

<u>Semester I</u>		MM	Credit
Theory papers			
Paper I	– Research Methodology	100	4
Paper II	- Applied Physiology	100	4
Paper III	- Nutritional Biochemistry	100	4
Paper IV	- Community Nutrition	100	4
Practical			
Based on Paper I, II, III, IV+ Seminar		200+25	8+1=9
Total No. of Marks =		625	25 Credits
<u>Semester II</u>			
Paper I	- Statistics and Computer Application	100	4
Paper II	- Food Microbiology	100	4
Paper III	- Food Science	100	4
Paper IV	- Maternal and child Nutrition	100	4
Practical			
Based on paper I,II, III, IV+Seminar		200+25	8+1=9
Total No. of Marks=		625	25Credits
<u>Semester III</u>			
Paper I	- Clinical and therapeutic nutrition	100	4
Paper II	- Nutrition for Health and fitness	100	4
Paper III	- Advance Nutrition	100	4
Paper IV	- Food Quality Analysis	100	4
Practical			
Based on paper I. II, III, IV+Seminar		200+25	8+1=9
Total No. of Marks=		625	25Credits
<u>Semester IV</u>			
Part I	Implant Training / Internship	200	7
Part II	Dissertation	200	10
Part III	Seminar and viva voce on Implant Training / Internship and Dissertation	125	4
Part IV	General Seminar	100	4

Total No. of marks = 625 25credit

Total No. of Credits =100

Semester I**Paper I : Research Methodology****UNIT-1 (15 Contact hour)****CREDIT-4 (L-3 T-1)**

Research Methodology – Meaning, objectives and types of research. Research approaches, Significance of research, Research and scientific methods, Research process and Criteria of good research.

Definition and Identification of a Research Problem – Selection of Research problem, Justification, Theory, Hypothesis, Basic assumptions, Limitations and delimitations of the problem.

UNIT-2 (15 Contact hour)

Research Design – Meaning and needs, Features of a good design; important concepts relating to research design, Variables, Experimental and Control groups, Different research designs–exploratory, descriptive and diagnostic, Hypothesis testing research. Sampling Design– Population and Sample, Steps in sampling design, Criteria for selecting a sampling procedure, Different types of sampling techniques–Probability sampling and Non-probability sampling.

Methods of Data collection–Schedules and Questionnaires, Interview, Case study, Home visits, Scaling methods, Reliability and Validity of measuring instruments.

UNIT-3(15Contact hour)

Concept and characteristics of a normal probability curve. Analysis of Data – Graphical and Diagrammatic presentation.

UNIT -4 (15 Contact hour)

Interpretation – Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation– Interpretation of tables and figures. Report Writing - Significance of report writing, Different steps in writing report; Types of reports, Mechanics of writing a Research Report and precautions for writing research reports. Use of Computers in Statistical Analysis – The computer system and technology, important characteristics of computer applications in researches..

Paper II : Applied Physiology**UNIT -1(15 Contact hour)****CREDIT-4(L-3 T-1)****Cell structure and function**

General cell structure. Structure and functions of the organelles, cell membrane. review of structure and function of tissue, organs and systems.

(A)Nervous System

Review of structure and function of neuron, nerve, conduction of nerve impulse, synapse, and neurotransmitters.

- General organization of the nervous system, protection structure and function of brain and spinal cord. Cerebrospinal fluid.
- Structure, function and role of sensory organs (skin, eyes, ears, nose and tongue) in perception of stimuli.

(B)Endocrine System

Review of structure and function of endocrine glands. Mechanism of hormonal action. Control of hormonal secretion. Function and different syndromes resulting from hypo and hyper secretion of Endocrine gland mainly Pituitary, Adrenal, Thyroid, Ovary, Testes, Pancreas, Parathyroid.

UNIT -2 (15 Contract hour)**Digestive system**

Review of structure of gastrointestinal tract and accessory organs. Secretory, Digestive and absorptive function of GIT. Role of Liver, Pancreas and gall bladder and their dysfunction. Hormones of GIT. Mechanism of absorption of carbohydrates, Proteins and fats.

(A)Respiratory System

Review of structure and function, Physiology of respiration, Exchange of gases and transport through blood, role of haemoglobin and buffer system. Pulmonary volume. Pulmonary Capacities.

