SINGHANIA UNIVERSITY

CURRICULUM AND SYLLABUS

B.Sc HUMAN NUTRITION AND DIETETICS

CONTENTS

1.INTRODUCTION

Nutrition plays a primary role in growth, development, health and fitness. Maintaining appropriate nutrition throughout life can prevent, or at least delay the onset of nutrition related diseases. Food is essential for our bodies to:

- Develop, replace and repair cells and tissues;
- Produce energy to keep warm, move and work;
- Carry out chemical processes such as the digestion of food; Protect against, resist and fight infection and recover from sickness.

The food or liquids affect our body and health because each food or liquid contain particular nutrients which is very necessary for our physical and mental growth. A particular level of any particular nutrient is essential for our body. So we should know that what food we have to take, how much and what type of nutrients are present in a particular food. The body cannot function properly if one or more nutrients are missing. A healthy and balanced diet provides foods in the right amounts and combinations that are safe and free from disease and harmful substances.

Whenever we take any food or nourishing liquids, our body digests and absorbs the simple butessentialminerals, vitamins, fats, proteins, carbohydrates, fats and water from these food or nourishing liquids and converts it into the bloodstream and energy that help our body to grow and keep it healthy The nutrition value is more important for any individual's health. The food or liquids whenever we take it affect our body and health as well both. So it is very important that we should be more aware of the foods or liquids whatever we take in our daily life. A large number of diseases occur only due to wrong diet.

Prevention is better than cure. The earlier a person starts to eat a healthy and balanced diet, the more he or she will stay healthy. Once weight has been lost it may be difficult to regain it because of tiredness and lack of appetite.

The UG programme in Clinical Nutrition & Dietetics gives special attention to the clinical aspects. An integration of theory, practical, internship and

community work aim at equipping the students the necessary proficiencies for a wide variety of careers.

2.AIMS AND OBJECTIVES

AIMS:

- 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 enable them to pursue higher education and research in Clinical Nutrition and Food Science .

3.SCHEME

- Credit Transfer and Accumulation system can be adopted in the programme. Transfer of Credit consists of acknowledging, recognizing and accepting credits by an institution for programmes or courses completed at another institution. The Credit Transfer Scheme shall allow students pursuing a programme in one University to continue their education in another University without break.
- A separate minimum of 30% marks each for internal and external (for both theory and practical) and aggregate minimum of 40% are required for a pass for a paper. For a pass in a programme, a separate minimum of **Grade D** is required for all the individual papers. If a candidate secures **F Grade** for any one of the paper offered in a Semester/Programme, **only F grade** will be awarded for that Semester/ Programme until he/she improves this to **D Grade** or above within the permitted period.
- Students who complete the programme with 'D' grade in the "Regulations for Under Graduate Programmes under Choice Based Credit System 2016"will have one betterment chance within 12 months, immediately after the publication of the result of the whole programme.
- Students discontinued from previous regulations, CBCSS 2013, can pursue their studies in "Regulations for Under Graduate Programmes under Choice Based Credit System 2016"after obtaining readmission. These students have to complete the programme as per "Regulations for Under Graduate Programmes under Choice Based Credit System 2016".

4.COURSE DESIGN

1	Programme Duration	3 YEARS
2	Total Credits required for successful completion of the Programme	120
3	Credits required from Common Course I	8

5.ELIGIBILITY CRITERIA FOR ADMISSION

- +2 or equivalent with any three of the following science subjects: physics, chemistry, biology, home science. Selection will be based on academic excellence.
- Eligibility for admission, norms for admission and reservation of seats for various Undergraduate programmes shall be according to the regulations framed/orders issued by the University in this regard, from time to time.

6. DURATION OF THE COURSE

- The duration of U.G. programmes shall be ***3 YEARS***.

- A student may be permitted to complete the Programme, on valid reasons, within a period of 3 YEARS from the date of commencement of the programme.

7. PROJECT EVALUATION

All students are to do a **project in the area of core course.** This project can be done individually or in groups (not more than five students) for all subjects which may be carried out in or outside the campus. Special sanction shall be obtained from the Vice-Chancellor to those **new generation programmes** and programmes on **performing arts** where students have to take projects which involve larger groups. The report of the project in duplicate is to be submitted to the department at the 3 YEAR and are to be produced before the examiners appointed by the University. External Project evaluation and Viva / Presentation is compulsory for all subjects and will be conducted at the end of the programme.

FIRST YEAR

yearly	Course type	Course code	Course title	Hours/week	credit	mark
1	Common	English I	5	4	80	20
	CN1CRT01	BASIC NUTRITION	4	4	80	20
	CN1CRT02	BASIC DIETETICS	4	3	80	20
	CN1CRT03	FAMILY MEAL MANAGEMENT I	4	3	80	20
	CN1CMT01	FUNDAMENTALS OF BIOCHEMISTRY	4	3	80	20
	CN1CMT02	HUMAN ANATOMY AND PHYSIOLOGY I	4	3	80	20
TOTAL			**25**	**20**	**480**	**120**

SECOND YEAR

yearly	Course type	Course code	Course title	Hours/week	credit	mark
2	Common	English II	5	4	80	20
	CN2CRT04	ADVANCED NUTRITION	4	4	80	20
	CN2CRT05	CLINICAL NUTRITION	4	3	80	20
	CN2CRT06	FAMILY MEAL MANAGEMENT II	4	3	80	20
	CN2CMT03	GENERAL BIOCHEMISTRY	2	2	80	20
	CN2CMP01	BIOCHEMISTRY PRACTICAL I	2	1	80	20
	CN2CMT04	HUMAN ANATOMY AND PHYSIOLOGY II	2	2	80	120
	CN2CMP02	HUMAN PHYSIOLOGY PRACTICAL I	2	1	80	20
TOTAL	25	English II	20	640		120

THIRD YEAR

yearly	Course type	Course code	Course title	Hours/week	credit	mark
3	CN3CRT07	THERAPEUTIC NUTRITION	4	3	80	20
	CN3CRT08	FOOD COMMODITIES I	4	3	80	20
	CN3CRT09	COMMUNITY NUTRITION	4	3	80	20
	CN3CRP01	THERAPEUTIC NUTRITION I	1	1	80	20
	CN3CRP02	COMMUNITY NUTRITION	2	2	80	20
	CN13CMT05	NUTRITIONAL BIOCHEMISTRY	5	4	80	20
	CN3CMT06	HUMAN ANATOMY AND PHYSIOLOGY III	**5**	**4**	**80**	**20**
TOTAL			25	20	560	140

YEAR I

BASIC NUTRITION

CORE **CN1CRT01**

Credit: 4 Hours/week : 4

Objectives

To enable the students to:

- To understand the relation between nutrition and health.
- To acquire knowledge about the main nutrients and its functions in the body.
- To understand the modifications in nutrient and dietary requirement for various diseases.

Module I

Introduction to Nutrition: Health, Food, Functions of food, Nutrients, Nutrition, Scope of nutrition, Basic four food groups, Food Pyramid, My Plate, Nutritional status, Visible symptoms of good health, Malnutrition.

Module II

Carbohydrates: Composition, Classification, functions, Sources, digestion, absorption and transport. Components of dietary fibre, Role of fiber in health and disease.

Protein: Composition, classification, functions, sources, requirements, digestion, absorption and transport, protein quality evaluation.

Lipids: Composition, Classification, functions, sources, requirements, digestion, absorption and transport.

Module III

Water and Electrolytes: Water, Sodium, Potassium: Distribution of water and

Electrolytes, Functions, Sources, Requirements, Sodium - Potassium balance, Mechanism of Water Regulation, Water intoxication and dehydration, Water and electrolyte balance

Module IV

Energy: Unit of energy, sources, determination of energy expenditure, energy value of foods, Measurement of total energy requirement, Resting energy expenditure, Physical Activity Level (PAL), Factors affecting PAL, Basal Metabolic Rate, determination of BMR, SDA.

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

BASIC DIETETICS

CORE **CN1CRT02**Credit: 3 Hours/week: 4

Objectives

To enable the students to-

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

Module I

Dietitian and diet counseling : Role of Dietitian, specializations of dietitian, Nutrition and diet clinic, Patient check up and Nutrition counseling- directive and non directive, Strategies and goals of counseling and follow up. Psychology of feeding the patient.

Computer application: use of computers by Dietitian, Dietary computations, Dietetic management, education/training.

Module II

Basic concepts of Diet Therapy: Routine hospital diets - regular diets, clear fluid diet, full fluid diet, soft diet, Modified diets, Enteral and parenteral nutrition, Refeeding syndrome.

Diet in Infections and Fevers: Types, Aetiology, Metabolic changes, Dietary considerations in Typhoid, Influenza, Malaria, Tuberculosis, AIDS.

Module III

Diet in Obesity: Aetiology, Assessment, Types, Childhood and Adolescent Obesity, Complications, Management and preventive strategies of Obesity.

Diet in Leanness: Aetiology, Nutritional requirement and Dietary management. Diet during eating disorders- anorexia, bulimia, binge eating.

Module IV

Diet in Food Allergy and food intolerance (hypersensitivity): Definition, etiology, food allergens, symptoms and diagnosis of food allergies, nutritional management, restricted diets, elimination diets and hypo-sensitization, prevention of adverse food reaction. Skin disturbances: Types, symptoms, Diagnosis and Treatment.

Drug-Nutrient interactions (in brief)

Suggested Readings

- Antia P. Clinical Dietetics and Nutrition, 2nd edition, Oxford university press.
- Garrrow J.S, James W. P.T, Ralph A, (2000), Human Nutrition and Dietetics, 10thedition, Churchill Livingston, London.

- Guthrie H. A, Picciano M. F (1995), Human Nutrition, Mosby, St. Louis Missorie.
- 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

FAMILY MEAL MANAGEMENT

CORE **CN1CRT03**

Credit: 3 Hours/week : 4

Objectives

To enable students to:

- Learn the principles of meal planning.
- Acquire knowledge on planning meals for different age groups.

Module I

Menu Planning: Balanced Diet, Basis for computing nutrient requirements, Latest concepts in dietary recommendations - RDA, ICMR and WHO: their uses and limitations, Food groups, Basic principles of menu planning, Points to be considered while planning menu.

Module II

Nutrition in pregnancy: Physiological changes, Relationship between maternal and foetal nutrition, Impact of nutritional deficiency on the outcome of pregnancy, Nutritional and food requirements, Dietary guidelines, Dietary problems, Complications of pregnancy, GDM.

Module III

Nutrition during Lactation: Structure of Breast, Physiology of lactation, Hormonal control of lactation, Nutritional and food requirements, Factors affecting volume & Composition of breast milk, Breast feeding and its advantages, Pre-term milk (PTM), Expressed Breast Milk (EBM), Drip Breast Milk (DBM), Common problems during breast feeding, Contraindications to breast feeding.

Module IV

Nutrition during Infancy: Growth & development, LBW, Small for Gestational Age and Pre term baby, Nutritional requirements, IMS Act, Artificial feeding, Hazards of Bottle feeding, Feeding of the Preterm and LBW babies, Weaning, Feeding problems in weaning, Family Pot Feeding, Low cost supplementary foods, ARF.

Suggested Readings

- Bamji, M.S, Reddy V. (1998), Text Book of Human Nutrition, Oxford & IBH Publishing Co, New Delhi.
- Gibney, M.J, Elia M Ljingquist. O (2005), Clinical Nutrition, Backwell Science Publishing Co.
- Robinson, C.H and Winely E.S, (1984). Basic Nutrition and Diet Therapy, Macmillian Pub. Co. New York.
- Swaminathan, M (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing Company Ltd.
- Guthrie, H.A & Picciano, M.F (1995), Human Nutrition, Mosby Publishing Co, New York.
- 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.

FUNDAMENTALS OF BIOCHEMISTRY

COMPLEMENTARY **CN1CMT01**

Credit: 3 Hours/week: 4

Objectives

To enable the students to:

- Understand knowledge about bimolecular which are the basics of life □Study about energy currency of the cell and chemical messengers

Module I

Introduction to Biochemistry: Definition, Scope of biochemistry, Concept of equilibrium - Acids and bases, buffers, molarity, molality, normality, equilibrium, viscosity, surface tension, adsorption, acidosis, alkalosis.

Molecular aspect of transport: Passive diffusion, facilitated diffusion, active transport - sodium potassium pump. Endocytosis and exocytosis.

Module II

Biological Oxidation: High energy compounds, Electron transport chain, ATP synthesis, ATP as currency of energy, substrate level phosphorylation, nonoxidative phosphorylation, oxidative phosphorylation - mechanism, inhibitors involved in oxidative phosphorylation, OR-potential.

Module III

Nucleic acids: Composition, functions, classification and structure of DNA and RNA. Nucleotide synthesis, DNA replication, Enzymes involved in DNA replication, DNA repair, Recombinant DNA technology, Protein synthesis, Genetic code, Gene mapping, Gene expression, operon concept, Lac, genotype and phenotype, epigenetics, Alleles, Epistasis.

Module IV

Prostaglandins: Introduction, chemical nature, classification, biosynthesis, biological effects, clinical significance and therapeutic uses of prostaglandins. Enzymes - Definition, classification, Apoenzymes, Coenzymes, Holoenzymes, Iso enzymes. Mechanism of action, properties, enzyme activity, factors affecting enzyme activity, enzyme kinetics, ping-pong mechanism, Enzyme inhibition.

Diagnostic value of serum enzymes.

Suggested readings

- Satyanarayana,U (2005), Biochemistry, Uppala Author- Publisher Interlinks Vijayavada.
- Jain J.L, Jain S, Jain N. (2005), Fundamentals of Biochemistry, S. Chand & Company LTD, New Delhi.
- Hames B.D and Hooper N.M (2001) Instant notes on Biochemistry, Viva books private limited, New Delhi.
- Devlin T.M (2002), Text book of Biochemistry with Clinical Correlations, A John Wiley and Sons Publications.
- Fatima D. et al., (1999) Biochemistry, Saras Publication, Nagarcoil, Tamil Nadu.
- Leninger,A.L (1987), Principles of Biochemistry, CBS Publishers and Distributors.
- Pattabhiraman T.N (1993), Principles of Biochemistry, Prithvi Book Agency.

HUMAN ANATOMY AND PHYSIOLOGY I

COMPLEMENTARY **CN1CMT02**

Credit: 3 Hours/week : 4

Objectives

To enable the students to-

- Understand the general structure and functions of various systems and organs of the body.
- Understand the abnormal changes in the tissue and organs on several disease states.

Module I

Composition of the human body: Cell, cell organelles, tissues, organs, organ systems: digestive, excretory, respiratory, nervous, endocrine, circulatory, muscular, skeletal and reproductive systems. Cell junctions, Cell signaling, body fluids: ECF and ICF

Module II

Homeostasis and acid base balance: Organ systems in homeostasis, components, mechanism - feed back signals, regulation of acid-base balance. Disturbances of acid-base balance- acidosis and alkalosis.

Module III

Digestive System: Structure and function of mouth pharynx, oesophagus, stomach, intestine and intestinal villi. Digestive glands- salivary glands, gastric glands, liver, pancreas, gall bladder and intestinal glands. Hunger and thirst mechanism. Mechanism of digestion and absorption, defecation, Movements of GI tract and Gastro-intestinal reflexes.

Module IV

Excretory system: structure and functions of kidney and nephron. Stages of urine formation, GFR, factors affecting GFR, composition of normal urine, abnormal constituents of urine, micturition. Factors affecting urine formation and urine volume, counter current mechanism.

Suggested Readings:

- Chatterjee, C.C. (2005), Human Physiology , Volume I & II Medical Allied Agency, 82/1, Mahatma Gandhi Road , Kolkata – 700009.
- Gyton and Hall (2000),Text book of Medical Physiology , 10th edition , Harcourt Asia LTD 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 – 110055.
- Wilson, K.J. and Waugh, A. (1999), Ross and Wilson Anatomy and Physiology in health and illness.
- Chandra Sekar C.N, (2007), Manipal Manuel of Physiology, 1st Edition, CBS Publisbers and Distributors, New Delhi.
- Indu Khurana and Arushi (2009), Text Book of Anatomy and Physiology for Health Professionals, CBS Publishers and Distributors, New Delhi.
- Guyton A.C(1991), Textbook of Medical Physiology, 8th, Philadelphia: W B Saunders
- RatanVidya, (2004), Handbook of Human Physiology, 7th Edition (Reprint), Jaypee Bros Medical Publishers (P) Ltd, New Delhi

ADVANCED NUTRITION

CORE **CN2CRT04**

Credit: 4 Hours/week: 4

Objectives

To enable the students -

- To understand the relation between nutrition and health.
- To acquire knowledge about the main nutrients and its functions in the body.

Module I

Macrominerals: Calcium, Phosphorus, Magnesium - Functions, sources, requirements, factors affecting absorption and utilization, Deficiency and Toxicity. Calcium – Phosphorus ratio.

Module II

Microminerals: Iron, Zinc, Copper, Selenium, Chromium, Iodine, Manganese, Molybdenum and Fluorine- Functions, sources, requirements, factors affecting absorption and utilization, deficiency and toxicity.

Module III

Fat Soluble Vitamins:- Functions, sources, requirements, factors affecting absorption and utilization, deficiency, toxicity of vitamin A, D, E, K , conversion factor of vitamin A and D.

Module IV

Water Soluble Vitamins: Functions, sources, requirements, factors affecting absorption and utilization, deficiency and toxicity of Thiamin, Riboflavin, Niacin, vitamin B6, Vitamin B12, Biotin, Pantothenic acid, Folic acid and Vitamin C.

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 Philip A. (1998), Clinical Nutrition and Dietetics, 4thedition, 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.

