age International Pvt. Ltd., New Delhi.
- Bamji, M., Prahlad N., Vinodhini R. (1998), Text Book of Human Nutrition. Oxford and IBH Publ. Co., New Delhi.
- Vijaya D.T. (1993), Handbook of Nutrition and Dietetics.,Vora Medical Publ., Mumbai.

- Indian Council of Medical Research (2010), Nutrient Requirements and RDA for Indians, ICMR.

SEMESTER II

MICRO NUTRIENTS HS030205

Total Credits: 4
Total Hrs: 25

Objectives

To enable the students to:

- Understand the functions and role of micro nutrients.
- Impart knowledge about various deficiency diseases.

MODULE I

Fat soluble vitamins: Vitamin A, D, E and K – unit of measurement of vitamins, physiological action, sources, requirements, absorption, transport, utilization, storage, hypervitaminosis and deficiency.

MODULE II

Water soluble vitamins: Thiamine, riboflavin, niacin, vitamin B12, folic acid, pyridoxine, pantothenic acid, biotin, vitamin C - physiological action, sources requirements, absorption, transport, utilization, storage, hypervitaminosis and deficiency.

MODULE III

Macrominerals: Magnesium, calcium, phosphorus, - physiological action, sources, requirements, absorption, transport, utilization, storage, toxicity and deficiency, Ca-P ratio, calcium balance, bone mineral density, diet and immobilization measurement, therapeutic uses of phosphorus.

MODULE IV

Microminerals and trace elements: Iron, iodine, fluorine, copper, zinc and chromium, selenium, sulphur, cobalt, nickel, manganese: Distribution, utilization, sources and requirements, deficiency and toxicity, factors affecting absorption of iron.

MODULE V

Metabolic interrelationships of macro and micro nutrients: Carbohydrate-protein-fat interrelationship, Calcium-phosphorus, calcium- magnesium, magnesium-potassium, sodium-potassium, Iron- calcium, mineral-vitamin interrelationships, vitamin-vitamin interrelationships and macro-micro nutrient interrelationship.

Suggested Readings:

- Garrow, J.S., James W.P.T. and Ralph A (2000), Human Nutrition And Dietetics, 10th edition, Churchill Livingstone.
- Antia, F.P and Abraham Philip (1998), Clinical Nutrition and Dietetics, 4th edition, Oxford Publishers.
- Robinson C.H., Rawler M.R., Chenoweth W.L., Garwich A.E (1986) Normal and Therapeutic Nutrition, 17th edition, Mac Millan Publiushing Co, New York.
- Swaminathan M. (1974), Adavanced Text Book On Food and Nutrition. Volume 1
- Manay, S.N., Sadaksharaswami M. (1998), Food Facts and Principles. New Age International Pvt. Ltd., New Delhi.
- Bamji, M., Prahlad N., Vinodhini R. (1998), Text Book of Human Nutrition. Oxford and IBH Publ. Co., New Delhi.
- Vijaya D.T. (1993), Handbook of Nutrition and Dietetics.,Vora Medical Publ., Mumbai.

- Indian Council of Medical Research (2010), Nutrient Requirements and RDA for Indians, ICMR.

SEMESTER III

NUTRITION IN CRITICAL CARE HS030301

Total Credits: 5
Total Hrs: 25

Objectives

To enable the students to:

- Understand different disease condition that need special care
- Impart knowledge about medical nutrition therapy in critically ill patients

MODULE I

Medical Nutrition Therapy in Metabolic Stress: Metabolic response to stress, sepsis, systemic inflammatory response syndrome and multiple organ dysfunction syndrome.

Injury and Trauma – neural and spinal trauma – pathophysiology, medical nutrition therapy.

Surgery- Types, physiological response, assessment of nutritional status, pre-operative and post-operative nutritional care.

Burns - pathophysiology, medical management, medical nutrition therapy, computation of degree of burns.

MODULE II

Medical Nutrition Therapy in neoplasmic Diseases: Development of cancer, Etiology of cancer, tumor markers, nutritional implications of cancer therapy - goals of nutritional care, common nutrition impact symptoms of cancer therapy, nutritional care of adults and children diagnosed with cancer, dietary recommendations for cancer survivors, Bone marrow transplant.

MODULE III

Medical Nutrition Therapy in Neurological Diseases: Cerebrovascular disease, Neurological diseases due to nutritional imbalance – pernicious anemia, Wernicke – Korsakoff's syndrome, Neurological diseases due to non- nutritional etiology – Alzheimer's disease, Amylotrophic lateral sclerosis, epilepsy, Guillain Barre syndrome, Migraine head ache, Myasthenia Gravis, Parkinson's disease.

MODULE IV

Diet in Cardiovascular diseases: Aetiology, Symptoms, Risk factors and dietary management of Atherosclerosis, Hypertension, Hypercholesterolemia, Angina Pectoris, Myocardial Infarction, Ischemic Heart Disease, Coronary Artery Disease. Congestive heart failure, Rheumatic heart disease, Cardiac cachexia, Transplant of heart.

MODULE V

Diet in Diseases of Liver and Biliary system: Aetiology, Symptoms, Dietary treatment in Jaundice, Hepatitis – viral, chronic and fulminant hepatitis, Cirrhosis, Hepatic Coma, Wilson's disease. Dietary management in disease of gall bladder and pancreas - Biliary dyskinesia, Cholecystitis, Cholelithiasis, Choledocolithiasis, Cholecystectomy, Pancreatitis – acute, chronic, Zollinger Ellison syndrome, Transplant of liver.

MODULE VI

Diet in Renal disease: Causes, symptoms and dietary management in glomerular diseases – Nephritis and Nephrosis, acute and chronic renal failure, other tubular or interstitial diseases – chronic interstitial nephritis, Fanconi's syndrome, renal tubular acidosis, End Stage Renal Disease (ESRD), Dialysis – hemodialysis and peritoneal dialysis, characteristics, drawbacks. Nephrolithiasis – types of stones, acid ash diet, alkaline ash diet, transplant of kidney.

MODULE VII

Dietary management in Pulmonary Diseases and Musculoskeletal Disease:

Pulmonary disorders - Medical nutrition therapy in pulmonary aspiration, asthma, bronchopulmonary dysplasia, chronic obstructive pulmonary disease, pneumonia, respiratory failure, TB.

Musculoskeletal diseases - Arthritis (osteo and rheumatoid), scleroderma, sjogren's syndrome, Systemic Lupus Erythomatous, Gout.