(B)Circulatory System

Structure and function of Heart, Blood vessels

Blood – Characteristics, Composition, Structure, function and life span of components. Blood clotting. Blood groups. Homeostatics. Erythropoiesis, Blood Pressure.

UNIT-3 (15 Contact hour)**Excretory System**

Structure and function of nephron. Anatomy and function of kidney. Urine formation. Electrolyte and acid base balance.

(A)Immune System

Cell mediated and humoral immunity. Antibody formation.

(B)Musculo Skeletal System

Structure and function of bone, cartilage and connective tissue. Types of muscles, structure and function.

UNIT -4 (15 Contact hour)**1. Reproduction**

Male and female organs of reproduction. Spermatogenesis, Mentrual Cycle. Pregnancy, Parturition, Menaupause, Mammary glands and location.

References:-

1. Kale, C.A. and Nail, E Samson Wright's Applied Physiology, Oxford University press, 1994.
2. Griffins, M. Introduction to Human Physiology, Mac Millan and Co. 1974.
3. Green, J.H. An introduction to human physiology, Oxfords University Press 1972.
4. Best C.H. and Taylor N.B., The living body, Asia publishing House, 1975.

Paper III : Nutrition Biochemistry**UNIT -1 (15 Contact hour)****CREDIT-4(L-3 T-1)**

Introduction to Nutritional biochemistry – Meaning and importance, Development of nutrition biochemistry and contemporary interests in nutritional biochemistry. Carbohydrates – Classification, Properties, digestion, absorption and metabolism, Blood glucose level.

UNIT-2 (15 Contact hour)

Proteins – Structure, classification and properties. Digestion, absorption and amino acid and nucleotide metabolism. Lipid – Structure, Classification and properties: Digestion and absorption. Lipid metabolism, Hyper-lipoproteinemia, atherosclerosis.

UNIT - 3 (15 Contact hour)

Vitamins and Minerals – Classification structure, properties and functions. Enzymes – Classification, enzymes, mechanisms of enzyme action, factors affecting enzyme activity and their role.

UNIT -4 (15 Contact hour)

Hormones – Endocrine Glands, mechanism of hormone action and biochemical role of hormones. Antioxidants – Definition, free radicals, oxygen free radicals, natural and diet derived antioxidants. Inborn Errors of metabolism – Concept disorders of protein metabolism, carbohydrates, metabolism, lipid metabolism and haemoglobinopathies.

References:

1. Command Stumph, Outlines of Biochemistry.
2. Devlin T.M., Biochemistry by Stryer Text book of Biochemistry with clinical correlations.
3. Lehninger, Principles of Biochemistry, by 4th Ed. By Nelson D.L. and Cox. M.M.
4. Murray R.K., Grammer, D.K., Mayer P.A., Rodwell V.W., Harpers Biochemistry, a large medical book 26th Ed. Mc. Graw Hill, Health Professions Division.
5. West. E.S., Todal, W.R., Mason H.S. and Van Brygen J.T., Text Book of Biochemistry.

Paper IV : Community Nutrition

UNIT-1 (15 Contact hour)

CREDIT-4(L-3 T-1)

Introduction to concept of community, rural and urban communities, community health, healthcare, community nutritional and its future projections. Protein Energy malnutrition – etiology, prevalence, causes, prevention and control.

UNIT-2 (15 Contact hour)

Other Major nutritional problems – Macro nutrient deficiencies and micronutrient deficiencies, etiology, symptoms, prevention and control. Assessment of nutritional status – meaning need, objectives, and techniques. Primary Methods: Anthropometric measurement, Weight, Height skin fold, Head circumference MUAC. Chest circumference, use of growth chart, Biochemical assessment, clinical assessment, Diet surveys.

UNIT -3 (15 Contact hour)

Secondary Methods: Vital statistics, Mortality rates, survival rate, morbidity rate, fertility rate. Nutrition Monitoring and Nutrition surveillance objectives and components of nutrition monitoring and current programmes. Nutrition Surveillance – Objectives, Uses, infrastructure and computerization

UNIT -4 (15 Contact hour)

Nutrition Education – Need and scope, importance, theories, Nutrition education programmes – formulations, Implementation and Evaluation. Nutrition Programmes in developing and developed countries – Role of various agencies – National, International and voluntary.