CLINICAL NUTRITION

CORE **CN2CRT05**
Credit: 3 Hours/week: 4

Objectives

To enable the students to:

- Study the aetiology, symptoms and medical nutrition therapy in various diseases
- Learn how to plan and prepare diet for various diseases.

Module I

Diet in Gastrointestinal disease: Aetiology, Symptoms and dietary management of Oesophagitis, Gastro Oesophageal Reflux Disease (GERD), Dyspepsia, Gastritis, Peptic ulcer, Constipation, Diarrhoea, Ulcerative colitis, Flatulence, Irritable bowel syndrome, Inflammatory bowel disease, Diverticulitis, Dumping syndrome, Malabsorption syndrome – Lactose intolerance, Steatorrhoea, Celiac disease, Tropical sprue.

Module II

Diet in Diabetes Mellitus: Types, Aetiology, Symptoms, factors affecting normal blood sugar level, Diagnosis, Treatment, Dietary modifications, food exchange system, Glycemic Index, Glycemic load, Complications of diabetes, Nutrition in complication of diabetes, hypoglycemic agents and supportive therapy.

Module III

Medical Nutrition Therapy in Critical Care:

Surgery- Physiological response and dietary management.

Burns – Classification, complications, dietary management, mode of feeding and nutrition support.

Trauma and Injury- physiological, metabolic and hormonal responses to injury, dietary management of trauma.

Sepsis- systemic, metabolic and catabolic responses, Systemic Inflammatory Response Syndrome(SIRS), Multiple Organ Dysfunction Syndrome(MODS), Dietary Management.

Module IV

Diet in Gout: aetiopathology, clinical features, complications and dietary management.

Diet in Inborn Errors of Metabolism : Phenylketonuria, Maple Syrup Urine Disease (MSUD), Tyrosinemia, Homocystinuria, Galactosemia.

Suggested Readings

- Mohan K. L. and 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 Missionery.
- Sharon,M. (1994), Complete Nutrition, Avery publishing group. New York.
- Garrrow J.S, James W. P.T. and 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 Therapectic Nutrition ,17 th edition, Mac Milan Publishers.
- Bamji M.S. andVinodini Reddy (1998), Text Book of Human Nutrition, ford and IBH Publishing Co. Ltd New Delhi.

FAMILY MEAL MANAGEMENT II

CORE **CN2CRT06** Credit: 3 Hours/week : 4

Objectives

To enable students to:

- Learn the principles of meal planning.
- Acquire knowledge on planning meals for different age groups.

Module I

Nutrition during early childhood (Toddler/Preschool): Growth and nutrient needs, Food requirements, Dietary guidelines, Feeding problems, Nutrition related problems, Growth monitoring, Importance of growth charts, GOBIFFF.

Module II

Nutrition of school children: Nutritional and food requirements, Dietary guidelines, Importance of breakfast, Feeding problems, Packed lunch, School lunch programmes

Module III

Nutrition during adolescence: Growth and nutrient needs, Food requirements, Food habits and dietary guidelines, Nutritional problems, Nutritional programmes for adolescence.

Module IV

Nutrition during adulthood – Reference man, Reference woman, Nutritional requirements, feeding pattern.

Geriatric nutrition: Process of ageing, Factors affecting food intake and nutrient use, Change in organ function with ageing, Nutrient needs, Nutrition related problems.

Suggested Readings

- Bamji, M.S, and Reddy V (1998), Text Book of Human Nutrition, Oxford and IBH Publishing Co, New Delhi.
- Gibney M.J, and Elia M Lingquist. O (2005), Clinical Nutrition, Backwell Science Publishing Co.
- Robinson C.H and Winely E.S, (1984). Basic Nutrition and Diet Therapy, Macmillian Pub. Co. New York .
- Swaminathan M (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing Company Ltd.
- Guthrie, H.A & Picciano, M.F (1995), Mosby Publishing Co, New York, $rilakshmi, B. (2005). Dietetics, New Age International Publishers, New Delhi.
- Wardlaw. G, M and Insel, P.M (1993). Perspectives in Nutrition, Mosby Publishing Co, London.

GENERAL BIOCHEMISTRY

COMPLEMENTARY **CN2CMT03**
Credit: 2 Hours/week : 2

Objectives:
To enable students to:

- Acquire knowledge about the importance of environmental biochemistry.
- Understand the basis of genetic engineering.

Module I

Environmental biochemistry - Applications of radioactive isotopes, health hazards of artificial fertilizers and pesticides, pesticide residue, significance of biofertilizers and bioplastics. Recycling codes of plastics.

Module II

Introduction to genetic engineering- Gene cloning, host cells, vectors, bacteriophages, cosmids, restriction endonuclease, DNA ligases. Applications of genetic engineering.

Module III

DNA in the diagnosis of infectious diseases - tuberculosis, malaria, AIDS, CHAGAS disease, Human Papilloma Virus, lyme disease, periodontal disease.

DNA in the diagnosis of genetic diseases-cystic fibrosis, sickle cell anaemia, Alzheimer's disease, cancers, diabetes, obesity.

Artificial chromosomes, Gene knockout, Gene silencing, Bioethics

Module IV

Basic techniques in genetic engineering - electrophoresis, blotting techniques, DNA sequencing, Polymerase Chain Reaction (techniques and applications) DNA analysis for environmental monitoring, DNA finger printing or DNA profiling, FISH techniques.

Suggested readings

- Satyanarayana.U (2005), Biochemistry, Uppala Author-Publisher Interlinks, Vijayavada.
- Jain J.L , Jain S and Jain N.(2005),Fundamentals of Biochemistry, S.Chand & Company LTD , New Delhi.
- Hames B.D and Hooper N.M (2001) Instant notes on Biochemistry, Viva books private limited, New Delhi.
- Devlin T.M (2002), Text book of Biochemistry with Clinical Correlations, A John Wiley and Sons Publications.
- Fatima D. et al, (1999) Biochemistry, Saras Publication, Nagarcoil, Tamil Nadu.
- Leninger A.L (1987), Principles of Biochemistry, CBS Publishers and Distributors.
- Pattabhiraman T.N (1993), Principles of Biochemistry, Prithvi Book Agency.

BIOCHEMISTRY PRACTICAL - I

COMPLEMENTARY **CN2CMP01**

Credit : 1 Hours/ week : 2

Objective:

- To enable the students to get practical experience in lab and clinical nutrition.

Module I

Principles and applications and methodology of colourimetry.

Module II

Quanlitative analysis of Sugars

a) Glucose
b) Fructose
c) Maltose
d) Lactose

Module III

a) Estimation urinary creatinine
b) Estimation of urinary urea

Module IV

a) Estimation of urinary calcium
b) Estimation of urinary Phosphorous
c) Estimation of urinary Ascorbic Acid

Suggested readings

- Satyanarayana.U (2005), Biochemistry, Books and Allied Publishing LTD.
- Jain J.L , Jain S , Jain N.(2005),Fundamentals of Biochemistry, S.Chand & Company LTD , New Delhi.
- Hames B.D and Hooper N.M (2001) Instant notes on Biochemistry, Viva books private limited, New Delhi.
- Devlin T.M (2002), Text book of Biochemistry with Clinical Correlations, Wiley and Sons Publications.
- Fatima D. et al, (1999) Biochemistry, Saras Publication, Nagarcoil, Tamil Nadu.
- Leninger A.L (1987), Principles of Biochemistry, CBS Publishers and Distributors.
- Pattabhiraman T.N (1993), Principles of Biochemistry, Prithvi Book Agency.
- Arti S Pandey , Arun Pandey , Naveen K srivastava, Durga P Neupane (2015), Biochemistry laboratory manual, Jaypee publishers.

- Shivaraja Shankara Y M, (2013), Laboratory manual for practical biochemistry. Jaypee publishers.

HUMAN ANATOMY AND PHYSIOLOGY II

COMPLEMENTARY **CN2CMT04**
Credit: 2 Hours/week : 2

Objectives
To enable the students to-

- Understand the general structure and functions of various systems and organs of the body.
- Understand the abnormal changes in tissue and organs on several disease states.

Module I

Cardiovascular System

Structure of heart, conducting system of heart, cardiac cycle, Blood –functions , composition, blood clotting, blood groups, blood vessels-artery, vein capillaries, blood circulation-greater, lesser.

Module II

Lymphatic System

Tissue fluid, Lymph, Functions, formation of Lymph, lymph glands - structure and functions, lymphoid organs in the body.

Module III

Immune System

AMI and CMI, Innate and Aquired, Antigens and Antibodies, Helper T cells and Cytokines,.

Module IV

Respiratory system

Organs of respiration – structure and functions, volume and capacity of lungs, mechanism of respiration, Artificial respiration, Compliance of lung and chest wall,cell respiration.

Suggested Readings:

- Chandra Sekar C.N, (2007),Manipal Manuel of Physiology, 1st Edition, CBS Publisbers and Distributors, New Delhi.
- Chatterjee, C.C. (2005), Human Physiology , Vol I & II Medical Allied Agency, 82/1, Mahatma Gandhi Road , Kolkata – 700009.
- Gyton and Hall (2000),Text book of Medical Physiology , 10th edition , Harcourt Asia LTD Singapore
- Indu Khurana and Arushi (2009), Text Book of Anatomy and Physiology for Health Professionals, CBS Publishers and Distributors, New Delhi.
  Jaypee Bros Medical Publishers (P) Ltd, New Delhi

- RatanVidya, (2004), Handbook of Human Physiology, 7th Edition (Reprint),
- Subramanyam , S , Madavankutty , K and singh , H.D (2001) Text book of Human Physiology, S. chand and Co. Ltd , Ramnagar , New Delhi – 110055. W B Saunders
- Wilson, K.J. and Waugh , A. (1999), Ross and Wilson Anatomy and Physiology in health and illness.

HUMAN PHYSIOLOGY PRACTICAL I

COMPLEMENTARY **CN2CMP02**

Credit : 1 Hours/ week : 2

Objectives

To enable the students to

- Identify and analyses body cells and fluids.
- To gain technical skill in physical examination of body.

Module I

Microscopic examination of prepared slides - examine and draw the tissues

a)Squamous, ciliated and columnar epithelia.

b) Bone and cartilage

c) Smooth, cardiac and striated muscle

d) Nerve cell

e) Skin

Module II

Physical examination of body

a) Pulse rate at rest and after exercise

b) Determination of arterial blood pressure

c) Measurement of body temperature and diurnal rhythm.

Module III

Examine the model: identify and draw

a)Section of human heart

b) Section of human kidney

c) Histology of artery and vein

Module IV

Haematology

a) Enumeration of RBC of human blood

b) Enumeration of WBC of human blood

c) Haematocrit (PCV) and haemoglobin

d) Mean Corpuscular Haemoglobin (MCH) and Mean Corpuscular Volume (MCV)

e) Mean Corpuscular Haemoglobin Concentration (MCHC)

f) Colour Index (CI)

Suggested Readings

- Chatterjee C.C. (2003), Human Physiology, Kalyani Mukherjee Publishers, Kolkata.
- Wilson K.J. and Waugh,A. (1999), Anatomy and Physiology in Health and Disease, British library of cataloguing in publishing data, London.
- Samson and Wright (1989), 'Applied Physiology', Tandon Publications.

- Best, H. And Taylor, B. (1991)'The Physiological Basis for Medical Practice', The Williams and Wildins Company.
- Chandrasekar, M. and Mishra,N. (2014) Practical Physiology. Jaypee Publishers.
- Sood, R. Haematology for students and practitioners. Jaypee Publishers.

YEAR II

THERAPEUTIC NUTRITION

CORE **CN3CRT07**

Credit: 3 Hours/week: 4

Objectives

To enable the students to:

- To understand skills and techniques in the planning of therapeutic diet for various diseases and nutritional deficiencies.
- To gain knowledge in diet counseling and educating patients.

Module I

Diet in Cardiovascular diseases **:** Aetiology, Symptoms, Risk factors, pathophysiology, dietary management and prevention of Atherosclerosis, Coronary Artery Disease, Myocardial Infarction, Ischemic Heart Disease,

Rheumatic Heart Disease(RHD), Congestive Cardiac Failure (CCF), Hypercholesterolemia, Hypertension – classification, sodium restricted diet, dangers of severe sodium restriction.

Module II

Diet in Diseases of Liver and Gall Bladder: Aetiology, Symptoms, Dietary treatment in Jaundice, Hepatitis, Pancreatitis, Cirrhosis, Hepatic Coma. Role of food and alcohol in developing liver diseses.

Biliary Tract Diseases- Cholecystitis Cholelithiasis and Choledocholithiasis .

Module III

Diet in Renal disease: Causes, Symptoms and dietary management in Nephritis, Nephrosis, Acute and chronic renal failure, Renal calculi, Acid and alkali producing foods, End Stage Renal Diseases (ESRD), Dialysis.

Module IV

Diet in Cancer: Tumor markers and their applications, Types of cancer, Risk factors, Symptoms, Metabolic alterations and Nutritional problems of cancer and cancer therapy, Medical Nutrition Therapy, Role of food in prevention of cancer.

Suggested Reading

- Gibney M J., Elia.M, Lingqvist. O (2005),Clinical Nutrition, Blackwell Science publishing Co.
- Guthrie, H.A and Picciano, M.F, (1995), Human Nutrition, Mosby Publishing Co, New York.
- Kris Etherton.P and Burus J.H.(1998), Cardiovascular Nutrition, American Dietetic Association ,Chicago, Illinosis.
- Kumar .P. Clark M (2005) , Clinical Medicine, 6th Edition, Elsevier Saunders Publishing Co.
- Nutrition and Changing Kidney Function, National Kidney Foundation New York.
- Patient Education Handbook- Diabetic Education (2000), Good Shepherd Medical Centre, Texas.
- Swaminathan, M (1989), Hand Book of Food and Nutrition, Bangalore Printing and Publishing Co, Bangalore.

FOOD COMMODITIES I

CORE **CN3CRT08**

Credit: 3 Hours/week: 4

Objectives

To enable the students to:

- To understand the raw and processed food commodities used in daily life.
- To discuss the qualities of available commodities and their suitability for different purposes.

Module I

Introduction to Food science: Objectives of cooking, Preliminary preparations, Cooking methods – Moist heat methods, Dry heat methods, Microwave cooking, Solar cooking.

Module II

Cereals and Pulses: Composition, Nutritive value and processing of wheat, rice, barley, rye, oats, millets and its products , convenient cereal products.

Cereal cookery : Gluten formation, Gelatinization and dextrinisation.

Pulses: Composition and nutritive value, Digestibility of pulses, Processing, Toxic constituents,Pulse cookery.

Module III

Nuts andOil seeds : Composition and Nutritive value, Specific nuts and oilseeds, Toxic constituents.

Fats and Oils : Composition and Nutritive value, Specific fats and oils, Refining and processing of edible oils, storage, Emulsions, Rancidity, Smoking point and Flash point.

Module IV

Vegetables and Fruits : Vegetables - Composition and Nutritive value, Pigments, Selection and Storage, Vegetable cookery.

Fruits - Composition and nutritive value, selection, post harvest changes and storage, Ripening of fruits, Enzymatic and non enzymatic browning.

Suggested Readings

- Clarke. D, Herbert. E (1992).). Botton. E.R, (1999), Oils, Fats and Fatty Foods, their practical application, Biotech Publishing Company.
- Eckles C.H, Combs. W.B, Macy. H (1998). Milk and Milk Products, MC Graw Hill Companies.
- Gopalan. C, Ramashathri V.V, Balasubramanyan S.C (1996), Nutritive Value of Indian Foods, National Institute of Nutrition, ICMR.
- Manay N.S, Shadaksharaswamy. M (2005), Foods – Facts and Principles. New Age International Publishers.
- Matz. S.A (1996). The Chemistry and Technology of Cereals and Food of Feed; Chapman and Hall, New York.
- Peckham C.G, Greaves H.T (1979). Foundation of food preparations, Mac Millan Publishing Co, New Delhi.

COMMUNITY NUTRITION

CORE **CN3CRT09**

Credit: 3 Hours/week :4

Objectives

To enable the students:

- To understand the importance of nutrition in national progress and the significance of the assessment of nutritional status.
- To find solutions to overcome problems of malnutrition in the community.

Module I

Introduction to nutrition and health in national development. Nutritional problems existing in our country - causes and preventive measures - PEM, VAD, IDA, IDD, VDD, Relationship between nutrition and infection.

Module II

Methods of assessment of nutritional status: Direct assessment and indirect assessment. Significance of nutritional assessment of community, improvement of nutrition of community, Importance of Antenatal and post natal care.

Module III

Nutrition Education: Meaning, Importance, Principles of planning, Executing and evaluating nutrition education programs, Problems encountered in nutrition education.

Nutrition intervention schemes in the community: Lecture method demonstrations, nutrition exhibitions and visual aids.

Module IV

National and International Agencies and intervention programs in Community Nutrition: FAO, WHO, UNICEF, ICDS, NIN, CFTRI, CARE, ICMR, ANP, SNP, Mid day meal program.

Suggested Reading

- 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, 18th edition, Banarsidas Bhanot Publishers, Jabalpur.
- Reddy, R.S. (1998), Nutrition Education, Commonwealth Publishers, New Delhi.
- Swaminathan, M. (2004), Food and Nutrition, Vol. II, 2nd edition, BAPPCO Publishers, Bangalore.
- Bamji, M.S, Rao, N.P and Reddy, V. (2003), Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
- Srilakshmi, B. (2004), Nutrition Science, New Age International Pvt. Ltd, New Delhi.
- Gibney, M.J, Margetts, B.M, Kearney, J.M and Arab, L. (2005). Public Health Nutrition, Blackwell Publishing, USA.
- Ramachandran, L. and Dharmalingam, T. (2005), Health Education, Vikas Publishing House Pvt. Ltd., New Delhi.

