SGT University Budhera,

Gurgaon

M. Sc. Nutrition and Dietetics

2018

DEAN
Faculty of Allied Health Sciences
SGT University, Gurugram

Objectives of the coursework:

1. To impart knowledge and develop capacities of the students through state of the art higher education in the area of Nutrition and Dietetics, Medical nutrition Management

2. To develop students to become health care professionals for services in various fields of clinical nutrition and medical nutrition management and related areas such as hospitals academics, research, industry, clinical nutrition department, training, extension and community service.

3. To develop capacities and abilities and enable them to pursue higher education and research in Nutrition and Dietetics

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Examination Scheme (M.Sc. Nutrition and Dietetics)

Paper	Subject	Paper Code	Theory Examination		Practical Examination		Total Marks	Credits
			Univ. Exam.	Int. Assess-ment	Univ. Exam.	Int. Assess-ment		
Semester I								
1	Nutritional Biochemistry		60	40	60	40	200	4+1
2	Advanced Nutrition –I		60	40	-	-	100	4
3	Nutritional Management-I		60	40	60	40	200	4+2
4	Physiology		60	40	-	-	100	4
5	Food Microbiology & Biotechnology		60	40	60	40	200	4+1
	Total		**300**	**200**	**180**	**120**	**800**	**24**
Semester II								
1	Research Methodology & Biostatistics		60	40	-	-	100	4
2	Advanced Nutrition –II		60	40	-	-	100	4
3	Applied Food Science and Product Modification		60	40	60	40	200	4+2
4	Nutritional Management –II		60	40	60	40	200	4+2
5	Nutrition Management in Emergencies		60	40	-	-	100	4
6	Internship					50	50	2
----	**Total**		**300**	**200**	**120**	**130**	**750**	**26**
Semester III								
1	Nutrition Management-III		60	40	60	40	200	4+2
2	Public Nutrition and Health		60	40	-	-	100	3
3	Food Service Management		60	40	60	40	200	4+1
4	Food packaging		60	40	-	-	100	4
5	Food processing & preservation technology		60	40	60	40	200	4+2
6	Dissertation/Project		-	-	-	-	-	2
	Total		**300**	**200**	**180**	**120**	**800**	**26**
Semester IV								
1	Functional Foods and Nutraceuticals		60	40	-	-	100	4
2	Management of Health and Fitness		-	-	60	40	100	2

3	Dissertation/Project (continued from 3rd semester)		-	-	100	50	150	12
	Total		**60**	**40**	**160**	**90**	**350**	**18**

SEMESTER-I

Paper I-Nutritional Biochemistry

Total-40 hrs

S.No.	Contents	Lectures
1.	**Membrane structure, composition and Transport** across cell membranes	2
2.	**Acid base balance and its regulation**	2
3.	**Carbohydrate Metabolism** Unit 1. Metabolism is to be discussed with reference to: Intestinal transport of carbohydrates transport of glucose across various cells Unit 2. Cellular metabolism of carbohydrates Unit 3. Glycogen metabolism Unit 4. Regulation of carbohydrate metabolism at substrate level, enzyme level, hormonal level and organ level Unit 5. Disorders of carbohydrate metabolism Unit 6. Definition, classification, structure and properties of glycoproteins an Proteoglycans.	6
4.	**Metabolism of Lipids** Unit 1. Metabolism is to be discussed with reference to: Intestinal transport of lipids, Cellular uptake and metabolism of lipids,(beta-oxidation, denovo synthesis of fatty acids, synthesis and breakdown of unsaturated fatty acids, cholesterol, phospholipids and triacylglycerol) Unit 2. Lipoprotein metabolism, VLDL and LDL ('Forward' Cholesterol transport) VLDL and LDL (Endogenous TAG transport), HDL ('Reverse' Cholesterol transport) Unit 3. Regulation of lipid metabolism at substrate level, enzyme level, hormonal level and organ level. Unit 4. Disorders of lipid metabolism, Dyslipidemias, Lipid storage diseases.	6
5	**Protein Metabolism** Metabolism is to be discussed with reference to: Unit 1. Metabolism of amino acids- biosynthesis and catabolism - energy, glucose and ketone bodies, protein amino acids, non-protein amino acids (including urea cycle, transamination, one-carbon metabolism). Unit 2. Creatine and creatinine Unit 3. Plasma proteins – Nature, properties and functions Unit 4. Biologically active peptides, polypeptides and transport	8