Reference:-

1. Mayer, J., Human Nutrition, Charles, C. Thomas, spring field.
2. Michael, J. Gibney, Barrie, M. Margetis, John, M. Kearney. Lenore Arab. Public Health Nutrition. Blackwell science, Blackwell Publishing Company (2004).
3. Willet Walter. Nutritional Epidemiology. Oxford University Press, Oxford, New York (1990).
4. Park, J.E. and Park, K. Text Book of Preventive and social medicine. Banarsi Das Bhanot Publishes.

Practical of Semester : I**Based on paper 1,2 ,3 &4****CREDIT 8(T-8)****Paper -1**

1. Observations on general development of new born and preschoolers.
2. Rapid participatory observations with adolescent groups and families across various socio-economic status.
3. Rapid participatory observation among old people in institutions and non-institutional setups.
4. Exercises relating to preparation of research designs. Preparation of tools for data collection. Administration of these tools.

Paper 2

Based on paper-2

Paper-3

1. Ph measurement
2. Qualitative tests for carbohydrates.
3. Blood glucose level test.
4. Separation of amino acids paper chromatography.
5. Determination of protein content using burett method
6. Determination of the iodine numbers of lipids using Hanus method.
7. Determination of the saponification number of fats.
8. Estimation of ascorbic acid.
9. Estimation of calcium.
10. Market survey of antioxidants, engymes and hormones available in local market.

Paper -4

Assessment of Nutritional status

Identification of nutritional problems among vulnerable groups.

Planning nutritive recipies.

Development, use and evaluation of methods and aids for nutrition and health education.

Development of tools to , assess nutrition knowledge, attitudes and practices.

Visit to Aganwadi and ICDS centre

Semester II**Paper I : Statistics and Computer Applications****UNIT -1 (15 Contact hour)****CREDIT-4(L-3 T-1)**

Conceptual understanding of statistical measures. Classification and tabulation of data. Measurement of central tendency, measures of variation. Frequency distribution, histogram, frequency, polygons, ogive. Binomial distribution.

UNIT -2 (15 Contact hour)

Normal distribution – Use of normal Probability tables. Parametric, non-parametric tests. Testing of hypothesis, Type I and II errors. Level of significance. Chi-Square test. Goodness of fit independence of attributes 2 X 2 and r X c contingency tables.

UNIT -3 (15 Contact hour)

Application of student ‘t’ test for small samples. Difference in proportion for means and difference in means. Correlation, Coefficient of correlation, ranks correlation.

UNIT -4 (15 Contact hour)

Fundamental of computer, History of computer, Generation of computer, Language, Components, Applications of Computers. Operating System & Internet: MS-DOS, MS-Windows, and Internet. MS-Office: MS-Word, MS Excel and Power Point. Introduction to Data-base Management system, Fox-Pro.

References:

1. Basandra, S.K.: Computer for Managers, Designing An Effective Management Information System, Abhinav Publishing Industries, N. Delhi, 1965.
2. Diwan, Parag, Information System Management, Deep & Deep Publications, New Delhi, 1997.
3. Laudon, Kenneth C. and London, Jane Price, Management Information System: A Contemporary Perspective, Macmillan Publishing Company, New Delhi.
4. Mehta, Versham Management Information System, Anmol Publication, New Delhi, 1998.
5. Banerjee, Utpal K. and sachdeva, R.K., Management Information System: A New Framework, Vikas Publishing House, Pvt. Ltd., New Delhi.

Paper II : Food Microbiology**UNIT-1 (15 Contact hour)****CREDIT-4(L-3 T-1)**

Food spoilage – Causes, Microbial growth in foods, factors affecting the growth of micro-organisms in food. Contamination and microorganism in spoilage of different kinds of foods – Cereals and cereal products, vegetables and fruits, fish and sea foods, milk and milk products, eggs, meat and meat products, canned and bottled food.

UNIT -2(15 Contact hour)

Contamination of water – Microorganisms in contaminated water, test for contamination, standards for drinking water. Food Borne Diseases – Sources, symptoms and methods of prevention and control.

UNIT -3 (15 Contact hour)

Food Hygiene – Sources of contamination of food, cleaning and sanitation in food processing in home and industry. Food plant sanitation, hygienic handling, processing, packaging and service of food.

UNIT -4 (15 Contact hour)

Food safety and quality control. Beneficial microorganisms – Sources, characteristics biochemical activities and their use in food products.