THERAPEUTIC NUTRITION PRACTICAL - I

CORE **CN3CRP01**

Credit: 1 Hours/week : 1

Objectives

- To emphasis skill development in planning therapeutic diets using food exchange lists.
- To provide greater exposure to dietetic practices followed in Indian hospital.
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- **Module I**

Planning of routine hospital diet:

a) Clear fluid diet
b) Full fluid diet
c) Soft diet
d) High calorie and low calorie diet
e) High residue and low residue diet

Module II

Planning of diet in infectious diseases:

a) Typhoid
b) Tuberculosis

Module III

Planning of diet in cancer, surgery and burns

Module IV

Planning of diet in deficiency diseases:

a) Vitamin A deficiency
b) Calcium deficiency
c) PEM

Suggested Readings

- Bhala S.M.L, Bhatia N, Gopinath(1983). Diet Manual for heart patient, CTC, AHMS, New Delhi
- Gibney M.J, Elia, M Ljingquist. O (2005), Clinical Nutrition, Blackwell Science Publishing Co.
- Robinson C.H and Winely E.S, (1984) Basic Nutrition and Diet Therapy 5th ed, Macmillian Pub. Co. New York .
- Swaminathan, M (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing Company.

COMMUNITY NUTRITION PRACTICAL

CORE **CN3CRP02**
Credit: 2 Hours/week : 2

Objectives
To enable the students to:

- Develop skills in field application of the techniques of assessing nutritional status. ☐Acquire skills in organizing and implementing community nutrition projects.

Module I

Methods for assessment of nutritional status: direct and indirect parameters

Module II

Nutritional assessment of various age groups
a)Preschool children
b) School children
c) Adolescents
d) Adults
e) Elderly

Module III

Nutrition education
Prepare ten visual aids and provide nutrition education to different age groups in community

Module IV

Observation reports on
a) Noon meal programme
b) Anganwadi visit

c) Visit to star hotel

Suggested Reading

- 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, 18th edition, Banarsidas Bhanot Publishers, Jabalpur.
- Reddy, R.S. (1998), Nutrition Education, Commonwealth Publishers, New Delhi.
- 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.
- Ramachandran, L. and Dharmalingam, T. (2005), Health Education, Vikas Publishing House Pvt. Ltd., New Delhi.

NUTRITIONAL BIOCHEMISTRY

COMPLEMENTARY **CN3CMT05**

Credit: 4 Hours/week : 5

Objectives

To enable the students to-

- Gain an understanding of the application of biochemistry in foods, nutrition and diet therapy.
- Know the different metabolic pathways of macronutrients in human body

Module I

Carbohydrate Metabolism: Basic structure, Metabolism of glucose (glycolysis), fructose and galactose; Metabolism of pyruvate and lactate; Metabolism of acetyl Co A (TCA cycle); energetic of glucose metabolism, Synthesis of ribose (HMP Shunt); Synthesis of glucose from noncarbohydrates (gluconeogenesis); Metabolism of Glycogen- Glycogenesis and Glycogenolysis.

Module II

Lipid metabolism: Basic structure, Metabolism of Triacylglycerol, synthesis of fatty acid-saturated and unsaturated; Beta-oxidation of fatty acid-; Metabolism of Cholesterol; Metabolism of Ketone bodies

Module III

Protein metabolism: Basic structure of protein and amino acids; General pathways of amino acid metabolism -Deamination, transamination, decarboxylation, and demethylation; urea cycle and fate of ammonia.

Module IV

Integration of metabolic pathways of energy metabolism, Metabolism in diabetes, obesity, starvation.

Regulation of metabolism: Interrelationship of carbohydrate, protein and lipid metabolism.

Metabolic adaptation during starvation, exercise, stress and diabetes mellitus.

Suggested readings

- Satyanarayana.U (2005), Biochemistry, Uppala Author-Publisher
  Interlinks,Vijayavada,A.
- Jain J.L , Jain S , Jain N.(2005),Fundamentals of Biochemistry, S.Chand & Company LTD , New Delhi.
- Hames B.D and Hooper N.M (2001) Instant notes on Biochemistry, Viva books private limited, New Delhi.
- Devlin T.M (2002), Text book of Biochemistry with Clinical Correlations, A John Wiley and Sons Publications.
- Fatima D. et al, (1999) Biochemistry, Saras Publication, Nagarcoil, Tamil Nadu.
- Leninger A.L (1987), Principles of Biochemistry, CBS Publishers and Distributors.
- Pattabhiraman T.N (1993), Principles of Biochemistry, Prithvi Book Agency.

HUMAN ANATOMY AND PHYSIOLOGY II

COMPLEMENTARY **CN3CMT06**
Credit: 4 Hours/week : 5

Objectives
To enable the students to:

- Understand the general structure and functions of various systems and organs of the body.
- Understand the abnormal changes in the tissue and organs on several disease states.

Module I

Endocrine System

Endocrine glands: structure and functions of Pituitary, Thyroid, Parathyroid, Adrenal, Pancreas, Placenta, Ovary, Testes, Thymus and Pineal body. Disorders of over and under secretions.

Module II

Reproductive system

Male and Female reproductive organs: structure and functions, reproductive hormones, Menstruation, Puberty, menopause, fertilization, development of fertilized ovum, placenta and its functions, parturition.

Module III

Muscular system

General account of the system, types of muscles, muscle contraction, Sliding filament theory, Biochemical events in muscular contraction, skeletal muscles of organs (brief)-pharynx, larynx, diaphragm, abdominal wall.

Module IV

Nervous System

Structure of nerve cell, nerve fiber. Classification of nervous system – CNS, PNS, ANS – their functions. Nerve impulses, synapse, reflex action, voluntary action.

Suggested Readings:

- Chatterjee, C.C. (2005), Human Physiology , Vol I & II Medical Allied Agency, 82/1, Mahatma Gandhi Road , Kolkata – 700009.
- Gyton and Hall (2000),Text book of Medical Physiology , 10th edition , Harcourt Asia LTD Singapore.
- Subramanyam , S , Madavankutty , K and singh , H.D (2001) Text book of Human Physiology, S. chand and Co. Ltd , Ramnagar , New Delhi – 110055.
- Wilson, K.J. and Waugh , A. (1999), Ross and Wilson Anatomy and Physiology in health and illness.
- Sarada Subramanyam. S, Text book of Human Physiology, S Chand and Company Ltd, New Delhi.
- Chandra Sekar C.N,(2007),Manipal Manuel of Physiology, 1st Edition, CBS Publisbers and Distributors, New Delhi.
- Indu Khurana and Arushi (2009), Text Book of Anatomy and Physiology for Health Professionals, CBS Publishers and Distributors, New Delhi.
- Guyton A.C (1991), Textbook of Medical Physiology, Philadelphia: W B Saunders.
- RatanVidya, (2004), Handbook of Human Physiology, 7th Edition (Reprint), Jaypee Bros Medical Publishers (P) Ltd, New Delhi

GENERAL MICROBIOLOGY

CORE **CN4CRT10**
Credit: 4 Hours/week : 4

Objectives
To enable the students to:

- To acquire an elementary knowledge about microorganisms To understand basics of microbial culture

Module I

Introduction to Microbiology: Definitions of microbiology and microbes, Beneficial effects of microorganisms.
Microbial growth curve, Effect of intrinsic and extrinsic factors on growth curve: PH, Moisture, Temperature, Oxygen availability, Nutrients and others.

Module II

Microorganisms: General morphology, Characteristics, Reproduction and Economic importance of: A) Bacteria,
B) Fungus
C) Virus
D) Algae
E) Protozoa

Module III

Culture Media: Common ingredients, Culture techniques: Streak, Stroke, Pour plate, Lawn, Cough plate methods, Observation of Microorganism: Direct and Indirect methods

Module IV

Medical microbiology: Causative pathogens and clinical features of - Nosocomial infection (HAI) - Bacteremia, Surgical site infection, UTI, Wounds and burns. Opportunistic pathogens. Other common infections- Malaria, Filariasis, Meningitis, Endocarditis, Dengue, Chickungunya, H1N1, Leptospirosis, Cystscercosis, Hide angle cysts, Osteomyelitis, Skin infections.

Suggested Readings

- Ananthanarayan R, Jayaram Panicker CK (2009) Text book of Microbiology, Eighth edition, Universities Press Pvt. Ltd., Hyderabad
- Banwart, G.J, Basic Food Microbiology, AVI, New York
- Frazier W.C and Westhoff D.C (1992), Food Microbiology, Tata McGraw Hill
- Jeffery C Pommerville, Alcamo's Fundamentals of Microbiology, 10th edition, 2014, Jones and Bartlett Learning India Pvt Ltd. New Delhi.
- Kathleen Park Talaro (2002) Foundations in Microbiology, Fourth Edition, Mc Graw Hill, New York.
- Narayanan, L.M. and Mani,L. Microbiology.Saras Publications, Nagercoil.
- Prescott, L.M., Harley, J.P. and Klein, D.A. Microbiology. 4th edition McGrawHill, NewYork. 1999
- Ray, B, Fundamentals of Microbiology, CRC Press, Boca Raton FL.
- Stuart Walker T. Microbiology, 1998, W.B Saunders Company, United States.

FOOD COMMODITIES II

CORE **CN4CRT11**
Credit: 4 Hours/week : 4

Objectives

To enable the students to:

- To understand the basic commodities, both raw and processed used in catering and various aspects of their production and distribution.
- To discuss the qualities and standard of available commodities and their suitability for different purposes.

Module I

Milk and Milk Products : Composition, Nutritive value, Processing- clarification, homogenization, pasteurization and freezing, Types of milk, Fermented and non fermented milk products, Milk cookery.

Module II

Beverages : Tea, Coffee, Chocolate, fruit beverages, Milk beverages, Carbonated beverages, Malted beverages, Non alcoholic beverages and alcoholic beverages. Spices and condiments, Raising agents.

Module III

Meat :Classification, structure, Composition and Nutritive value, Post mortem changes, Ageing , Tenderizing, Curing, Selection and storage, Meat cookery.
Poultry : Classification, Processing, Composition and nutritive value, Storage.
Fish :Classification, Composition and Nutritive value, Selection, Fish cookery, Storage
Egg : Structure, Composition and Nutritive value, Egg quality and evaluation, Egg cookery, Egg white foams, Iron sulphide formation.

Module IV

Sugar and related products: Nutritive value, Properties, Sugar related products, stages of sugar cookery, Crystallization, Crystalline and non crystalline candies, Role of sugar in cookery.

Suggested Readings

- Clarke. D, Herbert. E (1992).). Botton. E.R, (1999), Oils, fats and fatty foods, their practical application, Biotech Publishing Company
- Eckles C.H, Combs. W.B, Macy. H (1998). Milk and Milk Products, MC Graw Hill Companies.
- Gopalan. C, Ramashathri V.V, Balasubramanyan S.C (1996), Nutritive Value of Indian Foods, National Institute of Nutrition, ICMR.
- Manay N.S, Shadaksharaswamy. M (2005),), Foods – Facts and Principles. New Age International Publishers.
- Matz. S.A (1996). The chemistry and technology of cereals and food of feed; Chapman & Hall, New York.
- Peckham C.G, Greaves H.T (1979). Foundation of food preparations, Mac Millan Publishing Co, New Delhi.
- Srilakshmi B (2011), Food Science, New Age International Publications, New Delhi.

THERAPEUTIC NUTRITION PRACTICAL- II

CORE **CN4CRP03** Credit: 3 Hours/week : 4

Objectives

To enable the students to:

- To emphasis skill development in the planning and preparation of therapeutic diet
- To provide greater exposure to modification in normal diet

Module I

Standardisation of portion sizes for different food preparations, use of weights and measures (raw weight v/s cooked weight), use of food composition table, menu planning and calculation

Planning and preparation of diet in cardiovascular diseases
a)Hypertension with obesity
b)CVD with Cirrhosis

Module II

Planning and preparation of diet in renal diseases
a)Glomerulonephritis with CVD
b) Nephrosis
c) Renal failure

ModuleIII

Planning and preparation of diet in gastrointestinal diseases
a) Lactose intolerance with PEM and aneamia
b) Constipation
c) Peptic ulcer with Diarrhoea

Module IV

Planning and preparation of diet in diseases of liver and pancreas

a)Cirrhosis with Hypertension

b) Hepatitis

c) Pancreatitis

Suggested Readings

- Bhala S.M.L, Bhatia N, Gopinath. Diet Manual for heart patient, CTC, AHMS, New Delhi (1983)
- Gibney M.J, Elia M Ljingquist. O (2005), Clinical Nutrition, Backwell Science Publishing Co.
- Robinson C.H and Winely E.S, Basic Nutrition and Diet Therapy 5th ed, Macmillian Pub. Co. New York (1984)
- Swaminathan M (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing Company to Ltd.

QUANTITY FOOD PRODUCTION

CORE **CN4CRP04** Credit: 3 Hours/week : 3

Objective

- To enable students to organize, prepare and serve food for three different meals.

Module I

Cereal Preparations

Rice Preparations : Chicken Biriyani, Vegetable Pulao, Tomato Rice. Wheat Preparations : Aloo Paratha, Spicy Potato Puri, Spring Roll.

Module II

Vegetable Preparations

Gobi Manchurian, Vegatable Khorma, Shahi Mattar.

Module III

Meat and Fish Preparations

Meat Preparations: Chicken Peggy Digo, Chicken curry, Green Chicken, Masala Steaks

Fish Preparations: Tomato Fish, Chilly Fish, Fish Moilee

Module IV

Snacks, Sweets , Puddings And Desserts

Snacks: Onion Pakoda, Rainbow Sandwich, Vegetable Burger

Sweets : Carrot Burfi, Bread Gulab Jamun, Coconut Sweet

Puddings and Desserts: Chocolate Pudding, Bread Pudding, Fruit Triffle.

Suggested readings

- Khandwala V. (1987), Relish Food The Vegetarian Way, Vakils, Fefferr and Simons Ltd., Bombay

- Mathew K.M (2000), Modern Kerala Dishes
- Ravindran B. (1990), My Favourite Recipes – Puddings and Desserts, Bhavi Publishing, Cochin.

YEAR III

BIOCHEMICAL ASPECTS OF NUTRITION

COMPLEMENTARY **CN4CMT07**
Credit: 2 Hours/week : 3

Objectives
To enable the students to:

- To acquire knowledge about the micro nutrients and its functions in the body.
- To understand the metabolism of micro nutrients in human body

Module I

Metabolism of Macrominerals: Functions, Biochemical importance, metabolism, deficiency, and toxicity of the following minerals: Calcium, phosphorus, magnesium.

Module II

Metabolism of Microminerals: Functions, Biochemical importance, Metabolism, deficiency and toxicity of the following minerals: Iron, Zinc, copper, selenium, chromium, iodine, manganese, Molybdenum and fluorine.

Module III

Metabolism of Fat Soluble Vitamins: Functions, biochemical importance, metabolism, deficiency and toxicity of vitamin A, D, E, K.

Metabolism of Water Soluble Vitamins: Functions, Biochemical importance, metabolism , Deficiency, Toxicity of Thiamin, Riboflavin, Niacin, vitamin B6, Vitamin B12, Biotin, Pantothenic acid, Folic acid and Vitamin C.

Module IV

Nutrient-Nutrient interrelationships: Role of Vitamins and Minerals in macronutrient metabolism, micronutrient interrelationships.

Suggested readings

- Satyanarayana.U (2005), Biochemistry, Uppala Author-Publisher Interlinks,Vijayavada,A.
- Jain J.L , Jain S , Jain N.(2005),Fundamentals of Biochemistry, S.Chand & Company LTD , New Delhi.
- Hames B.D and Hooper N.M (2001) Instant notes on Biochemistry, Viva books private limited, New Delhi.
- Devlin T.M (2002), Text book of Biochemistry with Clinical Correlations, A John Wiley and Sons Publications.
- Fatima D. et al, (1999) Biochemistry, Saras Publication, Nagarcoil, Tamil Nadu.
- Leninger A.L (1987), Principles of Biochemistry, CBS Publishers and Distributors.
- Pattabhiraman T.N (1993), Principles of Biochemistry, Prithvi Book Agency.

BIOCHEMISTRY PRACTICAL III

COMPLEMENTARY **CN4CMP03**

Credit : 1 Hours/ week : 2

Objectives:

- To enable the students to get practical experience in lab and clinical nutrition.
- To make the students aware of the constituents of blood.

Module I

Analysis of Blood for

a) Glucose
b) Total Protein, albumin and globulin
c) Total Cholesterol and lipid profile

Module II

a) Estimation of Acid phosphatase
b) Estimation of Alkaline phosphatase

Module III

a) Estimation of Iron
b) Estimation of Haemoglobin

Module IV

a) Estimation of SGPT
b) Estimation of SGOT

Suggested readings

- Satyanarayana.U(2005), Biochemistry, Uppala Author-Publisher Interlinks,Vijayavada,A.
- Jain J.L , Jain S , Jain N.(2005),Fundamentals of Biochemistry, S.Chand & Company LTD , New Delhi.

HUMAN ANATOMY AND PHYSIOLOGY III

COMPLEMENTARY **CN4CMT08**
Credit: 2 Hours/week : 3

Objectives
To enable the students to

- Understand the general structure and functions of various systems and organs of the body.
- Understand the abnormal changes in the tissue and organs on several disease states.