MODULE VIII

Immunonutrition: Nutrients affecting the immune system at physiological, cellular and genetic level, nutrients involved in inflammatory response, role of specific nutrients in immune suppression, role of nutrients in immune promotion, acute inflammation – features, causes, vascular and cellular events, inflammatory cells and mediators, chronic inflammation – causes, types, classification.

Hospice Nutrition: Definition, social and psychological support to terminally ill, role of palliative care in different conditions – elderly, cancer patients, paralysed patients.

Suggested Readings:

- Mohan, K. L., Krause, M.V. (2002), 2nd edition Food , nutrition and Diet Therapy, W.S. suders Co, Philadelphia.
- Antia, P. Clinical Dietetics and Nutrition, 2nd edition, Oxford university press
- Guthrie, H. A, Picciano, M. F (1995), Human Nutrition, Mosby, St. Louis, Missourie.
- Michael Sharon (1994), Complete Nutrition, Avery publishing group. New York.

- Garrrow, J.S, James, W. P.T, Ralph A, (2000), Human Nutrition and Dietetics, 10th edition, Churchill Livingston, London
- Robinson, C.H,Lawler, M.R,Cheweth, W.L; and Gaswick A.E, Normal and Therapeutic Nutrition ,17th edition, Mac Milan Publishers.
- Bamji, M.S, Vinodini Reddy. (1998), Text Book of Human Nutrition, ford and IBH publishing Co. Ltd New Delhi.

SEMESTER III

RESEARCH METHODOLOGY AND STATISTICS HS030302

Total Credits: 5
Total Hrs: 25

Objectives:

- To enable the students to understand the principles & techniques of research and writing research report.
- To enable the students to learn the fundamentals of statistics and practical application of statistics in research.

MODULE I

Introduction to research methodology: Meaning and importance of Research – Types of Research, Selection and formulation of Research Problem. Research Design – Need, Features, Inductive, Deductive and Development of models.

Developing a Research Plan – Exploration, Description, Diagnosis, and Experimentation, Determining Experimental and Sample Designs. Descriptive studies – correlation studies, case studies, cross sectional/survey. Analytical studies – observational studies, cohort studies, cross sectional/ survey.

MODULE II

Analysis of Literature Review – Primary and Secondary Sources, Web sources, note taking. Hypothesis – Types, Significance, Development of Working Hypothesis.

Research Methods: Scientific method vs. Arbitrary Method, Logical Scientific Methods: Deductive, Inductive, Deductive-Inductive, pattern of Deductive – Inductive logical process, Different types of inductive logical methods.

MODULE III

Data Collection: Sources of Data – Primary, Secondary and Tertiary, Types of Data – Categorical, nominal & Ordinal. Methods of data collection - survey, observation, interview, experimentation, case study. Tools: questionnaire, interview / observation schedule, rating scales, other methods, Collection of secondary data.

MODULE IV

Scientific Writing: Structure and components of Scientific Reports, types of Report, Steps in report writing, components, precautions for report writing. Preparation of scientific paper, Bibliography, Referencing and foot notes, Plagiarism, Citation and Acknowledgement, ISBN & ISSN.

Preparation of Project Proposal - Title, Abstract, Introduction, Rationale, Objectives, Methodology, Time frame and work plan, Budget and Justification, References.

MODULE V

Use of Internet in Research – Websites, search Engines, E-journal and E-Library, INFLIBNET, Impact factor of a journal, citation Index.

MODULE VI

Introduction to Statistics: Scope of statistics as a science of methods

Correlation analysis: Types of correlation, degree of correlation, methods of studying correlation- scatter diagram, graphic method, Karl Pearson's coefficient of correlation, Spearman's rank correlation.

Regression analysis: Methods- scatter method, regression lines, regression equations, importance of regression analysis.

Probability: Measures of probability, probability distribution-binomial, poisson and normal.

Test of Significance: Null hypothesis, chi-square test, analysis of variance.

References

- Ahnad, Q.S., Ismail, M.V., Khan S.A (2008), Biostatistics, University Science Press, New Delhi.
- Best, J.W., Khan J.V (2003), Research in education, 9th edition, Prentice Hall of India Althoel S.C., (2002), Statistics, Cambridge University Press, UK.
- Sharma, K.R. (2002). Research Methodology, National Publishing House, New Delhi.
- Sophian, C. (1995), Representation and reasoning in early numerical development, counting, conservation, and comparison between sets.
- Pillai R.S, Bagavathi. V, (2002), Statistics, S. Chand and Company Ltd, Chennai.
- Gupta S.C (2000), Fundamentals of statistics, Himalaya Publishing House, Mumbai.
- Kothari, C.R (2004), Research Methodology, 2nd edition, New Age International (P) Ltd, New Delhi

SEMESTER III

ORGANIZATION AND MANAGEMENT OF DIETARY HS830301

Total Credits: 3
Total Hrs: 25

Objectives

To enable the students to:

- Understand the processes and details related to effective patient care and to further increase the satisfaction levels of patients.
- Gain insight of both clinical and non clinical services in a hospital and understand the process of organization and management of dietary.

MODULE I

Organization and management: Definition, types of organisation, organisation process, organizational hierarchy, principles of management - planning, organizing, directing, coordinating, controlling, evaluating.

MODULE II

Tools of management – Tangible tools - - Organization chart, job description, job specification, work schedule, job analysis, production, service and staff analysis statement, budget, benchmarking. Intangible tools-personality, trust, experience, social and interactive skills, self confidence, knowledge, leadership quality, communication skill, good will, appreciation, training, decision making.

MODULE III

Personnel Management: Recruitment – definition, objectives, factors affecting recruitment, sources of recruitment, advantages and disadvantages.

Selection – Procedure. Induction/indoctrination, training – on the job and off the job training methods. Motivation – negative and positive motivation, Performance appraisal- Traditional and modern methods.

MODULE IV

Planning a Food Service Unit: Planning, Investment, funds, Project report, registration,Setting a Food Service Unit :Layout, Design (definition), Layout for different food service establishments, planning a layout. Evaluation of plans .

MODULE V

Food production: Food production system, food production process, effects of preparation and cooking methods on the nutritional quality of foods, large quantity cooking techniques-standardization of recipes, stepping up of recipes.

MODULE VI

Organization of spaces: Kitchen spaces - size and type of kitchen, size and types of kitchen, developing kitchen plan, layout of kitchens, maintenance of kitchens

Storage space – location, types of storage, planning, layout, sanitation, safety and security of stores.