	proteins Unit 5. Inborn errors of amino acid metabolism.	
6.	**Intermediary Metabolism** Unit1. starve-feed cycle, caloric homeostasis and futile cycles. Unit 2. Tricarboxylic acid cycle Unit 3.Biological Oxidation, electron transport chain and oxidative phosphorylation.	4
7.	**1. Biochemical aspects of purine and pyrimidines** Unit 1. Metabolism of purines Unit 2. Metabolism of pyrimidines Unit 3. Role of purine and pyrimidine nucleotides in metabolism.	4
8.	**Biochemistry of Nucleic Acids** Unit 1. Biochemistry of DNA Unit 2. Biochemistry of RNAs Unit 3. DNA replication, mutation, repair and recombination concepts Unit 4. Disorders of nucleic acid metabolism	4
9.	**Enzymes** Unit1.Kinetics of mono-substrate and bi-substrate catalyzed reactions (including inhibition) Unit 2. Enzyme specificity, regulation of enzyme activity and synthesis Unit 3. Enzymes in clinical diagnosis, detoxification in the body-metabolism of xenobiotics, Free radicals, ROS and oxidative damage	4

Practical **Total-20 hrs**

- Determination of pH(in acids, alkalis and buffers using pH meter and indicators).
- Colorimeter-calibration graph
- Separation Technique-Chromatography(paper and column),Centrifugation and Electrophoresis
- Estimation of Hb by Cyanmethoemoglobin method or Sahl's method.
- Estimation of fat (centrifugation or soxhlet method)
- Estimation of proteins(by kjeldahl method)
- Estimation of fibre.
- Estimation of ash
- Estimation of moisture
- Estimation of ascorbic acid(titrimetric/ colorimetric method/)
- Estimation of calcium (titrimetric method/)
- Estimation of iron(wong's method)
- Lipid profile in given blood sample
- Study the principle and working of Glucometer

References:

1. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2000): 25th Ed. Harpers Biochemistry. Macmillan Worth Publishers.
2. Nelson, D.L. and Cox, M.M. (2000): 3rd Ed. Lehninger's Principles of Biochemistry, Macmillan Worth Publishers.
3. Devlin, T.M. (1997): 4th Ed. Text book of Biochemistry with Clinical Correlations, Wiley Liss Inc
4. Stryer, L. (1998): 4th Ed. Biochemistry, WH Freeman and Co.
5. Conn, E.E., Stumpf, P.K., Bruening, G. and Doi, R.H. (2001): 5th Ed. Outlines of Biochemistry, John Wiley and Sons.
6. Voet, D. Voet, J.G. and Pratt, C.W. (1999). Fundamentals of Biochemistry.
7. Tietz, N.W. (1976) Fundamentals of Clinical Chemistry. WB Saunders Co.
8. King, E.J. and Wootton, I.D.P. (1956). 3rd ed. Micro-Analysis in Medical Biochemistry. J and A Churchill Ltd.
9. Plummer, D.T. (1987). 3rd ed. An Introduction to Practical Biochemistry. McGraw-Hill Book Co.

SEMESTER-I

PAPER II-ADVANCED NUTRITION-I

Total-40 hrs

S.No.	Contents	Lectures
1.	**Human Nutritional Requirements** – Development and Recent Concepts. Unit 1. Methods of determining human nutrient needs Unit 2. Description of basic terms and concepts in relation to human nutritional requirements. Unit 3. Guidelines and Recommendation, Development of International and National Nutritional Requirements, Translation of nutritional requirements into Dietary Guidelines	4
2.	**Body Composition** Unit 1. Significance of body composition and changes through the life cycle Unit 2. Methods for assessing body composition (both classical and recent) and their applications.	3
3.	**Energy** Unit1.Components of energy requirements: BMR, RMR, thermic effect of feeding, physical activity. Factors affecting energy requirements, methods of measuring energy expenditure. Unit 2. Estimating energy requirements of individuals and groups. Unit 3. Regulation of energy metabolism and body weight: Control of food intake – role of leptin and other hormones.	5
4.	**Carbohydrates** Unit 1. Review of nutritional significance of carbohydrates and changing trends in dietary intake of different types of carbohydrates and their implications Unit 2. Dietary fibre: Types, sources, role and mechanism of action Unit 3. Resistant starch, fructo-oligosaccharides, other oligosaccharides: Chemical composition and physiological, Significance Unit 4. Glycemic Index and glycemic load Unit 5 Carbohydrates and gene expression	6
5	**Proteins** Unit 1. Overview of role of muscle, liver and G.I tract in protein metabolism Unit 2. Amino acid and peptide transporters Unit 3. Therapeutic applications of specific amino acids Unit 4. Peptides of physiological significance Unit 5: Proteins, amino acids and gene expression	6