Module I Sense
Organs
Structure, functions, physiology and diseases and disorders of Skin (integumentary system), Eye, Ear , Nose and Tongue .

Module II
Skeletal system
General structure and functions of bone, bone mineralization, factors affecting bone formation , A general account of axial skeleton and appendicular skeleton. Types of joints, Arthrology.

Module III
Regulatory Mechanism
Regulation of blood pressure, pulse, heart rate and temperature, adaptations during exercise.

Module IV
Physiology in special conditions
High altitude and space physiology, aviation physiology, deep sea physiology, effect of exposure to cold and heat.

Suggested Readings:

- Chatterjee, C.C. (2005), Human Physiology , Vol I & II Medical Allied Agency, 82/1, Mahatma Gandhi Road , Kolkata – 700009.
- Gyton and Hall (2000),Text book of Medical Physiology , 10th edition , Harcourt Asia PTE LTD 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 – 110055.
- Chandra Sekar C.N,(2007),Manipal Manuel of Physiology, 1st Edition, CBS Publisbers and Distributors, New Delhi.
- Indu Khurana and Arushi (2009), Text Book of Anatomy and Physiology for Health Professionals, CBS Publishers and Distributors, New Delhi.
- Guyton A.C(1991), Textbook of Medical Physiology, 8th, Philadelphia: W B Saunders
- RatanVidya, (2004), Handbook of Human Physiology, 7th Edition (Reprint), Jaypee Bros Medical Publishers (P) Ltd, New Delhi

HUMAN PHYSIOLOGY PRACTICAL- III

COMPLEMENTARY **CN4CMP04**

Credit : 1 Hours/ week : 2

Objectives

- To enable the students to identify and analyses body cells and fluids.
- To gain technical skill in physical examination of body. **Module I**
  Smear preparation of human blood for RBC and WBC types

Module II

Haematology

a) Testing of blood group
b) Bleeding time : Duke's method
c) Blood clotting time : Wright's method

Module III

Clinical examination of urine

i) Physical examination: Volume, colour, odour, appearance, p^H, specific gravity

ii) Test for abnormal constituents of urine

a) Sugar
b) Blood
c) Albumin
d) Bile salts
e) Bile pigments
f) Ketone bodies

Module IV

Analysis of saliva

a) Amylase
b) Mucin
c) Calcium
d) Inorganic Phosphate

Suggested Readings

- Chatterjee C.C (2003), Human Physiology, Kalyani Mukherjee Publishers, Kolkata.
- Wilson K J and Waugh A, (1999), Anatomy and Physiology in Health and Disease, British library of cataloguing in publishing data, London.
- Samson and Wright (1989), 'Applied Physiology', Tandon Publications.
- Best, H. And Taylor, B (1991)'The Physiological Basis for Medical Practice', 8th Edition, The Williams and Wildins Company.
- M. Chandrasekar & Nitesh Mishra , Practical Physiology. Jaypee 2014.
- Ramnik Sood , Haematology for students and practitioners. Jaypee Publishers.

FOOD MICROBIOLOGY, SANITATION AND HYGIENE

CORE **CN5CRT12**

Credit: 3 Hours/ week : 5

Objectives

To enable the students to:

- Understand the role of micro organisms in food spoilage
- Know the need for implementing sanitary procedures and attitudes.

Module I

Contamination and spoilage of food: Sources of contamination and spoilage, Classification of foods based on perishability, General principles underlying food spoilage, factors affecting kinds and number of micro organisms in food, factors affecting the growth of micro organisms in food, chemical changes caused by microorganisms.

Module II

Contamination, spoilage and preservation of different foods:

a) Cereals and Cereal products
b) Fruits and Vegetables
c) Meat, Fish, Egg and Poultry
d) Milk and milk products
e) Fats and oils

Module III

Quality control in food industry: Microbiology in food plant sanitation, Microbiological criteria for foods, packaging and labeling of foods.

Control of microbial growth in foods : Microbial control strategies and methods of control, Measuring effectiveness of anti microbial agents, phenol coefficient, TDP, TDT, DRT (D-value, z-value, F-value).

Module IV

Introduction to Sanitation and Hygiene : Definition of sanitation and hygiene, Significance of sanitation in food industry. Personal Hygiene of food handler.

Cleaning Methods: Sterilization and Disinfection- products and methods, use of detergents, heat, chemicals, steps in cleaning utensils and equipments. Waste Product Handling – garbage and sewage disposal, Pest control.

Suggested readings

- Frazier.W.C& Westhoff.D.C (1997), Food Microbiology,Tata McGraw-Hill publishing company Ltd, New Delhi.
- James.M.J (1996) Modern Food Microbiology 4th edition, CBS 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 McGraw-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 , New Delhi.
- Adams.M.R and Moss.M.O (2000) Food Microbiology, New Age International Ltd. New Delhi.

FOOD FORTIFICATION

CORE **CN5CRT13**

Credit: 4 Hours/week : 5

Objectives

To enable the students to-

- To understand the role of fortication in national nutritional development.
- To acquire knowledge about advantages, techniques and limitations of food fortification.

Module I

Food fortification– Needs, Objectives, Principles and rationale, Selection and basis of fortificants, Fortification as means of improving nutrition, Advantages of fortification, Criteria for selecting vehicles for food fortification, Limitations, Design of fortification programme, General techniques of food fortification.

Module II

Economic aspects of food fortification, Restoration and enrichment, Technological and cost limits of fortification, Enrichment and fortification programmes in India, Organic Vs inorganic salts,Newer trends and researches in food fortification.

Module III

Fortification with vitamin A, Iron, Iodine, Safety in nutrient fortification, Multiple nutrient fortification, Nutrient interaction and bioavailability of nutrients from fortified foods, Quality assurance and control in food fortification, Steps in implementation of food fortification quality assurance programme.

Module IV

Technology of fortifying cereals, beverages, snack products : Characteristics of nutrients used in cereal fortification, Types and levels of micronutrients to be added, Fortification of breakfast cereals.

Technology of fortifying beverages: Importance of beverage fortification, Health benefits of beverage fortification.

Snack products : Rationale for micronutrient fortification of snack products, Merits and demerits of snack fortification, and bioavailability.

Suggested Readings

- Manay N.S, Shadaksharaswamy. M (2005) Foods – Facts and Principles. New Age International Publishers.
- Bamji M., Prahlad N., Vinodhini R (1998), *Text Book of Human Nutrition.* Oxford and IBH Publ. Co., New Delhi.
- Srilakshmi, B. (2005). Nutrition Science, 5th edition, New Age International Publishers, New Delhi.
- Potter N.N, Hotchkiss J.H (1996), Food Science C.B.S. Publication, New Delhi.

RESEARCH METHODOLOGY AND STATISTICS

CORE **CN5CRT14**

Credit: 4 Hours/week : 5

Objectives

To enable the students to learn

- The fundamentals of research and statistics
- Practical application of statistics in research

Module I

An introduction to research methodology: Meaning and importance of research, Objectives, Characteristics of research, Types of research, Criteria of good research, selection and formulation of research problem, Research design-Need and features.

Module II

Methods and tools of data collection: Sourcess of data-Primary, secondary and tertiary, Types of data-categorical, nominal and ordinal. Methods - Survey, observation, interview, case study. Tools - Questionnaire, Interview schedule, rating scales, other methods, Collection of secondary data.

Module III

Scientific Writing: Structure and components of scientific report, 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 and ISSN.

Module IV

Sampling and tabulation of data, Diagrammatic representation of data line and bar diagram, frequency polygon and pie diagram.

Statistical Methods and Analysis – Mean, Median, Mode, Standard deviation and Variance, Correlation, Regression analysis.

Suggested Readings

- 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 Publ. House, New Delhi.
- Pillai R.S, Bagavathi. V, (2002), Statistics, S. Chand and Company Ltd, Chennai.
- Gupta S.C (2000), Fundamentals of statistics, Himalaya Publishing House.
- Kothari, C.R (2004), Research Methodology, 2nd edition, New Age International (P) Ltd, New Delh

FOOD PRESERVATION

CORE **CN5CRT15** Credit: 4

Hours/week : 5

Objectives

To enable students to:

- To study the principles and methods of food preservation
- To understand about the various preservatives and their use in food

Module I

Principles of food preservation: Classification of food in relation to shelf life, Principles and importance of food preservation

Processing and preservation by heat : Blanching, Pasteurization, Sterilization and UHT processing, Canning, Extrusion cooking, Dielectric heating, Microwave heating, Baking, Roasting and Frying, Retort processing of ready to eat products.

Module II

Processing and preservation by low temperature : Refrigeration, CA, MA and dehydro-freezing. Food irradiation, Principles of using electromagnetic radiation in food processing, Ionizing radiation and non-ionising radiation, Advantages and disadvantages.

Module III

Processing and preservation by drying, concentration and evaporation : Various methods employed in production of dehydrated commercial products, Selection of methods based on characteristics of foods to be produced, Advantages and disadvantages of different methods, Sun-drying, tray or tunnel drying, Spray drying, Drum drying, Freeze drying ,Fluidized bed drying.

Suggested Readings

Module IV

Processing and preservation by non-thermal methods : High pressure, Hurdle technology. Use and application of enzymes and microorganisms in processing and preservation of foods, Food fermentations, Pickling, Smoking.

- 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.
- Manay N.S, Shadaksharaswamy. M (2005), Foods – Facts and Principles. New Age International Publishers.

PERSONNEL MANAGEMENT

GENERIC ELECTIVE **CN5GET16**

Credit: 3 Hours/week : 3

Objectives

To enable the students to

- Understand the management of human resources in food service establishment.
- Understand the management of material resources in food service establishment.

Module I

Organisation and management : Organisation- Definition, Functions,Types and Organization process, Management- Functions and tools of management, Technique of effective management, Energy and time management.

Module II

Food Material Management – Meaning, definition, importance, food selection, budgeting, purchasing, purchasing procedures, receiving, and receiving procedures, store-room management and store records.

Module III

Personnel Management – Recruitment, selection, induction and training of personnel, work standards, productivity, supervision, performance appraisal - objectives, modern and traditional methods, motivations, incentives for effective performance.

Suggested Readings

Module IV

Laws affecting food service operations- Hospital, Flight/Railway kitchen, Hotels, Restaurants, Canteen and Industry. Labour policies and legislation, Union and contract negations.

- Chunawalla, S.A (2000), Essentials of Management, Himalaya Publishing House, Mumbai.
- Jitendra, M.D (1999), Catering Management, Dominant Publishers and Distributors, Delhi.
- Mamoria, C.B (2000), Personnel Management, Himalaya Publishing House, Mumbai.
- Pylee, M.V and George, A.S (2007), Industrial Relations and Personnel Management, 2nd edition, Vikas Publishing House, New Delhi.
- Rao, P.S (2000), Personnel and Human Resource Management, Himalaya Publishing House, Mumbai.
- Sethi, M. and Malhan, S. (2008), Catering Management, New Age International Publishers, New Delhi.
- Jitendra, M.D (1999), Catering Management, Dominant Publishers and Distributors, Delhi.

PROTEIN TECHNOLOGY

GENERICELECTIVE **CN5GET17**

Credit: 3 Hours/week : 3

Objectives

To enable the students to-

- To understand the role of protein in nutrition and health.
- To acquire knowledge about the advancement in protein technology

Module I

Nutritional and commercial importance of proteins. Physical, chemical and functional properties of proteins.

Module II

Commercial sources of proteins: Protein concentrates and isolates- Introduction, Process of making protein isolates and concentrates, Factors affecting quality of isolates and concentrates. Treatment to isolate and concentrates.

Module III

Packaging of protein isolates and concentrates: Food as well as non-food uses of isolates and concentrates. Protein hydrolysates - Various methods of manufacturing protein hydrolysates, Factors affecting quality of hydrolysates, Food uses of hydrolysates, Fibre spinning process of proteins, Textured protein gels and expanded products, Simulated milk products, Restructured protein, Nonconventional sources of protein.

Module IV

Physical, chemical and functional properties of various proteins, Protein concentrates and isolates from different sources, Protein hydrolysate, Manufacture of texturized vegetable proteins, Protein gels and expanded products, Development of simulated milk products from soy proteins, Use of vegetable proteins as meal extenders.

Suggested Readings

- Altschul, A.M. and Wilcke, H.L. Ed. 1978. New Protein Foods. Vol. III. Academic Press, New York.
- Bodwell, C.E. Ed. 1977. Evaluation of Proteins for Humans. AVI, Westport.
- Milner, M., Scrimshaw, N.S. and Wang, D.I.C. Ed. 1978. Protein Resources and Technology. AVI, Westport.
- Salunkhe, O.K. and Kadam, S.S. Eds. 1999. Handbook of World Legumes: Nutritional Chemistry, Processing Technology and.Utilization. Volume I to III. CRC Press, Florida.
- Salunkhe, D.K. Chavan, J.K., Adsule, R.N. Kadam, S.S. 1992. World Oilseeds: Chemistry, Technology and Utilization, Van Nostrand Reinhold, New York.

FOOD TOXICOLOGY

GENERIC ELECTIVE **CN5GET18**

Credit: 3 Hours/week : 3

Objectives

To enable the students :

- To understand the different toxins present in different foods.
- To acquire knowledge about food allergens, food additives and drug residues.

Module I

Principles of Toxicology: Areas of toxicology, Dose, dose-effect, dose –response, classification of toxic agents; characteristics of exposure; spectrum of undesirable effects; interaction and tolerance; biotransformation and mechanisms of toxicity, Risk and risk assessment of toxicity, NOAEL, LOAEL, Evaluation of toxicity, Research and applications-prospective and retrospective studies, animal models as predictors of human toxicity, Legal requirements and specific screening methods, LD50 and TD50, in vitro and in vivo studies, Clinical trials.

Module II

Food additives and toxicants added or formed during food processing: safety of food additives, toxicological evaluation of food additives, food processing generated toxicants - nitroso-compounds, heterocyclic amines, dietary Supplements and toxicity related to dose, common dietary supplements, relevance of the dose, possible toxic effects.

Module III

Food allergies and sensitivities: natural sources and chemistry of food allergens, true/untrue food allergies, handling of food allergies, food sensitivities (anaphylactoid reactions, metabolic food disorders and idiosyncratic reactions), Safety of children consumables, GM foods -Safety, toxicity and allergenisity.

Module IV

Environmental contaminants and drug residues in food: fungicide and pesticide residues in food, heavy metal and their health impacts, use of veterinary drugs (e.g. Malachite green in fish and β- agonists in pork), other contaminants in food,

Suggested Readings

radioactive contamination of food, Food adulteration and potential toxicity of food adulterants.

Suggested Readings

- Helferich, W., and Winter, C.K. (2007) Food Toxicology, CRC Press, LLC. Boca Raton, FL
- Shibamoto, T., and Bjeldanes, L. (2009) Introduction to Food Toxicology, 2nd Ed. Elsevier Inc. Burlington, MA.
- Watson, D.H. (1998) Natural Toxicants in Food, CRC Press, Boca Raton, FL.
- Duffus, J.H., and Worth, H.G. J. (2006) Fundamental Toxicology, The Royal Society of Chemistry.
- Stine, K.E., and Brown, T.M. (2006) Principles of Toxicology, CRC Press.
- Tönu, P. (2007) Principles of Food Toxicology. CRC Press, LLC. Boca Raton, FL.

FOOD SCIENCE PRACTICAL

CORE **CN5CRP05**

Credit: 2 Hours/week : 2

Objectives

To enable the students to:

- Understand the effect of various cooking methods on different food groups.
- Understand the various methods of sensory analysis

Module I

a) Starch cookery
   i) Gluten formation ii)Gelatinization temperature iii)Thickening power of starch
b) Sugar cookery
   i) Stages of sugar cookery

Module II

a) Milk cookery
   i) Curd formation ii) Scum formation iii) Scorching of milk
b) Meat cookery
   i) Various cooking methods and their effect on meat ii) Meat tenderization
c) Egg cookery
   i) Characteristics of egg ii)Eggs cooked in shell
   iii)Egg white foaming

Module III

Fruits and Vegetables

i)Darkening of fruits

ii)Prevention of darkening

iii)Effect of acid and alkali on vegetable pigments

iv)Blanching

Module IV

Sensory evaluation of foods: Sensitivity tests, Duo-trio test, Triangle test, Paired comparison test.

Suggested Readings

- Clarke. D, Herbert. E (1992) Botton. E.R, (1999), Oils, fats and fatty foods, their practical application, Biotech Publishing Company.
- Eckles C.H, Combs. W.B, Macy. H (1998). Milk and Milk Products, MC Graw Hill Companies.
- Gopalan. C, Ramashathri V.V, Balasubramanyan S.C (1996), Nutritive Value of Indian Foods, National Institute of Nutrition, ICMR.
- Manay N.S, Shadaksharaswamy. M (2005), Foods – Facts and Principles. New Age International Publishers.
- Matz. S.A (1996). The chemistry and technology of cereals and food of feed; Chapman & Hall, New York.
- Peckham C.G, Greaves H.T (1979). Foundation of food preparations, Mac Millan Publishing Co, New Delhi.
- Srilakshmi B (2011), Food Science, New Age International Publications, New Delhi.

FOOD SAFETY

CORE **CN6CRT19**

Credit: 3 Hours/week : 4

Objectives

To enable the students to acquire knowledge on:

- Food safety , hygiene and food hazards
- Food regulations (national as well as international)
- Design and implementation of food safety management systems such as ISO series, HACCP and its prerequisites such as GMP, GHP etc.

Module I

Introduction to Food Safety : Definition, Types of hazards and their impact on health, biological, chemical, physical hazards, and their control measures, Factors affecting Food Safety, Hygienic Food Handling, Purchasing and Receiving Safe Food—Important points to be observed for receiving various foods.