Service area – location, planning, dimensions for service area, décor of service and dining area.

MODULE VII

Safety and hygiene in food service establishment: Probable accidents in food service establishment- Cuts and laceration, falls and collisions, burns, fire, electric shock, back strain, safety procedures.

Sanitary procedures while storing, preparing, cooking and holding foods, holding techniques, effective use of left overs.

References

- Mohini Sethi and Surjeet Malhan,(1997),Catering Management, 2nd Edition., New Age International Pvt. Ltd., New Delhi.
- Mahmood A.Khan, Food Service Operations,Avi Publishing Co.
- Colleer.M.,Sussams.C.,Murray.J.,(1990), Success in Principles of Catering, John Murray Pub.Ltd., London
- Jitendra M.D.(1999), Catering Management, Dominant Publishers And Distributors, New Delhi.

SEMESTER III

FOOD MICROBIOLOGY HS830302

Total Credits: 3
Total Hrs: 25

Objectives

To enable the students to:

- Acquire an elementary knowledge about microorganisms
- Understand the role of microbes in contamination and spoilage of different foods and measures of controlling microbial growth.

MODULE I

Culture Media: Common ingredients, characteristics and classification. Culture techniques, Observation of Microorganism: Direct and Indirect methods, enumeration of micro organisms.

Sanitation microbiology: swab test on flour utensils, filling machine, and employees.

Measuring effectiveness of anti microbial agents, phenol coefficient, TDP, TDT, DRT(D-value, z-value, F-value).

MODULE II

Microbial Contamination and spoilage of Animal products: sources of contamination, types of spoilage, and preservation methods

A) Milk and milk products

B) Fish and other sea foods

C) Meat and poultry

D) Egg

MODULE III

Microbial Contamination and spoilage of other foods: sources of contamination, types of spoilage, and preservation methods of the following:

A) Cereals and cereal products

B) Fruits and Vegetables

C) Canned Foods

D) Fats and Oils

E) Sugar and Sugar Products

MODULE IV

Emerging technologies for the reduction of pathogenic and spoilage organisms in food, role of biopreservation in improving food safety, LAB as biopreservative, Bacteriocins - role of bacteriocins in food science, its antimicrobial activity, Anti Microbial Peptide (AMP)

MODULE V

Microbial behaviour against the newer methods of food processing, Adoption and resistance development, Microbes as test organisms, as sensors and as tools for future applications in energy production and food and non food industrial products.

MODULE VI

Hazard Analysis and Risk Assessment: Physical hazards (metals, glass, etc), Chemical hazards (food additive, natural toxins, pesticides, antibiotics, hormones, heavy metals and packaging components), Biological hazards (epidemiology of biological pathogens: virus, bacteria and fungi), Evaluation of the severity of a hazard Controlling Food Hazards. Hazard Analysis Critical Control Point (HACCP).

References

- Frazier,W.C. &Westhoff,D.C.(1997), Food Microbiology, Tata McGraw-Hill publishing company Ltd, New Delhi.
- James,M.J. (2000) Modern Food Microbiology 6th edition, Aspen Publications and distributors, New Delhi
- Mani,A., Selvaraj,A.M., Narayanan.L.M , Arumugham.N.(1999), Microbiology-General and Applied, Saras publications , Nagarcoil.
- Roday,S. (1999) Food Hygiene and Sanitation, Tata Mc Graw-Hill Publishing Co. Ltd, New Delhi.
- Powar,C.B and Daginawala, H.F. (1999) General Microbiology , Vol.II , Himalaya Publishing House.
- Khetarpaul, N. (2009) Food microbiology, Daya publishing house, New Delhi.

SEMESTER III

ADVANCED TECHNIQUES IN FOOD PRESERVATION HS840301

Total Credits:3
Total Hrs: 25

Objectives

To enable the students to-

- To understand the different techniques of food preservation.
- To acquire knowledge about the emerging trends in food preservation.

MODULE I

Traditional processing methods: Drying, salting, sugaring, pickling, smoking, fermentation, and concentration.

Modern processing techniques: Application of high temperature, low temperature, high voltage pulse technique, irradiation.

Canning: advantages and disadvantages

MODULE II

Use of natural antimicrobials: Bacteriocins, structure and function, genetics of bacteriocins from LAB, application of bacteriocins in food systems natural antimicrobials from animals, plants and microbial sources, Antioxidants from oilseeds, cereals, grain, legumes, fruits, vegetables, herbs and spices, improving antioxidant functionality.

MODULE III

High intensity light: Process and equipment, microbial inactivation. Ultra sound as preservation technology- inactivation of bacteria pulsed electric fields. Hydrostatic pressure treatment, industrial high pressure system, commercial application, high pressure freezing.

MODULE IV

Edible coatings: Development of edible coating, functioning of edible coatings, selecting edible coating, gas permeation properties of edible coatings, wet ability and coating effectiveness. Plastic packaging in retort operations, variables during processing, strength and weakness of batch retorts, continuous retorts, developments in conventional freezer technology, pressure in freezing, development in packaging, cryoprotectants.

MODULE V

Hurdle technology: Hurdle effect, behavior of microorganisms in quality of foods, assessing preservation requirements: modeling food spoilage, developing spoilage models, measurement techniques, constructing models, application of spoilage models, limitation of models, thermal preservation.

References

- Kalia, M., Sood, S. (2000), Food Preservation and Processing, Kalyani Publishing, New Delhi.
- Potter, N.N, Hotchkiss, J.H. (1996), Food Science C.B.S. Publication, New Delhi.
- Vangarde S.J., Wood Burn, M. (1999), Food Preservation and Safely, Surabhi Publications, Jaipur.

SEMESTER III

FOOD SAFETY AND QUALITY ASSURANCE HS840302

Total Credits:3
Total Hrs: 25

Objectives:

To enable the students to:

- Gain an insight on the importance of food safety in the present scenario
- Understand the legal procedures adopted in food industry to prevent food borne illnesses

MODULE I

Food safety concept: Importance of food safety in the food processing industry. Risk, classification, National and international food regulatory agencies, General food laws and food safety regulations, Nutritional labeling regulation (mandatory and optional nutrients, nutritional descriptors and approved health claims).

MODULE II

Microbial contamination (including cross-contamination/ indirect contamination) Physical, Chemical and Allergen contamination.