References: -

1. Frazier, We, Food Microbiology, Tata Mc Graw Hill 1978.

Paper III : Food Science**UNIT -1 (15 Contact hour)****CREDIT-4(L-3 T-1)**

Introduction to food science and modern development. Methods of cooking and effect of cooking on nutrients. Cereals, Pulses and legumes – structure, composite types and selection, methods of cooking, cooking losses.

UNIT -2(15 Contact hour)

Vegetable and fruits – Composition, recognition of quality, care in storage, methods of cooking, cooking losses. Milk and Milk products – Types and composition, preparation, effect of cooking and use in cookery.

UNIT -3 (15 Contact hour)

Egg, Meat, Fish and poultry – structure, composition quality care in storage, methods of cooking, effects of cooking. Sugar, fats and oils – composition, types, characteristics and use in cooking.

UNIT -4 (15 Contact hour)

Sols, Gels and Emulsions – Colloids, Properties of sols, Gels and its properties, suspensions, foams, emulsions. Enzymes and Pigments-classification and structure, use in Food Industry.

References:

1. Gaman, P.M. and Sherrington, K.B. (1996), The science of food, oxford, Butterworth – Heinemann.
2. Potter, Norman N. and Hotchkiss (1996) Food Science, 5th ed. C.B.S. Publication.
3. Manay, N. Shakuntala and Shadaksharaswami, N. (1987), Foods: Facts and Principles, Wiley Eastern Ltd.
4. Meyer, Lilian H. Ed. (1987), Food chemistry. Indian Ed. CBS Publishers and Distributors.

Paper IV : Maternal and Child Nutrition

UNIT -1 (15 Contact hour)

CREDIT-4(L-3 T-2)

Importance of maternal nutrition: Physiology and endocrinology of pregnancy and embryonic and fetal growth and development. Nutritional requirements during pregnancy. Importance of nutrition prior to and during pregnancy. Prerequisites for successful outcome.

UNIT -1 (15 Contact hour)

Effect of under nutrition of mother and child including pregnancy outcome and maternal and child health, pregnancy and AIDS, T.B., Intra-uterine growth retardation, complications of pregnancy and management and importance of antenatal care.

UNIT -3 (15 Contact hour)

1. Lactation- Development of mammary tissue and role of hormones, physiology and endocrinology of lactation – synthesis of milk components, let down reflex, role of hormones, lactation amenorrhea, effects of breast feeding on maternal health.
 - a. Human milk composition and factors affecting breastfeeding and fertility.
 - b. Management of lactation – Prenatal breast feeding skill education, rooming in, problems – sore nipples, engorged breast, inverted nipples etc. Exclusive breastfeeding.

UNIT -4 (15 Contact hour)

2. Growth, development and nutritional problems during infancy and childhood.

References :

1. International Child Health : A Digest of current information.
2. Barker, D.J. P (1998), Mothers, Babies and Health in later life. Edinburgh, Churchill livingstone.
3. Ward, R.H.T; Smith, S.K. Donnai, D. (Eds.) (1994) Early fetal Growth and Development. London, & COG Press.
4. Wallace, H.M. and Giri, K. (1990), Health care of women and children in developing countries, third party publishing co.Oakland.

Practical of Semester 2**Based on paper 1,2 ,3&4****CREDIT 8(T-8)****Paper -1**

Based on paper -1.

Paper 2

1. Study of various microbiological laboratory equipment.
2. Preparation of different culture medium.
3. Determination of bacteria and viable microbes by different techniques.
4. Simple staining, Gram staining, acid fast staining spore staining, capsule staining of culture.
5. Microbiological analysis of water, milk and curd
6. Microbiological analysis of fruits, vegetables, meat, cereals and canned foods.
7. Assessment of surface sanitation and hygiene of food preparation units.
8. Visit to food processing unit or any other organization dealing with advanced method in food microbiology.

Paper 3

1. Study the effect of cooking on cereals, pulses, vegetables fruits, egg, meat and sugar.
2. Determination of physical characteristics and presence of any additives.
3. Determination of moisture and impurities in sample of fat.
4. Study the effect of various additives on the stability of Egg white foam.
5. Preparation of stable emulsions.

Paper 4

1. Identification of nutritional problems among pregnant ladies.
2. Planning nutritive receipies for pregnant and lactating mother.
3. Market survey of products available for pregnant and lactating mothers.
4. Planning nutritive receipies for supplementary feedings of infant.