Sanitary procedures while preparing, cooking and holding food, Safety of left over foods, Food Storage- Guidelines for storage of foods at various temperatures, Storage of Specific Foods.

Module II

Food Borne Illness and Food Hazards

Food borne illnesses caused by Bacteria, Virus and Parasites. Natural toxicants in foods, Chemicals, Antibiotics, Hormones and Metal contamination.

Module III

Food Safety Management : Basic concept, Prerequisites - GHPs, GMPs and SSOPs , HACCP, ISO series, TQM - concept and need for quality, components of TQM, Kaizen. Risk Analysis, Accreditation and Auditing (in brief)

Safety concerns in food packaging: Principles in the development of safe and protective packaging , Product labeling, Nutritional labeling and safety assessment of food packaging materials.

Module IV

Food laws and Standards**:** Indian Food Regulatory Regime, Global Scenario, Other laws and standards related to food, FPO, PFA, FSSAI, AGMARK, BIS.

GRAS and permissible limits for chemical preservatives and legal aspects for γ-irradiations.

Recent concerns in food safety: New and Emerging Pathogens. Genetically modified foods / Transgenics / Organic foods. Newer approaches to food safety.

Suggested Readings

- Lawley, R., Curtis L. and Davis,J.(2004) The Food Safety Hazard Guidebook , RSC publishing.
- De Vries. (1997) Food Safety and Toxicity, CRC, New York.
- Marriott, Norman G. (1985). Principles of Food Sanitation, AVI, New York,
- Forsythe, S J. (1987) Microbiology of Safe Food, Blackwell Science, Oxford, USA.
- Roday .S. (1999) Food Hygiene and Sanitation, Tata McGraw-Hill company Limited, New Delhi.

FOOD ADULTERATION

CORE **CN6CRT20**

Credit: 3 Hours/week : 4

Objectives

To enable the students to:

- To study different food adulterants and its impacts
- To identify the hazards from adulterants

Module I

Adulteration – Food adulteration - definition, types, natural toxins- naturally occurring toxicants in plants, mycotoxins, metal contaminants, pesticide residues, presence of extraneous material, residue from processing and packaging material, common adulterants and its detection, food grains, wheat flour, Bengal gram flour, dhal, sweet meat, milk and milk products, edible oils, ghee or butter, sugar, jaggery, honey, tea, coffee, soft drinks, spices and condiments.

Module II

Food additives - BHA or BHT, MSG, hydrolysed vegetable protein or autolysed yeast extract, potassium bromate, propyl gallate, sulfites, sodium nitrate, sodium benzoate, hydrogenated or partially hydrogenated oils.

Module III

Food colourants and sweetners – Detection and health hazards of brilliant blue, indigo, carmine, citrus red, fast green, erythrosine, allura red, tartarzine, sunset yellow, food sweetners: high fructose corn syrup (HFCS), aspartame, sucrolase, saccharin, neotame, sorbitol and non certified sweetners.

Module IV

Emulsifiers, stabilizers, thickening and gelling agents: Tara gum, soyabean, hemicelluloses, sucroglycerides, stearyl tartarate, talc, gluconic acid, candelilla wax, carbamide, argon.

Suggested Readings

- Duffus, J.H. and Worth, H.G. J. (2006) Fundamental Toxicology The Royal Society of Chemistry.
- Gerorge, A.B. (2004). Fenaroli's Handbook of Flavor Ingredients. CRC Press.
- Madhavi, D.L., Deshpande, S.S and Salunkhe, D.K. (2006). Food Antioxidants, Technological, toxicological and Health Perspective. Marcel Dekker.
- Pomeraz, Y. and MeLoari, C.E. (2006), Food Analyasis, Theory and Practice, CBS publishers and Distributor, New Delhi.

PREVENTIVE NUTRITION

CORE **CN6CRT21**

Credit: 3 Hours/week : 4

Objectives

To enable the students:

- To understand the importance of preventive nutrition in the current scenario To understand the role of Food security in National Development

Module I

Functional foods- free radicals, antioxidants, phytochemicals, prebiotics, probiotics and symbiotic. Fibre – classification, role, physiological and metabolic effect, Role of fibre in prevention of diseases.

Module II

Food security- Food Security Bill, Role of PDS, Dietary diversification, Food Revolutions, agencies for control of food losses- FCI, SGC, SWC, CWC.

Module III

Perspectives in preventive nutrition- fortification, enrichment, restoration, health supplements and proprietary foods, Nutrigenomics.

Biomolecules as antibiotics,vitamins, pigments.

Module IV

Immunization – Significance, immunization schedule for children, adults and for foreign travels, Importance of vaccination in adulthood, Role of individual, family and community in promoting health.

Suggested Readings

- Leathers, H.D. and Fosters, P., The World Food Problem: Tackling the Causes of Undernutrition in the Third World, 3rd Edition. Lynne Rienner Publishers, 2004.
- Southgate, D., Graham, D.H. and Tweeten, L., The World Food Economy, Blackwell Publishing, 2007.
- Wildman, R.E.C. (2007) Handbook of Nutraceuticals and Functional Foods, second edition. CRC Press.
- Goldberg I. *Functional Foods: Designer Foods, Pharma Foods*. 2004.
- Brigelius-Flohé, J & Joost *HG. Nutritional* Genomics: Impact on Health and Disease, Wiley VCH. 2006.
- Park. K, (2005), Park's Textbook of Preventive and Social Medicine, 18th edition, Banarsidas Bhanot Publishers, Jabalpur.
- Lalitha. M, (1997), Major Issues in Food and Nutrition Science, Kanishka Publishers, New Delhi.
- Gibney, M.J, Margetts, B.M, Kearney, J.M and Arab, L. (2005). Public Health Nutrition, Blackwell Publishing, USA.

FOOD SERVICE MANAGEMENT

CORE **CN6CRT22**

Credit: 3 Hours/week : 4

Objectives

To enable the students to:

- To develop skills in menu planning for quantity preparation.
- To understand the different styles of food service in volume feedings.

Module I

Introduction to different food service outlets: Definition of catering industry, functions, types of catering establishments, commercial catering (hotels and restaurants), welfare catering (hospital), industrial catering and transport catering. Different food and beverage service outlet.

Module II

Menu planning: Sequence of course, Technique of writing menus, Functions of menu, Types of menu – Ala carte, Table d hote and combination menu, novelle cuisine, Different types of cuisines, Types of service, Styles of service, Services available in restaurant.

Module III

Equipments in food service: Classification of equipments, factors for selection of equipments, Service equipments, Care and use of equipment. Kitchen layout-Types of kitchen, location and layout.

Module IV

Staff organization of different outlets – manager, hostess, supervisor, steward, waiter. Uses of bills and checks on control system outlets.

Suggested Readings

- Anderson, F. (1996), Home Appliance Servicing Taraporwals Sons. & Co.
- Arora, K., (2002), Theory of Cookery, Frank Bros. & Co., Ltd., New Delhi.
- Berry, M., (1995), Complete Cook Book, Dorling Kindersley Ltd., London.
- Hsiung, D.T., (1994), Chinese Cantonese Cooking, Parragon Book Service Ltd., England.
- Johnson, J.B, (1995), Equipment for Modern Living, Macmillan company Ltd
- Khan, M.A. (1987), Food Service Operations, Avi Publishing Company.
- Lillicrap, D.K., (1989), Food and Beverage Service, 2nd edition, BLBS.
- Shiring, S.B., Jardine, R.W. and Mills, R.J (2000), Introduction to Catering, Thomson Asia Ltd., Singapore.
- Kinton, R. and Cesarani, V. (1999), The theory of catering, ELBS publishing.
- Varghese, B. (1999), Professional Food and Beverage Service Management, Macmillan India Ltd.
- Sethi, M and Malhan, S (1991), Catering Management, Wiley Eastern Ltd,

NUTRITION IN SPECIAL CONDITIONS

CORE **CN6OCT23**

Credit: 3 Hours/week : 3

Objectives

To enable the students to:

- Understand the physiological changes occur during special conditions
- To gain knowledge about the nutritional requirement and the special foods developed through research

Module I

Sports Nutrition: Nutritional requirement and RDA for athletes, suggested RDA for different sports activities, dietary guidelines for athletes, high performance

diet, carbohydrate loading, dietary supplements in sports, weight and body composition of athletes, sports anaemia, pre- event meals.

Module II

Space Nutrition: Physiological changes during space flight, types of space foods, space shuttle food system, and essential quality criteria required for space foods.

Module III

Nutrition in High altitude: Physiological changes, nutritional requirement, food supplements, special foods.

Sea voyages: Food on board, possible socio cultural and psychological causes for malnutrition, psychosocial and physical stress, diet pattern.

Module IV

Military Nutrition: Nutritional requirement, contemporary military nutrition, nutrition in the wounded, ration developed by DRDO, combat rations, role of neutraceuticals and adaptogens to minimize stress and optimize effectiveness.

Suggested Readings

- Bamji, M.S, Reddy, V. (1998), Text Book of Human Nutrition, Oxford & IBH Publishing Co, New Delhi.
- Gibney M.J, Elia M Ljingquist. O (2005), Clinical Nutrition, Backwell Science Publishing Co.
- Robinson C.H and Winely E.S, (1984). Basic Nutrition and Diet Therapy, Macmillian Pub. Co. New York .
- Swaminathan, M. (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing Company Ltd.
- Guthrie, H.A & Picciano, M.F (1995), Morby Publishing Co, New York.
- Srilakshmi, B. (2005). Dietetics, New Age International Publishers, New Delhi.

EPIDEMIOLOGY

CORE **CN6OCT24**

Credit: 3 Hours/week : 3

Objectives

To enable the students to-

- To understand the role of epidemiological approach in disease prevention.
- To acquire knowledge about the water and waste management.

Module I

Concept of Epidemiology: Study of the epidemiologic approach-determinants of disease preventive & social means, vital statistics and their significance. Principles of disease control

Module II

Secondary Sources of Community Health data: Sources of relevant vital statistics of infant, child & maternal mortality rates.

Module III

Immunization: Importance and schedule of Immunization for children, adults and for foreign travels, role of individual, family and community in promoting health.

Module IV

Water and Waste Management: Importance of water to the community, etiology and effects of toxic agents, water borne infectious agents, sources of water, safe drinking water, potable water, treatment of water for drinking purpose, waste and waste disposal, sewage disposal and treatment, liquid waste disposal.

Suggested Readings

- Smith, G.W.: Preventive Medicine and public health. 2nd edition. Macmillan Co. New York.
- Park: Park's Textbook of preventive and Social Medicine. M/s. Banarasidas Bhanot. Jabalpur.
- Lalitha. M, (1997), Major Issues in Food and Nutrition Science, Kanishka Publishers, New Delhi.

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

INFORMATION TECHNOLOGY

CORE **CN6OCT25**
Credit: 3 Hours/week: 3

Objectives
To enable the students :

- To understand the fundamentals of computer applications.
- To understand the practical applications of computer in nutrition science.

Module I

Computer Fundamentals: Computer Organization, Characteristics of computers, Input-Output Devices, Primary - Secondary memory, Hardware and Software, Types of Computers, Computer Languages, operating systems.

Module II

Computer arithmetic: Binary number system- addition, subtraction, multiplication and division. Conversion- binary to decimal, octal, and hexadecimal, conversion from hexadecimal, octal, decimal to binary.

Module III

Spread sheet packages: Spreadsheet concepts, Basic operations in EXCEL, Working with Charts, Formatting worksheets, Functions - Mathematical, Logical, Statistical, Text and Date and Time functions, Goal Seek, Scenarios, Auditing, Important Data menu commands.

Module IV

Use of computers in the field of nutrition - patient registration, diet prescription, counseling, research applications. Softwares in nutrition research: DIETCAL, WHO ANTHRO PLUS, ESHA etc. Statistical packages in research- SPSS, ATLAS.ti, Plagiarism softwares.

Search engines, browsers, e-mail etiquettes.

Suggested Readings

- Computer Fundamentals – P. K. Sinha and Priti Sinha
- Foundations of Computing – P. K. Sinha and Priti Sinha
- MS DOS 6.2 Quick Reference – Rajiv Mathur
- Microsoft Office for Windows – Steve Sagman
- MS Office 2000 – Dinesh Maidasani, Firewall Media

MEAL MANAGEMENT PRACTICAL

CORE **CN6CRP06**

Credit: 2 Hours/week : 4

Objectives

To enable the students to:

- Learn the principles of meal planning
- Plan and prepare meals for the family members at different income levels and different physiological status

Module I

Basic principles of meal and menu planning.

Daily food guide – Basic five food groups, food pyramid, My plate, use of food groups, food costing.

Module II

Plan and prepare a diet for

a) Sedentary pregnant woman
b) Lactating mother (0 – 6 months)
c) Infant (0 – 6 months)

Module III

Planning and prepare a diet for

a) a pre-school child (1-3 years)
b) a school going child (boy and girl of 7- 9 years)
c) an adolescent (boy and girl 17 – 19 years)

Module IV

Plan and prepare a diet for

a) sedentary, moderate and heavy worker (male and female)
b) a senior citizen
c) a middle income family

Suggested Readings

- Guthrie, H.A. (1985), Introductory Nutrition, 6th edition, Mosby Publication, St. Louis.
- Mudambi, S.R and Rajagopal M.V, Fundamentals of food and nutrition, Wiley Eastern Ltd., New Delhi – 19.
- Recommended Dietary Intake for Indians, ICMR (2010)

PROJECT

CORE **CN6PRP07**

Credit: 2 Hours/week : 2

Objectives

To enable the students to:

- To initiate research work among students

INSTRUCTION

The students will be guided and supervised by a member of the teaching faculty of the concerned department. The project in which the research culminates should reflect the student's own work.

ON JOB TRAINING

CORE **CN6OJP08**

Credit: 1

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 three case studies in order to familiarize various diseases and dietary management.
2. Assignment – 1
3. Seminar – 1
4. Project report – Presentation and viva

20. MODEL QUESTIONS

B.Sc CLINICAL NUTRITION AND DIETETICS

CN1CRT01 –BASIC NUTRITION

Time: 3Hrs **Maximum Marks: 80**

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. Define health.
2. Define BMR
3. Differentiate between monosaccharides and disaccharides.
4. What are essential amino acids? List the essential amino acids.
5. What is water intoxication?
6. Which are the symptoms of good health?
7. Differentiate between soluble and insoluble fibre
8. What is PAL?
9. Classify lipids.
10. What is hypernatremia?
11. What is REE?
12. What is My Plate? **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. Explain the components of dietary fibre.
14. Which are the basic four food groups?
15. Explain the role of fat in the body.

16. Briefly explain the mechanism of thirst.
17. Which are the factors affecting PAL?
18. Explain the sources, requirement and functions of potassium in body.
19. Explain the digestion of protein.
20. Comment on the distribution of water in body.
21. Explain the digestion of lipids. **(6 x 4 = 24 marks)**

PART C

III. Answer any 3 questions. Each question carries 6 marks

22. Which are the methods adopted to measure total energy requirement?
23. Explain the classification of carbohydrates.
24. How can we determine the energy value of food?
25. Which are the different protein quality evaluation methods?
26. Which are the different forms of fat present in food? **(3 x 6 = 18 marks)**

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. What is malnutrition? Explain the different forms of malnutrition.
28. What is BMR? Which are the factors that affect BMR?
29. Explain the functions, digestion, absorption and transport of carbohydrates?
30. Explain the role of dietary fibre. **(2x10 =20 marks)**

CN1CRT02 –BASIC DIETETICS

Maximum Marks: 80

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. What are the purposes of diet therapy?
2. What is meant by refeeding syndrome?
3. What is meant by influenza? Write the symptoms of influenza.
4. What is meant by binge eating disorder?
5. What is meant by food sensitivity?
6. List out the conditions in which tube feeding is used.
7. Which are the symptoms of allergy?
8. Write the metabolic changes in fever.
9. What is meant by diet counseling?
10. Discuss about causes and types of fever.
11. Describe the four stages of AIDS.
12. What is meant by soft diet? **(9 x 2 = 18 marks)**

PART B

II. Answer any 6 questions. Each question carries 4 marks.

13. Briefly explain the psychology of feeding the patient.
14. Explain the etiology of underweight.
15. Explain tube feeding.
16. Which are the different measures used in the assessment of obesity?
17. Discuss about the nutritional and food requirements in underweight.
18. Write about the nutritional requirements in tuberculosis.
19. Explain TPN.
20. Write about the complications of obesity.

21. Explain the uses of computers by dietitian. **(6 x 4 = 24 marks)**

PART C

III. Answer any 3 questions. Each question carries 6 marks

22. Explain the role of dietitian in hospital and community.
23. Explain the causes, symptoms and dietary management of Typhoid.
24. Write about anorexia nervosa and bulimia nervosa.
25. Write about types and symptoms of skin disturbances.
26. Which are the different types of foods involved in food sensitivity?