MODULE III

Food Safety Management Tools: Definitions and importance, Good Manufacturing Practices (GMPs), Good Hygienic Practices (GHP), Good Agricultural Practices(GAP), Good Veterinary Practice (GVP), ISO series. Storage and distribution of food, sanitation and safety in food services. TQM - concept and need for quality, components of TQM, Kaizen. Risk Analysis and Accreditation and Auditing.

MODULE IV

Hygiene and Sanitation in Food Service Establishments: Pest Control Program, Personal Hygiene, Supplier Control, Sanitary Design of Equipment and Infrastructure, Procedures for Raw Material Reception, Storage and Finished Product Loading, Sanitation Program. Sanitation Standard Operating Procedures (SSOPs), Education and Training Program. Water in the food industry, Water sources, Water uses, Water quality, Treatments, Cleaning and sanitation, Cleaning agents, Sanitizing agents, Equipment and systems, Evaluation of sanitation efficacy.

MODULE V

Safety concerns in food packaging: Principles in the development of safe and protective packaging, food packaging materials and their properties, safety assessment of food packaging materials. Special problems in packaging of food stuffs, consideration in the packaging of perishables and processed foods. Evaluation of packaging materials, package performance, packaging equipments, standards and regulation. Shrink packaging, bar coding, aseptic and retortable pouches. Aluminum as packaging material, Bio degradable packaging, active packaging.

References

- Early, R. (2005): Guide to Quality Management Systems for the Food Industry, Blackie,Academic and professional, London.
- Gould, W.A and Gould, R.W. (2006). Total Quality Assurance for the Food Industries, CTI Publications Inc. Baltimore.
- Pomeraz, Y. and MeLoari, C.E. (2006): Food Analysis: Theory and Practice, CBS

publishers and Distributor, New Delhi.

- Bryan, F.L. (2000): Hazard Analysis Critical Control Point Evaluations- A Guide to Identifying Hazards and Assessing Risks Associated with Food Preparation and storage , World Health Organisation, Geneva.
- FSSAI, FSIS, EU and FAO website for updates.

SEMESTER III
THERAPEUTIC NUTRITION PRACTICAL HS030303

Total Credits: 4
Total Hrs: 25

Objectives
To enable the students to:

- Learn and apply the principles of dietary modifications.
- Plan and prepare diet for different disease conditions.

MODULE I

Planning and preparation of routine hospital diets: Pre and post operative diets - clear fluid diet, full fluid diet and soft diet

Diet in upper and lower gastro intestinal disorders

a) GERD with cholelithiasis

b) Gastro intestinal resection

c) Pancreatititis

d) Irritable bowel disorder

e) Constipation with hyperthyroidism and diabetes

MODULE II

Dietary management for metabolic diseases

a) Diabetes Mellitus with insulin therapy

b) Diabetes with CVD and hypertension

c) Obesity with gout

d) CVD with COPD

MODULE III

Dietary management in liver disorders:

a) Hepatititis

b) Liver cirrhosis

c) Diet in liver transplantation

MODULE IV

Dietary management in Renal diseases:

a) Diabetic Nephropathy

b) Acute renal failure with hyperkalemia

c) Renal calculi (urates, oxalates, carbonates and phosphates)

d) Renal transplantation

MODULE V

Market Survey of Commercial Nutritional Supplements – enteral and parenteral feeds, infant formulas, health beverages, neutraceuticals, ergogenic aids

References

- Garrow, J.S, James, WPT and Ralph, A. (2000).Human Nutrition and Dietetics, 10th edition, Churchill living stone, London.
- Antia, F.P. (1989), Clnical Dietetics And Nutrition, Oxford University press, Mumbai.
- Krause, M.V. and Mahan (1980,), Food, Nutrition and Diet Therapy, Saunders Co; Philadelphia.
- Guthrie, H. A., Picciano M.F. (1995), Human Nutrition, Mosby, St. Louis, Missourie.
- Robinson, C.H., Lawler M.R.(1990), Normal and Therapeutic Nutrition, 7th ed., Macmillan Publ. Co., New York.

- Zaloga, G.P. (1994), Nutrition in Critical Care, Mosby Publications, New York.
- Michael Sharon(1994), Complete Nutrition, Avery Publishing Group, New York

SEMESTER IV

COMMUNITY NUTRITION PRACTICALS HS030401

Total Credits: 5

Total Hrs: 25

Objectives:

- To develop skill in field level application of the techniques of assessing nutritional status.
- To acquire skill in organizing and implementing community nutrition projects.

Course outline:

Module I

Techniques of nutritional assessment

a) Anthropometry – Height, Weight, MUAC, BMI, WHR and Growth monitoring
b) Diet survey – 3 day weighment and 24- hour dietary recall
c) Clinical examination of eyes, hair, nails, skin, lips, tongue, gums, teeth
d) Biochemical methods – Haemoglobin, blood and urine glucose

Module II

Field placement

Planning, implementation and evaluation of a nutrition/ health intervention programme in a community for seven days.

Module III

Field study

Assessment of nutritional status of a specific demographic group using the direct parameters

Module IV

Project

Development of a cost effective nutritious diet suitable for deficiency disorders using local food sources of the community and conduct and evaluate a nutrition education programme.

References

- Dandiya, P.C, Zafer, Z.Y.K and (2003), Health education and community pharmacy, Vallabh Prakashan Printers, New Delhi.
- Khader, V. (2003), Foods – Nutrition and Health, Kalyani Publishers, New Delhi.
- Park, K.(2005), Park's Textbook of Preventive and Social Medicine, Banarsidas Bhanot Publishers, Jabalpur.
- Modern Nutrition in Health and Disesase edited by Maurice B Shils,Moshe Shike.A,Catherine Ross,Benjamin Cabellero,Robert J Cousins, Lippincott Williams al Wilkins 2006.
- Nutrient Requirements and Recomended Dietary allowances for Indians.A report of the expert group of the Indian Council of Medical Research ICMR 2010.
- Public Health Nutrition in Developing Countries Edited by Sheila Chander Vir Woodhead Publishing India.Part I & II. 2011
- Bamji, M.S., Rao, N.P and Reddy, V. (2003), Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
- Gibney, M.J, Margetts, B.M, Kearney, J.M and Arab, L. (2005). Public Health Nutrition, Blackwell Publishing, USA.

SEMESTER IV

HOSPITAL INTERNSHIP HS830403

Total Credits: 3

Objectives

To enable the students to:

- Understand clinical and pathological conditions of various diseases, planning diet, prescription and dietary intervention for the same
- Observe and study the food service management practices.