Semester III**Paper I : Clinical and Therapeutic Nutrition****UNIT-1 (15 Contact hour)****CREDIT-4(L-3 T-2)**

Introduction to dietetics, Role of dietitian in Healthcare, Nutritional assessment, Nutrition diagnosis, intervention, monitoring and evaluation, Patient care and counseling.

UNIT -2 (15 Contact hour)

Adaptation of therapeutic diets – Therapeutic diets, Types of therapeutic diets, Routine hospital diets, Mode of feeding.

UNIT -3(15 Contact hour)

Prevalence, etiology, clinical manifestations, dietary management and recent advance in the management of the following.

- a) Weight imbalance
- b) Eating disorders.
- c) Coronary Heart Disease.
- d) Metabolic Disorders
- e) Gastrointestinal diseases
- f) Liver, Gall Bladder and Pancreatic disorders.
- g) Renal Diseases
- h) Cancer, Burns
- i) Infections, Fever and Allergies
- j) Stress and Food Intolerance.
- k) Preoperative and post operative condition
- l) Neurological disorders
- m) Pediatric and Geriatric Diseases.

UNIT-4 (15 Contact hour)

Drug and Nutrient Interaction – Basic Concept, Effect of nutrition on drugs, Drug effects on Nutritional status, Drug and Drug interaction, Clinical significance and risk factors for drug – nutrient interaction.

References:

1. Antia, F.P. and Philip A. Clinical Dietetics and Nutrition, 4th Ed.
2. Bamji, M.S. Rao, P.N. and Reddy. Text book of Human Nutrition. 1996. Oxford and IBH publishing housing.
3. Garrow, J.S. and James WPT. Human Nutrition and Dietetics, 9th Ed.
4. Williams, S.R. Nutrition and Diet Therapy, 6th Ed. Jones Mirror College Publishing.

Paper II : Nutrition for Health and Fitness**UNIT -1 (15 Contact hour)****CREDIT-4(L-3 T-1)**

Carbohydrates – Classification, functions, sources, Digestion and absorption, Regulation of blood glucose concentration, dietary fibre, resistant starch, Glycaemic Index. Proteins – Classification, food sources, functions, Digestion, absorption and transport, nutritional requirements.

UNIT -2 (15 Contact hour)

Fats – Types, Functions, sources and its metabolism, nutritional requirements, diseases, excessive fat intake. Water and Electrolyte Balance. Vitamins and Minerals – Types, sources, functions, requirements, deficiency, toxicity and preventive measures. Food components other than essential nutrients – Functional foods, Bioactive substances from protein foods, Non glycerides in edible oils, Probiotics and Prebiotics, Polyphenols, Phytoestrogens, other dietary factors with antinutritional effects like: Protease inhibitors, Saponins, Amylase inhibitors, Lectins or Haemagglutinins, Phytates and their health benefits.

UNIT -3 (15 Contact hour)

Nutrition during different stages of life cycle. Sports Nutrition – Concept Techniques of measuring body composition, work capacity, physical fitness, Nutritional demands of sports and dietary recommendations, ergogenic aids.

UNIT -4 (15 Contact hour)

Holistic approach to the management of fitness and health – Energy input and output Diet and exercise. Effect of specific nutrients on work performance and physical fitness. Nutrition, exercise, physical fitness and health inter – relationship. Review of different energy systems for endurance and power activity – fuels and nutrients to support physical activity, shifts in carbohydrate and fat metabolism, Mobilization of fat stores during exercise.

References:

1. Williams, S.R. B.S. Worthington Roberts (1988). Nutrition throughout the life cycle. Times mirror, mostly college publishing St. Louis.
2. Whitney. E.R. and S.R Kolfes (2002) Understanding Nutrition 9th ed. Wadsworth Thomson Learning, Australia.
3. Thompson, L.U. (1993) Potential Health Benefits and problems associated with antinutrients in foods. Food Research International. 26; 134 – 149
4. Gibson, G.R. and M.B. Roberfroil (1999) Coloric Microbio, Nutrition and health, Kluwer Academic Publishers, Dordecht.

Paper III : Advance Nutrition

UNIT -1 (15 Contact hour)

CREDIT-4(L-3 T-1)

1. History of Nutrition, Nutritional requirements. National and International Recommendations on nutrient requirements. Energy Requirement – Energy definition and components of energy requirement, factors affecting energy expenditure and requirement. Methods of estimation of energy expenditure and requirement and energy balance. Energy estimation of foods.