6.	**Lipids** Unit 1. Nutritional significance of fatty acids – SFA,MUFA,PUFA: functions and deficiency Unit 2. Role of n-3 and n-6 fatty acids Unit 3. Prostaglandins 1 Unit 4. Trans Fatty Acids 1 Unit 5:Conjugated linoleic acid, Nutritional Requirements and dietary guidelines (International and National) for visible and invisible fats in diets. Unit 6. Lipids and gene expression	8
7.	**Sodium, Potassium and Chloride**	2
8.	**For each of the vitamins in Blocks** Vitamin D, Vitamin E, Vitamin K, Vitamin A The following should be focused on: Historical background structure and chemistry,Food sources Metabolism (digestion, absorption,transport, storage and elimination), Bioavailability and factors affecting bioavailability. Biochemical and physiological functions, Assessment of status, Interaction with other nutrients, regulation of gene expression (wherever applicable),Therapeutic effects, Vitamin A and Carotenoids	4
9.	**Nutrition in Special Conditions**: Space Travel, High Altitudes, Low Temperature, Submarines.	2

References:

1. Annual Reviews of Nutrition. Annual Review Inc, California, USA.
2. Shils, M.E.; Olson, J.; Shike, M. and Roos, C. (1998): Modern Nutrition in Health and Disease. 9th edition. Williams and Williams. A Beverly Co. London.
3. Bodwell, C.E. and Erdman, J.W. (1988) Nutrient Interactions. Marcel Dekker Inc. New York
4. World Reviews of Nutrition and Dietetics.
5. WHO Technical Report Series.
6. Indian Council of Medical Research. Recommended Dietary Intakes for Indians - Latest Recommendations.
7. Indian Council of Medical Research. Nutritive Value of Indian Foods – Latest Publication.
8. Berdanier, C.D. and Haargrove, J.L. (ed) (1996): Nutrients and Gene Expression: Clinical Aspects. Boca Raton, FL CRC Press.
9. Baeurle, P.A. (ed) (1994) Inducible Gene Expression. Part I: Environmental Stresses and Nutrients. Boston: Birkhauser.
10. Chandra, R.K. (ed) (1992): Nutrition and Immunology. ARTS Biomedical. St. John's Newfoundland.
11. International Life Sciences Institute Present Knowledge in Nutrition – latest edition

SEMESTER-I

Paper III- NUTRITION MANAGEMENT-I

Total-40 hrs

S.No.	Contents	Lectures
1.	1. **Nutritional (and dietary) care Process** A) In health depending on the state of growth & development of the Individual - at various activity levels and socioeconomic status. B) Nutritional screening/ assessment and identification of nutritional problem -Nutritional Intervention and Diet Modification based on interpretation of - Nutrition Education and Counselling -Evaluation of Nutritional care	3
2.	**Exchange list as a tool in planning diets**	2
3.	**Nutrition for weight management:** -Disorders of energy Balance -Obesity Components of body weight Adipose tissue structure, regional distribution and storage.	5
4.	**Regulation of body weight:-** -Types of obesity Assessment of obesity Health risks, causes of obesity: neural, hormonal, and psychological, Management of obesity - Dietary Modification: past and present approach - Maintenance of Reduced weight, - Underweight/**Excessive Leanness** -Causes and assessment -Health risks -Dietary Management -Eating disorders: Anorexia Nervosa and Bulimia Nervosa.	7
5	**Nutrition in Fever and Infectious Diseases physiology** of fever and infection Effect of fever and infection on Nutritional status Nutritional management: typhoid, tuberculosis and malaria.	5