INSTRUCTION

1. Each student is instructed to take up fifteen case studies in order to familiarize various diseases and dietary management.
2. Assignment – 3
3. Seminar – 3
4. Project report – Presentation and viva

SEMESTER IV

INDUSTRIAL TRAINING HS840403

Total Credits: 3

Objectives

To enable the students to:

- Understand the technology of food processing.
- Observe and study the food processing practices.

INSTRUCTION

1. Assignment – 3
2. Seminar – 3
3. Project report – Presentation and viva

SEMESTER IV

PROJECT HS030402

Total Credits: 4

Objective:

- To inculcate ability in the area of research

CRITERIA

- Project work shall be completed by working outside the regular teaching hours.
- Project work shall be carried out under the supervision of a teacher in the concerned department.
- A candidate may, however, in certain cases be permitted to work on the project in an industrial/ research organizations/ institute on the recommendation of the supervisor.
- There should be an internal assessment and external assessment for the project work in the ratio 1:4.
- The external evaluation of the project work is followed by presentation of the work and viva- voce.

MODEL QUESTION PAPERS

M.Sc. CLINICAL NUTRITION AND DIETETICS

APPLIED HUMAN PHYSIOLOGY HS030101

Time: Three hours **Maximum Weight: 30**

PART A

(Short Answer Type Questions)

Answer any 8 questions out of 10. Each question carries a weight of 1

1. What are the adaptations of small intestine for nutrient absorption?
2. What is the effect of CO_2 level in blood on mechanism of respiration?
3. What is ESR? Write its pathological variations.
4. What are the biochemical and physiological functions of thyroid hormone?
5. What are cytokines? What is its clinical importance?
6. What is GFR and which are the factors affecting GFR?
7. What are the components of a reflex arc?
8. What are the cardiovascular modifications during exercise?
9. What are the non respiratory functions of blood?

10. Write a note on composition and functions of salivary secretions.

(8x 1 = 8)

PART B

Short Essay

Answer any 6 questions out of 8. Each question carries a weight of 2.

11. What is CPR?
12. Which are the different renal function tests?
13. Write a note on the different fluid compartments of the body.
14. Explain the mechanism of action and biochemical functions of thyroid hormone.
15. Explain CNS.
16. Write the pathophysiology behind peptic ulcer and diarrhea.
17. Briefly explain hunger and thirst mechanism.
18. Write a note on gastrointestinal hormones.

(6 x 2 = 12)

PART C

Long Essay Type Questions

Answer any 2 questions out of 4. Each question carries a weight of 5.

19. Explain the different digestive glands and the mechanism of secretion.
20. Write the steps involved in the formation of urine and add a note on the factors affecting urine volume.
21. Explain the different lymphoid organs in human body.
22. Write the mechanism of respiration and the adaptations during exercise.

(2 x 5 =10)

M.Sc. CLINICAL NUTRITION AND DIETETICS

CLINICAL BIOCHEMISTRY HS030102

Time: 3hrs **Maximum: 30 Weightage:**

PART A

Answer any 8 questions. Each question carries a weightage of 1)

1. Law of electron neutrality.
2. Reyes syndrome
3. Differentiate diverticulitis and diverticulosis
4. Lipotropic factors.
5. Biochemical changes in PEM.
6. Buffer systems in the body.
7. Biochemical estimation of ketone bodies in urine.
8. Irritable Bowel Syndrome.
9. Comment on creatine in renal disorders.
10. Action of drugs which are used in hyper secretory conditions of stomach.

(8x1=8)

PART-B

Answer any 6 questions. Each question carries a weightage of 2.

11. Enumerate on constipation and its management.
12. Describe the factors associated with the development of Diabetes.
13. Mention the clinical changes in AIDS.
14. Explain pancreatic function test.
15. Explain the role of body electrolytes in the regulation of electrolyte balance.

16. Give an account of drugs acting on the digestive system.
17. Give an account of disorders of liver and gall bladder.
18. Write a note on the drug interactions in renal diseases.

(6x2=12)

PART C

Answer any 2 questions. Each question carries a weightage of 5.

19. Write a note on the clinical significance of carbohydrate metabolism.
20. Pathology and treatment available for gastro intestinal diseases.
21. Regulation of acid base balance.
22. Treatment options in kidney disorders. **(2x5=10)**

M.Sc CLINICAL NUTRITION AND DIETETICS

THERAPEUTIC NUTRITION- HS030103

Time: 3Hrs **Maximum Weight: 30**

PART A

I. ***Answer any 8 questions not exceeding one page. Each question carries 1 weightage.***

1. Write short note on diet counselling.
2. Discuss enteral formulas.
3. Comment on Ulcerative colitis.
4. What is typhoid? What are the causes and symptoms?
5. Differentiate between anorexia nervosa and bulimia nervosa.
6. Comment on Glycemic index.
7. What is elimination diet?
8. Give the classification of obesity.
9. Write a short note on lactose intolerance.
10. What is GDM? **(8 x1 = 8 weightage)**

PART B

II. ***Answer any 6 questions not exceeding three pages. Each question carries 2 weightage*.**

11. What is diet therapy? Explain its purpose. How can you modify normal diet to therapeutic diet?
12. What is constipation? Write about the causes and dietary management.
13. Briefly explain enteral nutrition and its different access.
14. What is AIDS? Give the relationship between malnutrition and AIDS.
15. Brief on the causes and dietary management of underweight.
16. What are the complications of diabetes?
17. What is food allergy? How can you diagnose it?
18. Write about gastritis, causes, symptoms and dietary management.

(6x 2= 12 weightage)

PART C

III. ***Answer any 2 questions. Each question carries 5 weightage.***

19. Explain peptic ulcer. What are the causes and symptoms? Give its dietary management
20. What is diabetes mellitus? Discuss the types, symptoms and dietary management
21. Explain the role of dietitian in hospital and community.
22. Explain the types of obesity, causes and dietary management.