UNIT -2(15 Contact hour)

Concept of body composition, calculation of body density, calculation of body water and body fat from body density. Concept of body cell mass, lean body weight and fat free body. Evaluation of Protein Quality – Methods of assessing quality of Protein and estimation of protein requirements at different stages. Nutrition, immunity and infection – Primary and secondary lymphoid organs, cell mediated and humeral immunity, mechanism of interaction, agent, host and environmental pattern in disease occurrence. Primary and secondary infection.

UNIT -3 (15 Contact hour)

Regulation of food intake, hunger and appetite, gastrointestinal factors in regulation, role of hypothalamus, glucose utilization in body and fat stored in body as regulators of food intake. Metabolic interrelationship between nutrients, concept of nutritional interrelationship. Protein Energy, carbohydrates, fat, and vitamins interrelationships. Effects of Protein quality and quantity on protein utilization.

UNIT -4 (15 Contact hour)

Nutritional requirement for special conditions – Calamity and Emergency management. Nutritional requirements for extreme environments. Nutritional regulation of Gene Expression – Gene Expression, Role of specific nutrients in controlling Gene Expression.

Reference:

1. Gibson, G.R. and M.B. Roberfoid (1999), Calonic microbiota, Nutrition and Health. Kulwer Academic Publishers, Dordecht.
2. Whitney, E.R. and S.R. Rolfes (2009) understanding Nutrition 9th ed. Wadsworth Thomson, Learning, Australia.
3. Wardlaw GM and Insel PM. Perspectives in Nutrition. Third Ed. Mostly 1895
4. Chandra, R.K. and Newberne, P.M., Nutrition immunity and infection. Plenum Pres 1982.

Paper IV : Food Quality Analysis

UNIT -1 (15 Contact hour)

CREDIT-4(L-3 T-1)

Importance of Food Standards: Quality control and assurance. Food standard, laws and regulations to ensure safety of food. Product Evaluation: Sampling for product evaluation, sample preparation. Tests for raw food ingredients: Proximate principles, nutrient analysis.

UNIT -2 (15 Contact hour)

Hazards to food products: Microbiological, environmental, natural, toxicants, pesticide residues and food additives. Food Adulteration – common adulterants Methods and tests for detecting adulterants.

UNIT -3 (15 Contact hour)

Sensory Analysis: Definition, use in product evaluation.

Types of Tests:

1. Discrimination/ Difference test Paired test, triangle test and duo-trio test for multiple samples, difference from control/reference.
2. Quantitative Difference Tests: Ranking.
3. Numerical Scoring Test: Magnitude Estimation.
4. Descriptive Tests
5. Threshold Tests
6. Acceptance tests

Determining consumer acceptability using sensory evaluation.

UNIT -4 (15 Contact hour)

Product development and Evaluation – Need for product development, how to develop a new Product, new products and ingredients, functional foods, shelf life of Product.

References:

1. Amerine M.A., Pengtorn, R.M. Reoceansier E.B. (1965) Principles of sensory evaluation and academic Press, New York.
2. Bealon, G.H. and Begos J.M. (eds.) (1996) Nutrition in Preventitive Medicine. WHO.
3. Belity. H.D. an Grosch W. (1999) Food chemistry springer Verleg Berlin, Heidelberg.
4. Bamji, M.S., Rai, P.N. and Reddy V. (eds) Food chemistry (2nd ed.) springer, New York.

Practical of Semester-3**Based on Paper -1,2,3,&4****CREDIT -8(T-8)****Paper -1**

1. Planning and preparation of recipes of following type – Normal, soft, semi-solid, low fat, low calorie, high fiber, low fiber, low residue, bland, high protein, low protein etc.
2. Market survey of commercial nutritional supplements and nutritional supports substrates.
3. Diet plan for following disorders.
 - a. Weight imbalance.
 - b. Diabetes Mellitus and Gout.
 - c. Gastrointestinal disorders.
 - d. Renal disease.
 - e. Liver disease
 - f. Fever
 - g. Lactose intolerance.
 - h. Heart Disease.
4. Preparation of diet counseling aids for common disorders.

Paper -2

1. Calculation of the percent energy supplied by carbohydrate in the diet.
2. Planning and preparing protein rich recipes.
3. Planning diet for sports person.
4. Planning diet for obese person
5. Market survey of ergogenic aids

Paper -3

1. Calculation of Energy Expenditure
2. Calculation of Energy Balance.
3. Calculation of chemical score using the SAAP, PAAP reference protein.
4. Calculation of NDP Cal% of recipes.
5. Estimation of energy value of food stuffs using bomb – calorimeter.