(3 x 6 = 18 marks)

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain the routine hospital diets.
28. Explain AIDS under the following heads:
    a) Manifestations
    b) Nutritional Problems
    c) Nutriti*onal Requirements*
29. Explain obesity under the following heads:
    a) Etiology
    b) Types
    c) Dietary Management.
30. Explain diagnosis and treatment of food allergy. **(2 x 10 =20 marks)**

CN1CRT03 – FAMILY MEAL MANAGEMENT - I

Maximum Marks : 80

PART A

I . Answer any 9 questions. Each question carries 2 marks

1. What is meant by balanced diet?
2. What is transition milk?
3. What is meant by LBW babies?
4. What is meant by pre-term baby?
5. What is Beikost?
6. Briefly explain the role of placenta in pregnancy?
7. Why do energy needs increase during pregnancy?
8. Hormonal control of calcium metabolism during pregnancy?
9. What is meant by spina bifida?
10. Write down relationship between maternal and foetal nutrition?
11. What is meant by Lactogogues?
12. Write down the hormones which control lactation? **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. What are the factors affecting the volume and composition of breast milk?
14. Explain the process of stimulation of milk production?
15. What are the general dietary problems during pregnancy?
16. Explain the physiological changes of pregnancy?
17. What is four food group system?
18. What are the immunological benefits of breast milk?
19. Nutritional requirements of a pre-term baby?
20. What are the points to be considered in introducing weaning foods?

21. Comment on DBM and EBM. **(6 x 4 = 24 marks)PART C**

III. Answer any 3 questions. Each question carries 6 marks

22. Explain basic principles of menu planning?
23. What are the complications of pregnancy?
24. Nutritional requirements of a sedentary lactating mother?
25. What are the general dietary problems of a pregnant woman?
26. What is meant by weaning and explain its importance?

(3 x 6 = 18 marks)

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain nutritional requirements of a pregnant woman? Write any 5suggested Recipes and its reason?
28. Explain the nutritional and food requirements of an infant.
29. Explain the advantages of breast feeding and disadvantages of bottle feeding.
30. What is RDA? Write down their uses and limitations. What are the important points to be considered while planning menu? **(2 x 10 =20 marks)CN1CMT01 –**

FUNDAMENTALS OF BIOCHEMISTRY

Maximum Marks: 80

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. Differentiate between acidosis and alkalosis?
2. Write about genetic code?
3. Differentiate between molarity and molality?
4. Define oxidative phosphorylation?
5. What are prostaglandins? Comment on its classification?
6. What are enzymes? Give its classification?
7. Differentiate between endocytosis and exocytosis?
8. Comment on active transport?
9. Explain the role of mitochondria in ETC?
10. Differentiate between passive diffusion and facilitated diffusion?
11. Comment on ping –pong mechanism?
12. Explain structural difference between DNA and RNA? **(9 x 2 = 18 marks)**

PART B

II. Answer any 6 questions. Each question carries 4 marks.

13. Explain the mechanism of transport of macromolecules?
14. Explain the classification of high energy compounds?
15. Explain the inhibitors involved in oxidative phosphorylation?
16. Give the classification and composition of nucleic acids?
17. Define prostaglandins? Explain its biosynthesis?
18. Explain the characteristics of genetic code?
19. Explain the types of RNA?
20. Explain the uses of enzymes? **(6 x 4 = 24 marks)**

PART C

III. Answer any 3 questions. Each question carries 6 marks

21. Explain the mechanism of oxidative phosphorylation?
22. Explain DNA repair?
23. Describe biological effects of prostaglandins?

24. Explain properties and mechanism of action of enzymes?

25. Explain DNA replication?

26. Comment on diagnostic value of serum enzymes. **(3 x 6 = 18 marks)**

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain electron transport chain?

28. Explain protein synthesis?

29. Write on factors affecting enzyme activity?

30. Write on transport of molecules across cell membrane? **(2 x 10 =20 marks)**

Time: 3Hrs

B. Sc CLINICAL NUTRITION AND DIETETICS

CN1CMT02 – HUMAN ANATOMY AND PHYSIOLOGY-I

Maximum Marks: 80

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. What is GFR?
2. Functions of Pancreas.
3. What is homeostasis?
4. What are cell junctions?
5. What is xerostomia?
6. What is Cell?
7. Write a note on gall bladder.
8. Parotid Gland.
9. Cholecystokinin.
10. Vermiform appendix.
11. Different types of tissues.
12. Dentition. **(9 x 2 = 18 marks)**

PART B

II. Answer any 6 questions. Each question carries 4 marks.

13. Explain the functions of liver.
14. Comment on the movements in G.I system.
15. Write a note on the abnormal constituents in urine.
16. Explain the hunger and thirst mechanism.
17. Explain the endocrine functions of kidney.
18. Explain role of different organ systems in homeostasis.

19. Explain the structure of mitochondria as a cell organelle.
20. Explain the structure of intestinal villi.
21. What are the factors affecting urine formation and urine volume.

(6 x 4 = 24 marks)

PART C

III. Answer any 3 questions. Each question carries 6 marks

22. Explain the feedback mechanism for homeostasis.
23. Comment on juxtaglomerular apparatus.
24. Explain the structure of tooth with the help of a diagram.
25. Elaborate the structure of kidney with the help of a diagram.
26. Explain the different body fluids. **(3 x 6 = 18 marks)**

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain the mechanism of urine formation.
28. Describe the various digestive glands and its role in digestion.
29. Explain the regulation of acid base balance in the body.
30. Explain the mechanism of digestion in the body.

(2 x 10 =20 marks)

CN2CRT04 – ADVANCED NUTRITION

Maximum Marks: 80

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. What are the functions of copper?
2. Comment on the inter-relationship between zinc and vitamin A.
3. What is haemolytic anaemia?
4. What is osteomalacia?
5. What are the causes for vitamin A deficiency?
6. What is the role of vitamin K in blood clotting?
7. What are the functions of riboflavin?
8. Comment on biotin deficiency.
9. What is siderosis?
10. What are the causes of iron deficiency anaemia?
11. What are the functions of iodine?
12. List any four sources of thiamine. **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. What are the manifestations of riboflavin deficiency?
14. Explain the 3 D's of pellagra.
15. Explain the role of vitamin C in the body.
16. Briefly explain the functions of vitamin B6.
17. What is the role of B vitamins in energy metabolism?
18. Briefly explain vitamin C deficiency.
19. What are the functions of vitamin E?

20. Comment on the disorders of iron metabolism.

21. Explain the role of folic acid in the body. **(6 x 4 = 24 marks)PART C**

III. Answer any 3 questions. Each question carries 6 marks

22. Explain the causes and symptoms of thiamine deficiency?

23. Explain the absorption and metabolism of iodine.

24. Comment on deficiency and toxicity of copper.

25. Explain the functions and deficiency of zinc.

26. Comment on the spectrum of IDD. **(3 x 6 = 18 marks)**

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain the role of calcium in our body

28. Explain the risk factors of osteoporosis

29. Explain the functions and deficiency of vitamin A.

30. Explain the functions, sources, deficiency and toxicity of fluorine in our body?

(2x10 =20 marks)CN2CRT05 – CLINICAL NUTRITION

Maximum Marks: 80

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. What is oesophagitis?
2. What is Bland diet?
3. Comment on Diverticulitis.
4. Differentiate between Type I and Type II diabetes.

5. What is GALT?
6. How can you manage a person suffering from burns?
7. What is Glycemic Index?
8. Comment on MSUD.
9. Explain the role of fibre in constipation.
10. What is ulcer? Which are the different types?
11. Write short note on gout.
12. Write about homocystinuria. **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. Briefly explain gastritis.
14. Write on the causes and treatment of diarrhoea.
15. Briefly explain the symptoms of Diabetes.
16. What is the importance of medical nutrition therapy in Trauma?
17. Explain the term Tyrosinemia.
18. What is Gestational diabetes?
19. Explain Lactose intolerance.
20. What is inflammatory bowel disease?
21. Comment on SIRS and MODS. **(6 x 4 = 24 marks)**

6 marks

PART C

III. Answer any 3 questions. Each question carries

22. Explain the different types of constipation.
23. Explain Malabsorption syndrome.
24. Which are the different methods for the detection of Diabetes?
25. What are the complications of Diabetes?
26. What is galactosemia? Give its dietary management. **(3 x 6 = 18 marks)**

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. What is peptic ulcer? Explain its causes, symptoms and dietary management.
28. Explain Phenylketonuria and its symptoms. How can you diagnose it? Give its dietary management
29. What is Diabetes mellitus? Explain the causes and dietary management.
30. Explain the importance of medical nutrition therapy in surgical condition

(2 x 10 =20 marks)

CN2CRT06 –FAMILY MEAL MANAGEMENT -II

Maximum Marks: 80

PART A

I . Answer any 9 questions. Each question carries 2 marks

1. What are the symptoms of marasmus?
2. What is Pica?
3. What is meant by Corneal Xerosis?
4. What is Binge Eating Disorder?
5. Define Reference man.
6. Write down the causes of constipation in school children?
7. Discuss the modifications of calorie requirements during old age?
8. What are the causes of osteoporosis in geriatrics?
9. How can you prevent dental problems in children?
10. Write a note on Anaemia in adolescents.
11. Write a note on packed lunch.
12. What is meant by premenstrual syndrome? **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. Give the RDA for a 5 year old child.
14. Write down two recipes rich in vitamin A Suitable for a preschool child.
15. Plan a packed lunch for a 12 year old boy.
16. Explain the role of mid- day meal programme in alleviating malnutrition.
17. Explain Anorexia and Bulimia Nervosa.
18. Explain the common nutrient deficiencies in adolescents.
19. What are the reasons for malnutrition during old age?
20. Bring out the importance of calcium and fibre during old age.
21. Comment on feeding problems of preschoolers. **(6 x 4 = 24 marks)**

PART C

6 marks

III. Answer any 3 questions. Each question carries

22. Explain the nutritional problems during old age.
23. Explain the points to be considered in planning diets for school children.
24. Give the clinical symptoms of vitamin A deficiency.
25. Plan a day's diet for a 4- year old child from low income group.
26. Discuss the eating disorders of adolescents.**(3 x 6 = 18 marks)**

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain the nutritional requirements and dietary guidelines of a preschool child?
28. Explain the nutritional requirements of adolescents. Plan a day's diet of an adolescent girl suffering from nutritional anaemia?
29. Why is osteoporosis common during old age? What are the risk factors? Explain the preventive methods
30. Write about the food habits of school children. How can one modify the food habits?

Write down the importance of breakfast. **(2 x 10 =20 marks)CN2CMT03 –GENERAL BIOCHEMISTRY**

Maximum Marks: 80

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. What is restriction endonuclease?
2. What is a vector?
3. What is southern blotting?
4. What is DNA ligase?
5. What is host cell?

6. Define biofertilisers.
7. Write a note on pesticide residue.
8. List down the advantages of using biopesticides.
9. What is DNA profiling?
10. What are pesticides? How are they classified?
11. What is a plasmid?
12. Write a note on different types of biofertilisers? **(9 x 2 = 18 marks)**

PART B

II. Answer any 6 questions. Each question carries 4 marks.

13. Explain the applications of blotting technique.
14. Explain the significance of using biofertilisers
15. Explain different types of vectors.
16. Give the classification of artificial fertilizers.
17. Explain the benefits of using bioplastics
18. Explain the medicinal applications of radioactive isotopes.
19. Comment on applications of DNA profiling
20. Explain DNA sequencing.
21. Explain the applications of genetic engineering. **(6 x 4 = 24 marks)PART C**

III. Answer any 3 questions. Each question carries

22. Write down the steps involved in genetic engineering.
23. Explain the importance of DNA analysis for environmental monitoring
24. Explain the applications of radioactive isotopes
25. Explain recycling codes of plastics
26. Write down the health hazards of artificial fertilizers and pesticides

(3 x 6 = 18 marks)

6 marks

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain techniques and applications of gel electrophoresis and DNA sequencing.

28. Explain the role of DNA in disease diagnosis and medical forensics.

29. Explain the importance of DNA in genetic disease diagnosis.

30. Explain DNA fingerprinting and blotting techniques. **(2 x 10 =20 marks)**

B.Sc. CLINICAL NUTRITION & DIETETICS
CN2CMP01 - BIOCHEMISTRY PRACTICAL I

Time: 2 hrs **Max. Mark: 80**

I. Answer any one

a) Estimate the amount of creatinine present in a day's excretion of given urine sample

b) Estimate the amount of urea present in a day's excretion of given urine sample

c) Estimate the amount of phosphorus present in a day's excretion of given urine sample

d) Estimate the amount of ascorbic acid present in a day's excretion of given urine sample

(Marks: 35) **II.**

Identify the given sugar sample for

a) Glucose

b) Fructose

c) Maltose

d) Lactose

(Marks: 25)

III Lab record (Marks: 10)

IV Viva (Marks: 10)

B.Sc CLINICAL NUTRITION AND DIETETICS

CN2CMT04 –HUMAN ANATOMY AND PHYSIOLOGY II

Time: 3Hrs **Maximum Marks : 80**

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. Differentiate phagocytosis and pinocytosis.
2. Write about Chloride shift.
3. Comment on inspiratory muscles.
4. What you meant by greater circulation?
5. Write the sequence of reactions in blood clotting.
6. What are antigens?
7. Differentiate RBCs and WBCs.
8. Comment on cardiac output.
9. Write a note on spleen.
10. What is laboured breathing.
11. Discuss on AMI and CMI
12. What is GALT? **(9 x 2 = 18 marks)**

PART B

II. Answer any 6 questions. Each question carries 4 marks.

13. How lymph is formed.
14. Comment on respiratory tree 15.Write the factors leading to oedema.
16. Differentiate arteries and veins.
17. Write a note on ABO blood gr oup system.
18. Discuss different types of Antibodies.
19. Explain the functions of plasma proteins.
20. Comment on different lung volumes.

21. Comment on artificial respiration. **(6 x 4 = 24 marks)PART C**

III. Answer any 3 questions. Each question carries 6 marks

22. Describe the mechanism of inspiration.
23. Explain the functions of lymph glands.
24. Draw and label the structure of human heart and add a note on special conducting tissues of heart. .
25. Comment on Helper T cells and cytokines.
26. How does CO_2 transported through blood. **(3 x 6 = 18 marks)PART D**

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain various types of immunity with suitable examples.
28. Discuss the events occurring in heart during each beat.
29. Explain the mechanism involved in the process of respiration.
30. Discuss the different lymphoid organs in human body. **(2 x 10 =20 marks)**

B.Sc. CLINICAL NUTRITION & DIETETICS
CN2CMP02 HUMAN PHYSIOLOGY PRACTICAL I

Time: 2 hrs **Max. Mark: 80**

I. Answer any one

Enumerate the WBC present in $mm^{3\ of}$ the given blood sample

Or

Enumerate the RBC present in $mm^{3\ of}$ the given blood sample

Or

Find the haemoglobin and haematocrit value of the given blood sample

(Marks: 25)

II. Calculate the MCV, MCH, MCHC and CI of blood from the given lab values

(Marks: 15)

III. Identify, sketch and label the given slide

(Marks: 20)

IV. Lab record (Marks: 10)

V. Viva (Marks: 10)

B.Sc CLINICAL NUTRITION AND DIETETICS

CN3CRT07 –THERAPEUTIC NUTRITION

Time: 3Hrs **Maximum Marks: 80**

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. What is hypertension? Which are the types?
2. Write the beneficial effects of PUFA.
3. What is meant by functional foods? Give example.
4. What is DASH diet?
5. Write about the protective action of dietary fibre in cancer.
6. What is meant by Cholecystitis and Cholelithiasis?
7. Discuss the clinical symptoms of glumerulonephritis.
8. What is Cancer?
9. What is meant by fatty globulation of liver?
10. What is meant by acid ash diet and alkaline ash diet?
11. What is meant by cancer cachexia?
12. Write about prebiotics and probiotics. **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. Which are the risk factors of cancer?
14. Explain pancreatitis.
15. Briefly explain the role of fat in the development of atherosclerosis.
16. Explain the nutritional problems of cancer therapy.
17. Briefly explain urolithiasis.
18. Briefly explain the causes, symptoms and dietary management of hypertension.
19. Explain about hyper cholesterolemia.
20. Write about sodium restricted diet & dangers of severe sodium restriction.
21. Write about the agents responsible for liver damage.

(6 x 4 = 24 marks) **PART C**

III. Answer any 3 questions. Each question carries 6 marks

22. Explain the types, dietary management and drawbacks of dialysis.
23. Explain the general systemic reactions in cancer.
24. Explain the symptoms and dietetic management of infective hepatitis.
25. Briefly explain the causes, symptoms and dietary management of nephritis and nephrosis.
26. Explain the following:
    a) Nutritional requirements in cancer
    b) Hepatic encephalopathy. **(3 x 6 = 18 marks)**

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain CVD under the following heads:
    a) Risk factors
    b) Dietary management.
28. Explain the causes, symptoms and dietary management of acute and chronic Renal failure.
29. Explain the role of food in the prevention of cancer.
30. a) Which are the damages caused to liver?
    b) What is cirrhosis? Explain aetiology, symptoms and dietary management of cirrhosis. **(2 x 10 =20 marks)**

B.Sc CLINICAL NUTRITION AND DIETETICS

CN3CRT08 –FOOD COMMODITIES -I

Time: 3Hrs **Maximum Marks: 80**

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. What is meant by blanching?
2. What is ARF?
3. What is meant by TVP?
4. What is corn germ oil?
5. What are the different types of parboiling?
6. Write a note on Favism?
7. What is parched rice?
8. What are the different types of rancidity?
9. Nutritional importance of garden cress seeds?
10. Write a note on Smoke point and flash point?
11. Write a note on Aflatoxin?
12. What is meant by flavour reversion? **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. Explain the toxic constituents present in nuts and oil seed?
14. What are the different types of moist heat methods?
15. Write a note on microwave cooking?
16. Explain the process of milling of rice?
17. Explain nutritional importance of green leafy vegetables?
18. What are the different soy products available in markets?
19. Differentiate between enzymatic and non-enzymatic browning?
20. Nutritional importance of pulses in our daily life?
21. What are the changes occur during fruit ripening. **(6 x 4 = 24 marks)PART C**

III. Answer any 3 questions. Each question carries 6 marks

22. Explain antinutritional factors found in pulses?
23. Draw and explain the structure of a cereal grain?
24. What are the objectives of cooking?
25. Effect of moist heat and dry heat on cereal starch?
26. Explain nutritional importance of different nuts and oil seeds? **(3 x 6 = 18 marks)**

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain composition and nutritive value of vegetables?
28. Explain different methods of processing and refining of edible oil?
29. Explain wheat under the following heads:
    a) Milling.
    b) Products.
30. Explain different methods of cooking food? **(2 x 10 =20 marks)**

B.Sc CLINICAL NUTRITION AND DIETETICS

CN3CRT09 –COMMUNITY NUTRITION

Time: 3Hrs **Maximum Marks: 80**

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. Give the role of ICDS in preventing vitamin A deficiency?
2. Explain prevalence of anaemia in India?
3. What is BMI? How do you classify malnutrition using this index?
4. Write about the prevalence of PEM in India?
5. Explain different methods of nutritional assessment?
6. Comment on SNP and ANP?
7. Comment on CARE?
8. Give the list of biophysical or radiological measures used in deficiency diseases?
9. Explain the need for nutrition education?
10. How will you implement a nutrition education programme?
11. Comment on problems encountered in nutrition education?
12. What is the best vehicle to fortify iodine? **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. Explain the role of nutrition and heath in national development?
14. Write about the classification of PEM?
15. Give the clinical symptoms of vitamin A deficiency? 16.Explain clinical findings of iron deficiency anaemia?
17. Explain the importance of clinical examination?
18. What are the communication methods used in nutrition education?
19. Writ about ICMR?
20. Give the importance of mid day meal programme?