(2 x 5 = 10 weightage)

M.Sc CLINICAL NUTRITION AND DIETETICS

ADVANCED FOOD SCIENCE –HS030104

Time: 3Hrs **Maximum Weight: 30**

PART A

Short Answer

I. Answer any 8 questions. Each question carries 1 weight.

1. Explain the toxic constituents present in pulses.
2. What are the different types of convenient foods?
3. Write a note on rigor mortis.
4. What are the methods to evaluate the quality of egg?
5. Differentiate between enzymatic and non-enzymatic browning?
6. Write a note on different types of coffee beverage?
7. Differentiate between gelatinization and dextrinization.
8. Comment on egg white proteins.
9. Define adulteration**.** Briefly explain three types of adulteration.
10. Comment on uses of salt. **(8 x 1 =** 8 **weight)**

PART B

Short Essay

II. Answer any 6 questions. Each question carries 2 weight.

11. What are the different proteins present in egg white and egg yolk?
12. Draw and briefly explain the structure of a cereal grain?
13. What is cheese? How is it manufactured?
14. Write a note on different types of salt and its uses?
15. How does cooking vegetables affect its vitamin content? How can this loss be minimized or prevented?
16. Write a note on denaturation of proteins and properties of colloids.
17. What are flour improvers? Write a note on tests for flour quality.
18. Explain the importance of HACCP.

(6 x 2 = 12 **weight)**

PART C

Long Essay

III. Answer any 2 questions. Each question carries 5 weight

19. Explain different types of fermented and non fermented milk products available in the market?
20. Explain wheat under the following heads:
    a) Types
    b) Structure and composition
    c) Milling.
21. Explain the importance of sensory evaluation in food industry and different types of sensory tests?
22. Explain pulses under the following heads:
    a) Processing
    b) Antinutritional factors.

(2 x 5 = 10 **weight)**

M.Sc CLINICAL NUTRITION AND DIETETICS

NUTRIGENOMICS & PHARMACOGENOMICS- HS030201

Time: 3Hrs **Maximum Weight: 30**

PART A

Short Answer

I. Answer any 8 questions. Each question carries 1 weight.

1. Define nutrigenomics and explain the functions of nutrigenomics.
2. What is the use of nanotechnology in functional food industry?
3. Comment on ISSN.
4. What is the use of antidotes?
5. Explain pharmacodynamics?
6. Differentiate between pre and probiotics.
7. What are immunostimulants?
8. Explain Nutraceuticals and its classification.
9. Explain development of functional foods.
10. Explain natural occurrence of phytochemicals.

(8x1=8)

PART B

Short Essay

II. Answer any 6 questions. Each question carries 2 weight.

11. Explain the benefits and risk of nutrigenomics.
12. What are the different types of probiotics and explain the health benefits of probiotics?
13. Comment on the effect of drug on nutritional status.
14. Describe the signs and symptoms of overdose of drugs.
15. Explain the health benefits of phytochemicals.
16. How will you detect and quantify poisons?
17. Explain drug nutrient interaction.
18. Explain recent trends in prebiotics.

(6x2=12)

PART C
Long Essay

III. Answer any *two* questions, not exceeding *three* pages. Each question carries a weight of 5:

19. Classify nutraceuticals and explain its relevance in the management of diseases.
20. Explain the use of bioactive compounds in health care.
21. Describe the recent advances in pre and probiotics.
22. Explain the therapeutic implications of drugs. (5x2=10)

M.Sc CLINICAL NUTRITION AND DIETETICS

PUBLIC HEALTH NUTRITION - HS030202

Time: 3Hrs **Maximum Weight: 30**

PART A

Short Answer

I. Answer any 8 questions. Each question carries 1 weight.

1. What is meant by India state Hunger Index (ISHI)?
2. Explain food fortification.
3. Explain the anthropometric methods needed to assess PEM.
4. Write on consequences and preventive measures of Vitamin A deficiency.
5. Write a short note on indirect methods of nutritional assessment.
6. Explain principles of nutrition education.
7. Explain epidemiological methods.
8. Explain IDD
9. Explain mid day meal programme.
10. What are GM foods?

(8x1=8)

PART B

Short Essay

II. Answer any 6 questions. Each question carries 2 weights.

11. What are the modern methods of improvement or nutritional quality of food?
12. Discuss about the risk factors for non Communicable diseases.
13. Write a brief note on VADD.
14. Elucidate the role of ICDS, SLP and ANP.
15. Explain methods of nutrition education.
16. Explain the role of mass media in health education.
17. Discuss about **r**ole of nutrition and health in national development.
18. How can we improve the nutritional status of a community?

(6x2=12)

PART C
Long Essay

III. Answer any 2 questions. Each question carries 5 weights.

19. Write an essay on various methods used in assessment of nutritional status.
20. What are the major nutritional problems in India and explain its prevalence, consequences and prevention?
21. Explain nutrition policies and programmes in India.
22. What is nutrition education and discuss in detail about theories of nutrition education?

(5x2=10)

MSc CLINICAL NUTRITION AND DIETETICS

NUTRITION THROUGH LIFE CYCLE –HS030203

Time: 3Hrs **Maximum Weight: 30**

PART A

Short Answer

I . Answer any 8 questions. Each question carries 1 weight

1. What are the complications of pregnancy?
2. What are the factors affecting breast feeding?
3. Write a note on low cost supplementary foods.
4. What is meant by weaning and explain its importance?
5. Explain the nutritional problems of elderly.
6. Write a note on anaemia in adolescents.
7. Describe the points to be considered in planning diets for school children.
8. Comment on growth monitoring.
9. What is ADHD?
10. Comment on KMC. **(8 x 1 =** 8 **weight)**

PART B

Short Essay

II. Answer any 6 questions. Each question carries 2 weight

11. What are the factors affecting breast feeding? Explain the effect of breast feeding on maternal and child health
12. Explain the physiological changes of pregnancy.
13. What are the reasons for malnutrition during old age? Bring out the importance of Calcium during old age.
14. What is menu planning and explain the principles of planning a menu.
15. Comment on BFHI, KMC Programme and milk banking.
16. Explain the nutritional problems during school going period.
17. What are the health problems of adults?
18. Explain the merits &demerits of institutionalization of elderly. **(6x 2= 12 weight)**

PART C

Long Essay

III. Answer any 2 questions. Each question carries 5 weight .

19. What are the complications of pregnancy? Explain the importance of nutrition during and prior to pregnancy.
20. Explain the nutritional management and feeding of LBW and Pre-term infants?
21. Explain the nutritional requirements and nutritional problems of toddlers.
22. Explain the nutritional problems of adolescents? Plan a day's menu for an anaemic Adolescent girl.