Paper -4

1. Sensory evaluation of foods.
2. Designing of questionnaires and evaluation score cards.
3. Testing of food adulterants in different foods.
4. Development of a new product and evaluation.

Semester IV**Paper I : Food Processing and Technology****UNIT-1 (15 Contact hour)****CREDIT-4(L-3 T-1)**

Introduction to food processing, food spoilage and causes, traditional methods of food processing. Methods of food Processing – Thermal Processing, Dehydration, Preservation by concentration freezing, Microwave Processing, Food irradiation, Fermentation, Chemical Preservation.

UNIT -1 (15 Contact hour)

Primary Processing – Introduction, Production, Harvesting and handling of fresh foods; Preparation of raw materials for processing. Primary processing of cereals, pulses and oil seeds. Chemical, Physical and Nutritional alterations occurring in foods during processing and storage. Alterations occurring in cereals, Pulses, fruits and vegetables, Milk and milk products, Meat and Poultry, fish, egg, Nuts, Oil seeds and spices and their products.

UNIT -3 (15 Contact hour)

Food Additives – Classification and use. Nutritional Implications of food processing – causes for loss of nutrients, enrichment, restoration and fortification.

UNIT -4 (15 Contact hour)

Packaging – Packaging materials and techniques.

References:

1. Brooker, B.E. (1985), Food theory and application 2nd ed. New York: Mecomillan Publishing.
2. Lawson, H. (1997) Food oils and Fats, CBS Publisher and Distributors.
3. Charley. H. (1982) Food Science (2nd Ed.), John Wiley sons, New York.
4. Gopalan, C. (eds.) (1993) Recent trends in Nutrition, Oxford University Press.

Paper II : Food Service Management

UNIT -1 (15 Contact hour)

CREDIT-4(L-3 T-1)

1. History and Development of food service establishment. Factors affecting development, recent trends, Types of food service establishment. Approaches to management – Theories of management Principles and aspects of management and management tools.

UNIT -2 (15 Contact hour)

Entrepreneurship and Food service Management Conceptual perspective of entrepreneurship, creativity and innovation, Business requirements for food products, Entrepreneurship Development and training. Personnel Management – Staff planning and Management, Employment process, staff recruitment and selection, placement and training, employee laws, trade unions and negotiations, leadership, formal relationships and duties, work design, work measurement in food service operations.

UNIT -3 (15 Contact hour)

Food Management – Menu – Planning, purchase and storage, Quality food production, planning and control, kitchen production, records and control, delivery and service styles, types of food service systems. Kitchen layout and equipment – steps in planning and layouts. Determining equipment selection and placement, maintenance of equipment

UNIT -4 (15 Contact hour)

Sanitation and safety – Plant sanitation and safety, considerations necessary for an efficient cleaning programme, Post cleaning care and cleaning premises and surroundings. The 3 E's of safety, standards, Policies and schedules, Microbiology and food safety, food borne illness, Modes of Disease transmission, Food spoilage, importance of pest control, Hygienic food handling.

Reference:

1. Sethi. M. (2004), Institutional food management. New Age International Publishers, New Delhi.
2. Terry. G.R. (1972), Principles of Management 6th Ed. Irwin Dorsey International London.
3. Sethi, M. and Malhan, S.(1993) Catering management an integrated approach 2nd ed. New Age, International Publishers, New delhi.
4. Drucker, Peter F. The Practice of Management, Harper and Brother: New York 1954.

Practical of Semester-4**Based on Paper -1 &2****CREDIT -3(T-3)****Paper -1**

1. Methods for Blanching vegetables.
2. Moisture removal techniques in foods.
3. Advance Diploma courses in food preservation, Bakery and confectionary.
4. Visit to food Processing units.

Paper -2

1. Analyse the relationship between the purchased amount, edible portion and cooked weight of food stuffs.
2. Recept conversion.
3. Market survey of food products to know the prices.
4. Visit to a Food service Establishments to study its planning and functioning.
5. Cost analysis of menu.
6. Analysis of food safety and hygiene in different food instructions.
7. Running a snacks and beverage service for about 1 ½ - 2 months (For about 30 people)