6.	**Nutrition therapy for Upper Gastrointestinal tract Diseases/Disorders** a) Physiology and Nutritional care and diet therapy in i) Diseases of esophagus; esophagitis, Hiatus hernia ii) Disorders of stomach: Gastritis, Gastric and duodenal ulcers - Management: associated with H. pylori infection, NSAIDS, Dietary management: traditional approach and liberal Approach	6
7.	**Nutrition therapy for Lower gastrointestinal tract Diseases/Disorders** - a) Common Symptoms of Intestinal dysfunction –Flatulence, constipation, diarrhoea -b) Diseases of the large intestine: - Diverticular disease, Irritable bowel syndrome, inflammatory bowel disease - c) Malabsorption Syndrome/Diseases of Small intestine - Celiac (Gluten –induced) sprue, tropical sprue, intestinal brush border enzyme deficiencies, Lactose intolerance, protein- losing enteropathy. -e) Intestinal surgery: Short bowel syndrome, Ileostomy, Colostomy, Rectal surgery.	5
8.	**NT for Diseases of the Hepato - Biliary Tract** a) Nutritional care in liver disease in context with results of specific function tests liver-Dietary care and management in viral hepatitis(different types), cirrhosis of liver, hepatic encephalopathy, Wilson's disease. b) Dietary care and management in diseases of the gall bladder and pancreas i.e. billary dyskinesia, cholelithiasis, cholecystitis, cholecystectomy, pancreatitis, Zollinger- Ellison syndrome	5
9.	**Delivery of Nutritional Support** – Meeting nutritional needs a) Enteral tube Feeding b) Parenteral Nutrition	2

Journals:

1. Nutrition Reviews
2. Journal of Nutrition
3. American Journal of Clinical Nutrition
4. British Journal of Nutrition
5. European Journal of Clinical Nutrition
6. International Journal of Vitamin and Nutrition Research
7. International Journal of Food Science and Nutrition
8. Nutrition Research
9. Ann

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Paper III- NUTRITION MANAGEMENT-I PRACTICAL Total-20 hrs

S.No.	Contents	Practical
1.	**Market survey of commercial nutritional supplements** and nutritional support substrates	2
2.	**Nutritional (and dietary) care Process** A) in health depending on the state of growth & development of the individual at various activity levels and socioeconomic status.	2
3.	**Exchange list as a tool in planning diets** -Interpretation of patient data and diagnostic tests and drawing up of patient diet prescription, using a case study approach. - Follow up – acceptability of diet prescription, compliance, discharge diet plan for each of the diseases listed below.	2
4	**Nutrition for weight management**: Disorders of energy balance A. Obesity, Assessment of obesity, Management of obesity B. Underweight– Assessment, - Dietary Management	3
5.	**Nutrition in Fever and Infectious Diseases** Nutritional management: typhoid, tuberculosis	3
6.	**Nutrition therapy for Upper Gastrointestinal tract Diseases /Disorders** a) Physiology and Nutritional care and diet therapy in b) Disorders of stomach: Gastric and duodenal ulcers	2
7.	**Nutrition therapy for Lower gastrointestinal** tract Diseases/Disorders a) Intestinal dysfunction - Constipation	

	b) Diseases of large intestine: Irritable bowel syndrome	2
8.	**NT for Diseases of the Hepato - Biliary Tract** - Dietary care and management in viral hepatitis (different types) , cirrhosis of liver, -Dietary care and management in diseases of the gall bladder and pancreas i.e. cholelithiasis, pancreatitis,	4

References:

1. Mahan, L.K. and Escott-Stump, S. (2000): Krause's Food Nutrition and Diet Therapy, 10th Edition, W.B. Saunders Ltd.
2. Shils, M.E., Olson, J.A., Shike, M. and Ross, A.C. (1999): Modern Nutrition in Health and Disease, 9th Edition, Williams and Wilkins.
3. Escott-Stump, S. (1998): Nutrition and Diagnosis Related Care, 4Th Edition, Williams and Wilkins.
4. Garrow, J.S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics, 10 Th Edition, Churchill Livingstone.
5. Williams, S.R. (1993): Nutrition and Diet Therapy, 7th Edition, Times Mirror/Mosby College Publishing.
6. Davis, J. and Sherer, K. (1994): Applied Nutrition and Diet Therapy for Nurses, 2 Nd Edition, W.B. Saunders Co.
7. Walker, W.A. and Watkins, J.B. (Ed) (1985): Nutrition in Pediatrics, Boston, Little, Brown & Co.
8. Guyton, A.C. and Hall, J.E. (1999): Textbook of Medical Physiology, 9th Edition, W.B. Saunders Co.
9. Ritchie, A.C. (1990): Boyd's Textbook of Pathology, 9th Edition, Lea and Febiger, Philadelphia.
10. Fauci, S.A. et al (1998): Harrison's Principles of Internal Medicine, 14th Edition, McGraw Hill.
11. World Cancer Research Fund (1997). Food, Nutrition and the Prevention of Cancer- A Global perspective, Washington E.D. WCRF.