(2 x 5 = 10 weight)

M.Sc CLINICAL NUTRITION AND DIETETICS

MACRONUTRIENTS -HS030204

Time: 3Hrs **Maximum Weight: 30**

PART A

Short Answer

I . Answer any 8 questions. Each question carries 1 weight

1. Write about effects of dehydration.
2. What is meant by resistant starch?
3. Write about the latest concepts in energy requirements for different age groups.
4. Write about storage of protein in body.
5. Which are the different types of fats in the food?
6. Write down the functions of carbohydrates.
7. Write about nitrogen balance.
8. Briefly explain the digestion of fat.
9. What is meant by DEXA?
10. Write about the functions and deficiency of sodium. **(8 x 1 =** 8 **weight)**

PART B

Short Essay

1I.Answer any 6 questions. Each question carries 2 weight.

11. What is BMR? Explain the factors affecting BMR.

12. Explain the specific functions of amino acids.

13. Explain the disorders of lipid metabolism.

14. Explain the hormonal control of carbohydrate homeostasis.

15. Explain the role of lipoproteins, cholesterol and triglycerides in health.

16. Explain the regulation of sodium-pottassium balance.

17. Explain protein synthesis.

20. 18. Explain different methods of studying body composition. **(6x 2= 12 weight)**

PART C

Long Essay

III. Answer any 2 questions. Each question carries 5 weight.

19. Explain dietary fiber under the following heads:

    a) Components

    b) Physiological and metabolic effects.

    c) Role of fiber in prevention of diseases.

20. Explain the classification, functions, digestion, absorption and utilization of fat.

21. Write about water balance. Which are the factors affecting water balance?

22. Explain the classification, functions, digestion, absorption, transport and utilization of protein. **(2 x 5 = 10 weight)**

M.Sc CLINICAL NUTRITION AND DIETETICS

MICRONUTRIENTS- HS030205

Time: 3Hrs **Maximum Weight: 30**

PART A

Short Answer

I . Answer any 8 questions. Each question carries 1 weight

1. Write down the functions of vitamin K.
2. What is meant by pernicious anaemia?
3. Write down the functions of phosphorus.
4. Write on calcium-phosphorus ratio.
5. What is the importance of selenium?
6. Write down the functions of vitamin C.
7. Write about vitamin-vitamin interrelationship.
8. What is rickets?
9. Write about fluorosis.
10. Write about the functions and deficiency of zinc.

(8 x 1 = 8 **weight)**

PART B

Short Essay

1I.Answer any 6 questions. Each question carries 2 weight.

11. Explain the functions, absorption and deficiency of vitamin K.
12. Explain the sources, functions, absorption and deficiency of Magnesium.
13. Explain deficiency and toxicity of iron.
14. Explain mineral-vitamin interrelationship.
15. Explain the deficiency and toxicity of iodine.
16. Explain the functions, sources, requirements, absorption and deficiency of vitamin E
17. Explain the functions and deficiency of vitamin C.
18. Explain the sources, functions, absorption and deficiency of phosphorus.

(6x 2= 12 weight)

PART C

Long Essay

III. Answer any 2 questions. Each question carries 5 weight.

19. Briefly explain the metabolic interrelationship of micro and macro nutrients.
20. Explain the functions, absorption and deficiency of calcium.
21. Briefly explain the distribution, utilization, sources, requirements, deficiency and toxicity of micro minerals and trace elements.
22. Explain the functions, sources, absorption and deficiency of the following vitamins;
    a) Thiamine
    b) Vitamin B_{12}.
    c) Niacin.

(2 x 5 = 10 weight)

M.Sc CLINICAL NUTRITION AND DIETETICS

NUTRITION IN CRITICAL CARE HS030301

Time: 3Hrs **Maximum Weight: 30**

PART A

I. ***Answer any 8 questions not exceeding one page. Each question carries 1weightage***

1. Write about the importance of pre and post operative diet.
2. Describe the development of cancer.
3. Write about Parkinson's disease.
4. Discuss Myocardial Infarction.
5. Differentiate between Cholecystitis and Cholelithiasis
6. Briefly describe ESRD
7. Comment on Systemic Lupus Erythomatous
8. Comment on Angina pectoris
9. What is zollinger Ellison syndrome
10. Brief on nephrosis

(8x 1 = 8 weightage)

PART B

II. ***Answer any 6 questions not exceeding three pages. Each question carries 2 weightage.***

11. Explain Multiple Organ Dysfunction Syndrome.

12. Write on tumor markers.
13. Explain the nutritional management of patient with coronary artery disease.
14. Write about the causes, symptoms and dietary modification in hepatitis.
15. Explain dialysis.
16. Explain the medical nutrition therapy in COPD
17. Write about the role of nutrients in immune promotion.
18. Explain hypertension, causes, types and dietary management.

(6x 2 =12weightage)

PART C

III. ***Answer any 2 questions. Each question carries 5 weightage.***

19. Write about the medical nutrition therapy in Sepsis and Injury.
20. . Explain the causes of cancer and nutritional implications of cancer therapy.
21. Explain the causes, symptoms and dietary management of Atheroslerosis.
22. . Explain (a) Nephrolithiasis, causes, dietary management
    (b) Kidney transplantation.

(2 x 5 = 10 weightage)

M.Sc CLINICAL NUTRITION AND DIETETICS

RESEARCH METHODOLOGY AND STATISTICS -HS030302

Time: 3Hrs **Maximum Weight: 30**

PART A

Short Answer

Answer any *eight* questions, not exceeding *one* page. Each question carries a weight of 1:

1. Research.
2. Note taking
3. Arbitrary research
4. INFLIBNET.
5. Bibliography.
6. Statistics.
7. Correlation.
8. Hypothesis.
9. Primary data collection.
10. Observation schedule.

(8x1=8)

PART B

Short Essay

Answer any *six* questions, not exceeding *two* pages. Each question carries a weight of 2:

11. Explain the steps in report writing.
12. Explain the role of internet in research.
13. Explain the following
    a) Rating Scale. b) Pantry Audit.
    c) Distributor Audit. d) Warranty Card.
14. Explain the importance of review of literature.
15. Explain the various methods for studying correlation.
16. Calculate Karl Pearson's co-efficient of correlation

X	78	89	96	69	59	79	68	61
Y	125	137	156	112	107	136	123	108

Assume 69 and 112 as the mean values for X and Y respectively.

17. Explain about experimental design.
18. Explain the importance of statistics. (6x2=12)

PART C
Long Essay

Answer any *two* questions, not exceeding *three* pages. Each question carries a weight of 5:

Explain the different types of research.