21. Explain the importance of antenatal and post natal care. **(6 x 4 = 24 marks)PART C**

III. Answer any 3 questions. Each question carries 6 marks

22. Write about relation between nutrition and infection?

23. Write about causes and preventive measures of iron deficiency anaemia?

24. Write about different anthropometric measurements?

25. Explain causes and preventive measures of vitamin D deficiency?

26. Explain the role of ICDS in preventing malnutrition? **(3 x 6 = 18 marks)**

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Write about causes and preventive measures of PEM, IDD and VAD?

28. Explain the role of international agencies in combating malnutrition?

29. Explain the contributions of NIN and CFTRI?

30. Explain dietary assessment methods? **(2 x 10 =20 marks)**

B.Sc CLINICAL NUTRITION AND DIETETICS

CN3CMT05 – NUTRITIONAL BIOCHEMISTRY

Time: 3Hrs **Maximum Marks: 80**

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. Define TCA cycle.
2. What is gluconeogenesis?
3. What is the significance of lactate formation in anaerobic condition?
4. What is the fate of ammonia in human body?
5. What are eicosanoids?
6. What are reducing sugars? Give examples.
7. Differentiate between aldoses and ketoses.
8. What is transdeamination?
9. What are omega-3 and omega -6 fatty acids?
10. Write the significance of HMP shunt pathway.
11. What is ketoacidosis?
12. What is amino acid pool? **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. Write the classification of unsaturated fatty acids.
14. How lactose is synthesized in the mammary gland 15.What are the metabolic adaptations during starvation?
16. Differentiate deamination and transamination.
17. Explain Lipolysis.
18. Write the steps involved in the synthesis of pentose sugar from hexose sugar.
19. Define glycolysis and write the salient features of the same.
20. Explain the synthesis of bile acids from cholesterol.
21. What are the metabolic adaptations during DM? **(6 x 4 = 24 marks)PART C**

III. Answer any 3 questions. Each question carries 6 marks 22. Explain the adaptive mechanisms of human body during exercise.

23. Explain Beta- oxidation of fatty acids in detail.
24. How much energy is produced on complete oxidation of one molecule of glucose under aerobic condition?
25. Discuss the structure of proteins.
26. What are the metabolic changes in Diabetes? **(3 x 6 = 18 marks)PART D**

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain the metabolic interrelationship of macronutrients.
28. Write the pathway of gluconeogenesis. Write its significance also.
29. Explain the general metabolic pathways of amino acids
30. Explain endogenous cholesterol synthesis **(2 x 10 =20 marks)**

B. Sc CLINICAL NUTRITION AND DIETETICS

CN3CMT06 – HUMAN ANATOMY AND PHYSIOLOGY-III

Time: 3Hrs **Maximum Marks: 80**

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. What are hormones?
2. What is Parturition?
3. What is Sarcomere?
4. What is goiter?
5. What is fertilization?
6. What is endomysium?
7. What is thoracic cage?
8. Puberty
9. What is patella?
10. ADH
11. List the functions of FSH.
12. Muscles of Diaphragm **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. Comment on fontanelles.
14. Differentiate the types of muscles.
15. Write a note on pelvic girdle.
16. Explain the development of fertilized ovum.
17. Explain the role of thyroxin.
18. Explain the structure of sarcomere with the help of a diagram.
19. Draw the structure of sperm and explain.
20. What are the roles of reproductive hormones in our body?

21. Draw the structure of nerve cell and explain. (6x4= 24 marks)

PART C

III. Answer any 3 questions. Each question carries 6 marks 22. Classify vertebral bones and explain the structure of a typical vertebra.

23. Explain the structure of placenta with its functions.

24. Explain the organisation of a muscle with the help of a diagram.

25. Explain the structure of pituitary gland and describe its functions.

26. Explain the male reproductive system and the glands associated with it.

(3 x 6 = 18 marks)

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain the disorders caused due to hypo and hyper secretion of hormones.

28. Describe the biochemical events in muscular contraction.

29. Explain female reproductive system with the help of a diagram.

30. Describe the two outstanding events in human sexual cycle

(2 x 10 =20 marks)

B. Sc CLINICAL NUTRITION AND DIETETICS

CN4CRT10 – GENERAL MICROBIOLOGY

Time: 3Hrs **Maximum Marks: 80**

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. What are nosocomial infections?
2. What is meningitis?
3. What is Lyophilisation?
4. What is commensalism?
5. What are the main characteristics of fungi?
6. What are SV?
7. What are interferons?
8. What is Leptospirosis?
9. What is UTI?
10. What is bacteriophage?
11. What is tyndallisation?
12. What are pyrenoids? **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. Describe the motility in bacteria.
14. Comment on yeast reproduction.
15. Write a note on mould mycelium.
16. Explain opportunistic pathogens.
17. Explain the different staining methods.
18. Write short note on spirogyra.
19. Explain the structure of bacteriophage.
20. Comment on the morphology of yeast cell with the help of diagram.
21. Explain clinical features of common infection. **(6 x 4 = 24 marks)PART C**

III. Answer any 3 questions. Each question carries 6 marks

22. Explain the beneficial effect of microorganism.

23. Comment on the morphology of bacteria.

24. Explain the mode of multiplication in viruses.

25. Elaborate the causes and symptoms of malaria.

26. Explain the indirect methods for observation of microorganisms

(3 x 6 = 18 marks)

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain the different culture techniques.

28. Describe the various factors affecting growth curve.

29. Explain the reproduction in bacteria.

30. Explain the economic importance of algae.

(2 x 10 =20 marks)

B.Sc CLINICAL NUTRITION AND DIETETICS

CN4CRT11 – FOOD COMMODITIES II

Time: 3Hrs **Maximum Marks: 80**

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. What is clarification?
2. Give the classification of beverages. Give examples.
3. Which are the factors affecting the quality of tea?
4. What is meant by MSG?
5. Write the properties of sugar and related products.
6. What is meant by tenderizing of meat?
7. Write the role of egg in cookery.
8. Write about the post-mortem changes in meat.
9. Which are the points to be considered in selection of fish?
10. What is ageing of meat?
11. Which are the constituents of coffee?
12. Which are the different types of spoilage occur in fish? **(9 x 2 = 18 marks)**

PART B

II. Answer any 6 questions. Each question carries 4 marks.

13. Explain the processing of milk.
14. Explain about the various raising agents.
15. Which are the different stages of sugar cookery?
16. Give the structure of egg.
17. Which are the steps in cheese preparation?
18. Describe the composition and nutritive value of fish.
19. Which are the factors affecting egg white foams?
20. Explain the manufacture of different types of tea.
21. Comment on different types of milk. **(6 x 4 = 24 marks)**

PART C

III. Answer any 3 questions. Each question carries 6 marks

22. Explain the composition and nutritive value of milk.
23. Explain the processing of cocoa and chocolate.
24. Explain the following
    a) Composition and nutritive value of meat.
    b) Changes occur in meat during cooking.
25. Explain the effect of heat on milk.
26. Explain the classification, processing, composition and nutritive value of poultry.

(3 x 6 = 18 marks)

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain fermented and non-fermented milk products.
28. Briefly explain the various spices used in cookery.
29. Explain the composition and nutritive value of egg.
30. Explain the following
    a) Crystallization of sugar and factors affecting crystallization.
    b) Crystalline and non-crystalline candies. **(2 x 10 =20 marks)**

B.Sc. CLINICAL NUTRITION & DIETETICS

CN4CRP03 - THERAPEUTIC NUTRITION PRACTICAL- II

Time: 2 hrs **Max. Mark: 80**

I. Answer any one: Plan a day's menu and prepare lunch or dinner for the following conditions.

a) Hypertension with obesity
b) CVD with hyperlipidemia
c) Glomerulonephritis with diabetes
d) Nephrosis
e) Renal failure
f) Peptic ulcer with anemia
g) Constipation
h) Diarrhoea
i) Cirrhosis with ascites
j) Hepatitis
k) Pancreatitis (Marks: 20 +20=40)

II. Calculation of nutritive value (Marks: 10)

III. Serving the prepared menu (Marks: 10)

III Lab record (Marks: 10)

IV Viva (Marks: 10)

BSc.CLINICAL NUTRITION & DIETETICS

CN4CRP04 - QUANTITY FOOD PRODUCTION

Time: 2Hrs. Max marks: 80

1. Give the recipe- ingredients and methods- prepare and serve ***Tomato Rice***
2. Give the recipe- ingredients and methods- prepare and serve ***Chicken Biriyani***.

3. Give the recipe- ingredients and methods- prepare and serve ***Vegetable pulao***
4. Give the recipe- ingredients and methods- prepare and serve ***Fish moilee***.
5. Give the recipe- ingredients and methods- prepare and serve **Tomato Fish.**
6. Give the recipe- ingredients and methods- prepare and serve **Chilly *Fish***
7. Give the recipe- ingredients and methods- prepare and serve **Carrot burfi**
8. Give the recipe- ingredients and methods- prepare and serve ***Bread Gulabjamun***
9. Give the recipe- ingredients and methods- prepare and serve ***Rainbow sandwich***.
10. Give the recipe- ingredients and methods- prepare and serve ***Onion Pakoda***
11. Give the recipe- ingredients and methods- prepare and serve ***Vegetable Burger***
12. Give the recipe- ingredients and methods- prepare and serve **Spicy potato puri**
13. Give the recipe- ingredients and methods- prepare and serve Aloo ***Paratha***
14. Give the recipe- ingredients and methods- prepare and serve ***Spring Roll***
15. Give the recipe- ingredients and methods- prepare and serve ***Vegetable Khorma***
16. Give the recipe- ingredients and methods- prepare and serve ***Bread Pudding***

B.Sc CLINICAL NUTRITION AND DIETETICS

CN4CMT07 –BIOCHEMICAL ASPECTS OF NUTRITION

Time: 3Hrs **Maximum Marks: 80**

PART A

I . Answer any 9 questions. Each question carries2 marks

1. Write the Rhodopsin cycle.
2. Comment on the role of copper in blood clotting.
3. Discuss the role of vitamin B6 in transamination reaction.
4. What are metalloflavoproteins?

5. What is folate trap?
6. Comment on anti- egg white injury factor.
7. Write on Vitamin K and blood clotting relation 8.Comment on the peroxidase activity of Selenium.
9. What is avitaminosis?
10. Comment on skeletal flurosis.
11. What is haemochromotosis?
12. Write a note on calcium- phosphorus balance **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. What is the role of pantothenic acid in macronutrient metabolism
14. Comment on haemopoietic water soluble vitamins
15. Discuss the role of vitamin E as antioxidants?
16. Write the mechanism by which rods functions in dim light.
17. Comment on selenium toxicity.
18. Elaborate the role of vitamins and minerals in energy metabolism.
19. What are the functions of zinc?
20. Which are the factors affecting calcium absorption?
21. Comment on vitamin A deficiency. **(6 x 4 = 24 marks)PART C**

III. Answer any 3 questions. Each question carries 6 marks 22.

What is the role of calcium and phosphorous in bon mineralization.

23. Write the synthetic pathway of thyroid hormone.
24. What are the biochemical functions of magnesium?
25. Write a note on B vitamins.
26. Comment on antioxidant minerals. **(3 x 6 = 18 marks)PART D**

IV. Answer any 2 questions. Each question carries 10 marks.

27. Enumerate the metabolic functions and toxicity of Vitamin A.
28. Discuss calcium- vitamin D homeostasis.
29. Explain micro nutrient interrelationship with suitable examples?

30. Explain the metabolic synthesis and biological functions of vitamin D

(2 x 10 =20 marks)

B.Sc. CLINICAL NUTRITION & DIETETICS
CN4CMP03 - BIOCHEMISTRY PRACTICAL II

Time: 2 hrs **Max. Mark: 80**

I. Answer any one

a) Estimate the glucose present in 100 ml of the given blood sample

b) Estimate the total protein present in 100 ml of the given blood sample

c) Estimate the total cholesterol present in 100 ml of the given blood sample

d) Estimate the iron present in 100 ml of the given blood sample

(Marks: 40)

II. Write the principle, procedure, normal values and clinical significance of any one of the following test

a) Acid phosphatase

b) Alkaline phosphatase

c) SGPT

d) SGOT

(Marks: 20)

III. Lab record (Marks: 10)

IV. Viva (Marks: 10)

B.Sc CLINICAL NUTRITION AND DIETETICS

CN4CMT08 –HUMAN ANATOMY AND PHYSIOLOGY-IV

Time: 3Hrs **Maximum Marks: 80**

PART A

I. Answer any 9 questions. Each question carries2 marks

1. What are the functions of blood pressure?
2. What is synapse
3. Functions of medulla oblongata
4. What is brain stem?
5. What are the factors affecting pulse?
6. Which are the different lobes of brain?
7. Comment on acetyl choline
8. Write the functions of vitreous humor.
9. Explain the functions of CNS
10. What is synaptic cleft
11. Write a note on ear ossicles
12. Differentiate grey matter and white matter. **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. Discuss the regulation of B.P in human body.
14. Write the structure of spinal cord
15. Which are the factors regulating temperature.
16. Explain the structure of skin with the help of a diagram.
17. Explain the defects of eye.
18. Explain the mechanism of equilibrium by ear
19. Write the physiology behind taste sensation.
20. What is action potential?

21. Draw the structure of ear and explain. **(6 x 4 = 24 marks)PART C**

III. Answer any 3 questions. Each question carries 6 marks

22. Explain the structure of neuron with the help of a labeled diagram.

23. Explain reflex action

24. What are the effects of high temperature on human body?

25. Explain the physiology at space

26. What are the pathological variations in blood pressure **(3 x 6 = 18 marks)**

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain the chemical transmission of impulses.

28. What are the adaptations of human body during exercise?

29. Write on space physiology and aviation physiology

30. Write on the physiological adaptations of human being at higher altitude, at high temperature and low temperature. **(2 x 10 =20 marks)**

B.Sc. CLINICAL NUTRITION & DIETETICS
CN4CMP04 - HUMAN PHYSIOLOGY PRACTICAL II

Time: 2 hrs **Max. Mark: 80**

I. Analyze the given urine sample for the following abnormal constituents a)Sugar

b) Blood
c) Albumin
d) Bile salts
e) Bile pigments
f) Ketone bodies

(Marks: 25)

II. Analyze the saliva sample for the following constituents

a) Amylase
b) Mucin
c) Calcium
d) Inorganic phosphate

(Marks: 20)

III. Identify, sketch and label the given blood cells

(Marks: 15)

IV. Lab record (Marks: 10)

V. Viva (Marks: 10)

B.Sc CLINICAL NUTRITION AND DIETETICS

CN5CRT12 –FOOD MICROBIOLOGY SANITATION AND HYGIENE

Time: 3Hrs **Maximum Marks: 80**

PART A

I . Answer any 9 questions. Each question carries2 marks

1. What is pin spot molding of eggs?
2. Comment on TDP and TDT.
3. What is the significance of sanitation in food industry?
4. What are perishable foods?
5. Comment on red bread.
6. Differentiate sterilization and disinfection.
7. What is ropiness of milk?
8. What is phenol coefficient?
9. Comment on vegetable rot.
10. What is evisceration?
11. Differentiate contamination and spoilage.
12. Which are the different chemicals used for disinfection? **(9 x 2 = 18 marks)**

PART B

II. Answer any 6 questions. Each question carries 4 marks.

13. Which are the preventive measures to be taken against moldiness of bread.
14. Discuss the different types of spoilages seen in vegetables
15. What are the changes occurring in egg during storage?
16. Define sanitation and hygiene.
17. What you meant by humane method of slaughtering?
18. Write the steps involved in cleaning utensils and equipments.
19. Which are the possible sources of contamination of marine foods?
20. What are the evidences of fish spoilage?