20. Explain the structure and components of scientific report. Write down the precautions for report writing.
21. Explain the.tools and methods of data collection.
22. What is regression? Write about regression lines and regression equations.
    From the following data find the regression equation of y on x.

x	2	3	4	5	6
y	3	5	4	8	9

23. What is probability? Explain the different types of probability distributions

(5x2=10)

M.Sc CLINICAL NUTRITION AND DIETETICS
ORGANISATION AND MANAGEMENT OF DIETARY- HS830301

Time: 3 Hrs **Max.Wt:30**

Part A

Answer any **eight** *questions not exceeding* **one page**

Each question carries a weightage of **one**

1. What are the functions of management?
2. How are tools of management classified?
3. Write a note on induction.
4. Comment on standardization of recipes.
5. How can you effectively manage left over foods?
6. Write a note on work simplification?
7. What are the functions of a food and beverage manager?
8. Write a note on motivation.
9. Comment on the process of evaluation
10. Which are the different types of kitchen. (8 x 1 = 8 weightage)

Part B

Answer any **six** *questions not exceeding* **three pages**

Each question carries a weightage of **two**

11. Write a note on organization process.
12. Comment on modern methods of performance appraisal.
13. What are the factors to be considered while storing perishable foods?
14. Which are the different types of accidents in food service area?

15. Define organization. Which are the different types of organization?
16. Explain the process of selection.
17. Comment on different food holding techniques.
18. Explain the process of stepping up a recipe.

(6 x 2 = 12 weightage)

Part C

Answer any **two** *questions not exceeding* **five pages**

Each question carries a weightage of **five**

19. Explain different types of kitchen and factors to be considered while designing a kitchen.
20. Discuss different methods of appraisal of employees.
21. Explain the sources, merits, demerits and process of recruitment.
22. Comment on different food production system. (2 x 5 = 10 weightage)

M. Sc. CLINICAL NUTRITION AND DIETETICS

FOOD MICROBIOLOGY-HS830302

Time: 3Hrs **Maximum Weight: 30**

PART A

(Short Answer Type Questions)

Answer any 8 questions out of 10. Each question carries a weight of 1

1. What are the common ingredients used for the preparation of culture media?
2. Write a note on non-food industrial products.
3. LAB as preservative
4. What are the sources of contamination in cereals and its products?
5. Which are the organisms that cause ropiness?
6. Write a note on effect of microorganisms on the quality of fish.
7. Describe the method for the removal of microorganism from cream?
8. Write a note on factors affecting survival and growth of microorganisms in food.
9. Write a note on bacteriological examination of water.
10. Write a note on sources of contamination of milk.

(8x 1= 8)

PART B

Short Essay

Answer any 6 questions out of 8. Each question carries a weight of 2.

11. Describe on the techniques used for improving the shelf life of dairy products.
12. How will you measure the effectiveness of anti-microbial agents?
13. Explain the different culture techniques.
14. Describe the role of bacteriocins in food science.
15. Explain the contamination and spoilage in sugars.
16. Explain the changes caused by microorganisms in egg.
17. Write on microbial behavior against the newer methods of food processing.
18. Explain the spoilage and preservation of fruits.

(6 x 2 = 12)

PART C

Long Essay Type Questions

Answer any 2 questions out of 4. Each question carries a weight of 5.

19. Explain the direct and indirect methods to observe microorganisms.
20. With reference to fruits and vegetables, explain the sources of contamination, types of spoilage and preservation methods.
21. Describe the emerging technologies for the reduction of pathogenic and spoilage organisms in food.
22. Elaborate on the microbial activity and preservation of meat.

(2 x 5 =10)

M.Sc CLINICAL NUTRITION AND DIETETICS
ADVANCED TECHNIQUES IN FOOD PRESERVATION- HS840301

Time: 3Hrs **Maximum Weight: 30**

PART A

Short Answer

Answer any *eight* questions, not exceeding *one* page. Each question carries a weight of 1:

1. Bacteriocins.
2. Canning.
3. Cryoprotectants
4. Thermal preservation.
5. High pressure freezing.
6. Irradiation.
7. Hurdle Effect
8. Edible coating..
9. Fermentation.
10. Smoking.

(8x1=8)

PART B
Short Essay

Answer anysix questions, not exceeding *two* pages. Each question carries a weight of 2:

11. Explain the applications of bacteriocins in food systems.
12. Write about the commercial application of industrial high pressure system.
13. Explain the development and functioning of edible coatings.
14. Explain the plastic packaging in retort operations.
15. Explain hurdle technology.
16. Explain the behaviour of microorganisms in quality of foods.
17. ..Explain canning. Write about the advantages and disadvantages
18. Write on microbial inactivation using high intensity light.

(6x2=12)

PART C
Long Essay

Answer any *two* questions, not exceeding *three* pages. Each question carries a weight of 5:

19. Explain the different antioxidants from oilseeds, cereals, grain, legumes, fruits, vegetables, herbs and spices.
20. Explain the use of ultra sound as preservation technology-
21. Explain edible coating under the following heads,
    a) Development of edible coating,
    b) Functioning of edible coatings,
    c) Selection of edible coating,
    d) Gas permeation properties.
22. Explain the structure, functions and genetics of bacteriocins. Write about the application of bacteriocins in food systems.

(5x2=10)

M.Sc CLINICAL NUTRITION AND DIETETICS

FOOD SAFETY AND QUALITY ASSURANCE- HS840302

Time: 3Hrs **Maximum Weight: 30**

PART A

Short Answer

I. Answer any 8 questions. Each question carries 1 weight.

1. List the importance of food safety in food processing industry.
2. What is GMP?
3. Write a note on Kaizen.
4. Mention the importance of pest control program?
5. What is active packaging?
6. List the importance of personal hygiene in food safety.
7. Give the principle of HACCP.
8. What is GHP?
9. Explain microbial contamination.
10. What are the various cleaning agents used in food service establishments?

(8x1=8)

PART B

Short Essay

II. Answer any 6 questions. Each question carries 2 weight.

11. Describe cleaning and sanitizing agents and measures to check the sanitation efficacy.
12. What are the physical hazards present in food?
13. Explain the components of TQM.
14. Explain general food laws.
15. What is the importance of sanitary design of equipments in imparting food safety?
16. Describe on SSOPs?
17. Explain the problems encountered in packaging of food.
18. Explain importance of personal hygiene in food service establishments.

(6x2=12)

PART C
Long Essay

Answer any *two* questions, not exceeding *three* pages. Each question carries a weight of 5:

19. Explain the role of national and international food regulatory agencies in food safety.
20. Describe briefly on education and training programs in implementing food safety.
21. Elaborate on the safety concerns in food packaging.
22. Explain on the food safety management tools? (2x5=10)