21. Explain the importance of sanitation in food industry. **(6 x 4 = 24 marks)PART C**

III. Answer any 3 questions. Each question carries 6 marks

22. Explain the general principles of meat spoilage.

23. What is rancidity and write its types?

24. What are the common spoilages seen in butter?

25. Briefly explain any three methods for garbage disposal

26. Explain three bucket method **(3 x 6 = 18 marks)PART D**

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain the different microbial control strategies.

28. What are the different types of spoilages seen in unprocessed milk?

29. Explain microbial growth curve and which are the factors affecting the same?

30. Explain the effect of microorganisms on food degradation **(2 x 10 =20 marks)**

B. Sc CLINICAL NUTRITION AND DIETETICS

CN5CRT13 – FOOD FORTIFICATION

Maximum Marks: 80

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. What is fortification?
2. What is double fortified salt?
3. What is the safe limit for iodine?
4. What is nutrifaction?
5. Bioavailability of nutrients from fortified foods 6.List the health benefits of beverage fortification?
7. What are merits of snack fortification?
8. What are the general techniques in food fortification?
9. What are the principles in fortification?
10. What are multiple nutrient fortifications?
11. What are the functions of iodine?
12. What is enrichment? **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. Describe the advantages of fortification.
14. Distinguish restoration and enrichment.
15. Write a note on need of fortification.
16. Explain the newer trends in food fortification.
17. Explain the characteristics of nutrients used in fortification.
18. Write a note on levels of micronutrients used in fortification.
19. Explain the various steps in implementation of food fortification quality assurance program.
20. Comment on the technology involved in fortifying beverages.

21. Explain the new trends in food fortification. **(6 x 4 = 24 marks)**

PART C

III. Answer any 3 questions. Each question carries 6 marks

22. Explain the quality assurance and control in food fortification.

23. Comment on the design of fortification of foods.

24. Explain the enrichment and fortification programmes in India.

25. Elaborate on the limitations of fortification.

26. Explain the economic aspects in food fortification.

(3 x 6 = 18 marks)

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain the role of vitamin A fortified foods in combating deficiency.

28. Describe the various techniques used in food fortification.

29. Explain the objectives and criteria of selection of vehicle for fortification.

30. Explain the challenges involved in fortifying snack products.

(2 x 10 =20 marks)

B.Sc CLINICAL NUTRITION AND DIETETICS

CN5CRT14 –RESEARCH METHODOLOGY AND STATISTICS

Maximum Marks: 80

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. Define research.
2. What is meant by multistage and multiphase sampling?
3. Which are the sources of secondary data and which are the points to be considered in collection of secondary data?
4. Write objectives of research.
5. Write the merits and demerits of mode.
6. What is meant by systematic sampling?
7. Calculate median 4,45,60,20,83,19,26,11,27,12,52.
8. What is applied research?
9. Define average.
10. What is correlation?
11. Mention the criteria of good research.
12. Calculate mean for the following 22, 12, 15,30,45,36. **(9 x 2 = 18 marks)**

PART B

II. Answer any 6 questions. Each question carries 4 marks.

13. Briefly explain experimental research.
14. Calculate Standard Deviation

C.I	0-2	2-4	4-6	6-8	8-10	10-12
f	2	4	6	4	2	6

15. Briefly explain case study method. Give advantages and disadvantages.
16. Explain frequency polygon.

17.Explain various kinds of observations.

18.What is sampling? Mention the characteristics of a good sample.

19. Differentiate between questionnaire and interview schedule.

20. Explain pie diagram.

21. Comment on ISBN and ISSN. **(6 x 4 = 24 marks)PART C**

III. Answer any 3 questions. Each question carries 6 marks

22. Explain survey. Write advantages and disadvantages.

23. Write the characteristics of research.

24. Explain line diagram and bar diagram.

25. Explain the properties and functions of average.

26. Calculate co-efficient of correlation for the following

Height of father (in inches)	65	66	67	67	68	69	71	73
Height of son(in inches)	67	68	64	68	72	70	69	70

(3 x 6 = 18 marks)

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain the different types of research.

28. Explain tabulation under the following heads

a) Objectives

b) Functions

c) Types

d) Parts of a table

e) General principles of tabulation.

29. Which are the different methods of sampling?

30. Calculate mean, median and mode for the following

C.I	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
F	2	4	3	2	4	5	3	5	2

(2 x 10 =20 marks)

B.Sc CLINICAL NUTRITION AND DIETETICS

CN5CRT15 –FOOD PRESERVATION

Maximum Marks: 80

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. What is dielectric heating?
2. What is meant by extrusion cooking?
3. What is dehydro freezing?
4. What is food irradiation?
5. Write a note on fluidized bed drying?
6. What is hurdle technology?
7. What are the different methods of preservation by evaporation?
8. Write a note on preservation by non ionizing radiation?
9. Write a note on newer methods of thermal processing?
10. Write a note on preservation by ionizing radiation?
11. What is meant by flavour reversion?
12. What is meant by blanching? **(9 x 2 = 18 marks)**

PART B

II. Answer any 6 questions. Each question carries 4 marks.

13. Explain the principles and importance of food preservation.
14. Discuss the principles of using electromagnetic radiation in food processing.
15. Write a note on microwave cooking and baking.
16. Explain the retort processing of ready to eat products.
17. Write down the classification of food in relation to shelf life.
18. What are the advantages and disadvantages of sun drying?
19. What are the different methods of freezing?
20. Write a note on pasteurization.

21.Write a note on retort processing of RTE products. **(6 x 4 = 24 marks)PART C**

III. Answer any 3 questions. Each question carries 6 marks

22. Explain preservation by non thermal methods.

23. Explain preservation by drying and concentration.

24. What are the advantages and disadvantages of spray drying and drum drying?

25. Explain processing by high pressure, pulsed electric field and hurdle technology.

26. Explain methods of preservation by high temperature. **(3 x 6 = 18 marks)**

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain use and application of micro organisms in processing and preservation.

28. Explain different methods of processing and preservation by low temperature

29. Explain different methods of processing and preservation by heat.

30. Explain methods of processing and preservation by drying and evaporation.

(2 x 10 =20 marks)

B.Sc CLINICAL NUTRITION AND DIETETICS

CN5GET16 –PERSONNEL MANAGEMENT

Maximum Marks: 80

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. What is organization?
2. Define management.
3. What is recruitment?

4. What is food material management?
5. Explain organizational hierarchy.
6. Define productivity.
7. What is informal organization?
8. What is performance appraisal?
9. Write about stock book.
10. What is negotiated buying?
11. What is Bench marking?
12. Write about any four intangible tools of management. **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. Explain the importance of planning in an organization.
14. Which are the different sources of recruitment?
15. Explain the different types of storages.
16. What is line organization? Give its merits and demerits.
17. Explain the management process.
18. Explain the qualities and characteristics of personnel manager.
19. What are the objectives of Performance appraisal?
20. Write on the significance of time management.
21. Comment on laws affecting hotels. **(6 x 4 = 24 marks)**

PART C

III. Answer any 3 questions. Each question carries 6 marks

22. What is selection? Explain the selection procedure.
23. Write about a) Line and Staff organization.
    b) Tall and Flat organization
24. What is motivation? Which are the different types of motivation?
25. Explain the procedure involved in purchasing, receiving and storage of food materials in catering establishments.

26. Write on different types of store records. **(3 x 6 = 18 marks)**

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. What is the need of tools of management? Which are the different tools of management?
28. Which are the different methods for buying food?
29. Explain the various laws related to food service organization
30. What is performance appraisal? What is its importance? Which are the different methods for assessing the performance of an employee?

(2 x 10 =20 marks)

B.Sc CLINICAL NUTRITION AND DIETETICS

CN6CRT19-FOOD SAFETY

Maximum Marks: 80

PART A

I. Answer any 9 questions. Each question carries 2 marks.

1. Give the classification of package of foods?
2. Role of consumer in maintaining food standards?
3. List any five benefits of genetically modified foods?
4. Comment on botulism?
5. What is trangenesis?
6. Comment on types of hazards?
7. Differentiate between hazard analysis and risk analysis?

8. Comment on kaizen?
9. Write about legal aspects of gamma radiations?
10. Comment on GRAS?
11. Give permissible limits for chemical preservatives?
12. Comment on codex alimentarius? **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. Bring recent advances in packaging material? How are they superior to traditional ones?
14. List the packaging material suitable for different foods?
15. What is FPO? Explain its functions?
16. Explain the components of TQM?
17. Explain the storage of specific foods?
18. Explain about bacterial food poisoning?
19. Explain the sanitary procedures to minimize microbial load while preparing, cooking and holding of food?
20. Functions of packaging?
21. Comment on GM foods. **(6 x 4 = 24 marks)**

PART C

III. Answer any 3 questions. Each question carries 6 marks

22. Explain the importance and laws related to nutrition labeling?
23. Describe the role of BIS and AGMARK in maintain standards of food?
24. Explain in detail FSSAI? How is it different from PFA act?
25. Explain food hazards?
26. Write on factors affecting food safety? **(3 x 6 = 18 marks)**

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain the prerequisites for HACCP?

28. Write on ISO series?
29. Write on food borne illness?
30. Explain the types of food storage? **(2 x 10 =20 marks)**

B.Sc CLINICAL NUTRITION AND DIETETICS

CN6CRT20 –FOOD ADULTERATION

Time: 3Hrs **Maximum Marks: 80**

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. What are adulterants?
2. Which are the different types of adulterants?
3. What is lathyrism?
4. What are intentional adulterants?
5. Which are the adulterants present in milk? How can it be detected?
6. Write note on packaging hazards.
7. Name the adulterants present in turmeric, chilli powder, coriander powder and mustard seed.
8. Explain the toxic effect of lead and mercury poisoning.
9. Comment on MSG.
10. What are emulsifiers?
11. Write about the functions of guar gum.
12. What is HFCS? **(9 x 2 = 18 marks)**

PART B

II. Answer any 6 questions. Each question carries 4 marks.

13. Write note on mycotoxins.
14. Explain the harmful effect of pesticide residue.
15. What are food additives? Explain the different types of food additives.
16. Write about different food colors.
17. What are sweeteners?
18. Explain Class I and class II preservatives.
19. Write note on thickening and gelling agents.
20. Write about incidental adulterants.
21. What are the common adulterants of spices and condiments? **(6 x 4 = 24 marks)**

PART C

III. Answer any 3 questions. Each question carries 6 marks

22. Explain the naturally occurring toxicants in food.
23. Explain the toxic effect of metals.
24. How food get contaminated from processing and packaging material.
25. How can you detect the presence of adulterants in edible oil and ghee?
26. What are food preservatives? Explain its properties and uses.

(3 x 6 = 18 marks)

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. What is food adulteration? Which are the types of adulterants? How can you detect the presence of adulterants?
28. Explain the use of emulsifiers, thickeners and stabilizers in food industry?
29. What are food additives? Write on food colors and preservatives
30. What are artificial sweeteners? Write on different types of artificial sweeteners.

(2 x 10 =20 marks)

B.Sc CLINICAL NUTRITION AND DIETETICS

CN6CRT21 – PREVENTIVE NUTRITION

Time: 3Hrs **Maximum Marks: 80**

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. What are free radicals?
2. Comment on symbiotic.
3. Write note on food security bill.
4. Discuss FCI
5. What is double fortification?
6. Give the significance of immunization.
7. Write about MMR vaccine.
8. Write about the beneficial effects of phenols and lignans
9. What is blue revolution?
10. What are the criteria for selecting a fortificant?
11. Give the classification of fibre.
12. What are toxoids? **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. Explain the role of PDS.
14. Differentiate between prebiotics and probiotics.
15. Explain the importance of vaccination in adulthood.
16. Explain the role of antioxidants in preventing diseases.
17. Explain with example
    a) Enrichment
    b) Restoration
18. Which are the different types of vaccines?

19. Discuss the role of photochemical as anticancer agents.

20. Explain the physiological and metabolic effect of fibre.

21. Write a note on proprietary foods. **(6 x 4 = 24 marks)**

PART C

III. Answer any 3 questions. Each question carries 6 marks 22.

Explain the immunization schedule for children, adult and foreigners.

23. What are the criteria for selecting vehicle for fortification?

24. Comment on Nutrigenomics.

25. Explain the different food revolutions.

26. What are the hazards of immunization? **(3 x 6 = 18 marks)**

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain the role of individual, family and community in promoting health.

28. Explain the role of fibre in preventing diseases.

29. Explain the role of various agencies for control of food losses.

30. Explain health supplements and proprietary foods **(2x10 =20 marks)**

B.Sc CLINICAL NUTRITION AND DIETETICS

CN6CRT22 – FOOOD SERVICE MANAGEMENT

Time: 3Hrs **Maximum Marks: 80**

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. What is A la carte menu?
2. What are banquets?
3. Differentiate between Mise-en-scene and Mise-en-place.
4. What is silver service?
5. What are the points to be considered in the care of glassware?
6. What is hollowware?
7. What are the functions of a restaurant manager?
8. Comment on welfare catering.
9. What are the functions of catering industry?
10. What are specialty restaurants?
11. What is flambé trolley?
12. What is a menu card? **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. What are the functions of menu?
14. Explain the work related attributes of a supervisor.
15. Which are the different types of menu?
16. Classify catering establishments.
17. What is the role of food and beverage manager?
18. What is transport catering?
19. Classify hotels.
20. What are the criteria for ideal menu planning?

21. Comment on different types of cuisines. **(6 x 4 = 24 marks)**

PART C

III. Answer any 3 questions. Each question carries 6 marks

22. Explain the classification of equipments.
23. Explain the organisational hierarchy in a food service establishment.
24. Comment on the different services available in a restaurant.
25. Explain the duties of a waiter.
26. What are the techniques for writing a menu? **(3 x 6 = 18 marks)PART D**

IV. Answer any 2 questions. Each question carries 10 marks.

27. What is a menu? Which are the courses of a French classical menu?
28. Explain the styles of services.
29. Explain the care and maintenance of equipments
30. Define equipment. What are the factors affecting selection of equipments?

(2x10 =20 marks)

B.Sc CLINICAL NUTRITION AND DIETETICS

CN6CRT23 – NUTRITION IN SPECIAL CONDITIONS

Time: 3Hrs **Maximum Marks: 80**

PART A

I. Answer any 9 questions. Each question carries 2 marks

1. What is carbohydrate loading?
2. What are supplementary foods?
3. What is sports anaemia?
4. What is a rehydratable food?
5. What are the points to be considered in choosing space foods?
6. What is the RDA for an athlete?
7. What are the physiological changes during space flight?
8. Comment on high performance diet.
9. What are the nutritional problems in soldiers?
10. What are factors affecting the food choice in mountaineers?
11. What is DRDO?
12. What are tubed foods? **(9 x 2 = 18 marks)PART B**

II. Answer any 6 questions. Each question carries 4 marks.

13. Comment on the space shuttle food system.
14. Explain the physiological changes in people at high altitude.
15. Comment on food on board during sea voyage.
16. Which are the different foods developed by DRDO?
17. What is contemporary military nutrition?
18. Write about the role of dietary supplements in sportsmen.
19. What are the dietary guidelines to be followed in preparing meal for athletes?
20. What are the nutritional requirements for wounded soldiers?

21. Comment on contemporary military nutrition. **(6 x 4 = 24 marks)PART C**

III. Answer any 3 questions. Each question carries 6 marks

22. Explain the causes for malnutrition in sea voyagers.

23. Explain the changes in body composition of an athlete.

24. Comment on the different types of space foods.

25. Explain the effect of physical stress during sea voyage

26. What are the dietary allowances by DRDO to armed force? **(3 x 6 = 18 marks)**

PART D

IV. Answer any 2 questions. Each question carries 10 marks.

27. Explain the nutritional requirements for athletes.

28. Explain the role of neutraceuticals in military nutrition

29. Explain the nutritional requirements for an astronaut.

30. What are the nutritional problems faced by a mountaineer? **(2x10 =20 marks)**

BSc.CLINICAL NUTRITION & DIETETICS

CN6CRP06 - FAMILY MEAL MANAGEMENT

Time: 2Hrs. **Max marks: 80**

1. Plan a diet for a male moderate worker and prepare lunch for the same. Calculate Energy, protein, iron, and vitamin.C, for the prepared item.

2. Plan a diet for an adolescent girl and prepare dinner for the same. Calculate Energy, protein, iron, and vitamin.C, for the prepared item.

3. Plan a diet for a female sedentary worker and prepare lunch for the same. Calculate Energy, protein, iron, and vitamin.C, for the prepared item.

4. Plan a diet for a sedentary pregnant woman and prepare lunch for the same. Calculate Energy, protein, iron, and vitamin.C, for the prepared item.

5 .Plan a diet for a male heavy worker and prepare lunch for the same. Calculate Energy, protein, iron, and vitamin.C, for the prepared item.

6 .Plan a diet for a Preschool child and prepare dinner for the same. Calculate Energy, protein, iron, and vitamin.C, for the prepared item.

7. Plan a diet for a school going child and prepare dinner for the same. Calculate Energy, protein, iron, and vitamin.C, for the prepared item.

8 .Plan a diet for a lactating mother and prepare lunch for for the same. Calculate Energy, protein, iron, and vitamin, for the prepared item.

9. Plan a diet for a male sedentary worker and prepare dinner for the same. Calculate Energy, protein, iron, and vitamin C, for the prepared item.

10. Plan a diet for an adolescent boy and prepare lunch for the same. Calculate Energy, Protein, iron, and vitamin.C, for the prepared item.

11. Plan a diet for a Female Heavy Worker and prepare dinner for the same. Calculate Energy, protein, iron, and vitamin C, for the prepared item.

12. Plan a diet for a Female Moderate Worker and prepare dinner for the same. Calculate Energy, protein, iron, and vitamin.C, for the prepared item.