Journals and Other Reference Series

1. Nutrition Update Series
2. World Review of Nutrition and Dietetics
3. Journal of the American Dietetic Association
4. American Journal of Clinical Nutrition
5. European Journal of Clinical Nutrition
6. Nutrition Reviews

SEMESTER-I

PAPER IV- PHYSIOLOGY **Total-40 hrs**

S.No.	Contents	Lectures
1.	Basic concepts of Physiology • Cell structure and function , fluid and electrolyte • Brief review of transport across cell membrane • Genetics, applied genetics • Musculo skeletal system , disorders of skeletal system • Immunity • Homeostasis	4 hours
2.	Haematology • Blood, formation , composition • Erythropoesis • Haemostasis • Blood grouping, cross matching , Rh incompatibility • Anemia's and clinical manifestations • Thallesemia and haemoglobinopathies • Jaundice	5 hours
3.	Cardiovascular system • Structure and function of heart, blood vessels • Cardiac output • Blood pressure • Alteration of cardiovascular functions • Heart failure , hypertension	5 hours
4	Respiratory system Transport of gases • Mechanics of respiration • Cardio respiratory response to exercise and effects of training. • Alteration of pulmonary function –signs and symptoms of pulmonary diseases, asthma, ILD	4 hours
5.	GIT • Secretory , digestive & absorptive functions • GI hormones • Role of liver, pancreas & gall bladder • Manifestations of GI dysfunction • Malabsorption syndrome • Inflammatory bowel diseases	5 hours

6.	Excretory system • Urine formation • Role of kidney in maintaining acid base balance	3 hours
7.	Endocrine system • Mechanisms of hormone regulation • Endocrine glands and their disorders • Emphasis on physiology of diabetes and stress hormones	5 hours
8.	Nervous system • Conduction of nerve impulse synapse • Organisation of CNS & PNS • Hypothalamus and its role in body functions- obesity, sleep, memory • Evoked potentials • Disorders CNS • Cerebellum & basal ganglia	9 hours

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Paper V- Food Microbiology & Biotechnology **Total-50 hrs**

S.No.	Contents	Lectures
1.	Micro-organisms of importance in food - Factors affecting the growth of micro organisms in food - Intrinsic and Extrinsic parameters that affect microbial growth.	3
2.	Contamination and spoilage of cereal, pulses and their processed products	4
3.	Contamination and spoilage of vegetables & fruits and their products	4
4.	Contamination and spoilage of -Flesh foods, - Eggs and poultry, -Milk & milk products	6
5	Use of Biotechnology for food processing.	3
6.	Indian fermented foods – Historical perspective, mechanism of fermentation, effect on nutritional value	8
7.	Genetically modified foods - Need for GM foods – The food challenges, - Potential benefits in agriculture, Crop engineered for input and output traits, nutritional improvement, animal foods, -issues of concern, safety of GM foods.	5
8.	Technology for production of alcoholic beverages	2
9.	Fermented cereal and legume based products, traditional and yeast Leavened products. -Fermentation of vegetables and fruits – lactic acid fermentation. -Fermented milk products – yoghurt, butter- milk, cheese. -Fermentation of meat and fish.	5

(Practical)

1. Study of common equipments in a microbiology lab.
2. Preparation of media and culturing, sub culturing of bacteria.
3. Staining of bacteria: gram-staining and study of colony morphology
4. Isolation of spoilage microbes from bread
5. Study of Shelf life of specific food item- raw, cooked, packaged.
6. Study of food borne bacteria and viruses – morphology and structure (Photographic)
7. Preparation of Dahi/curd using specific starter culture.
8. Microbiological identification of important molds and yeasts.
9. Visit (at least one) to food processing units or any other organization dealing with advanced methods in food microbiology.

SEMESTER-II

Paper I-Research Methodology and Biostatistics (Theory)Total-60 hrs

S.No.	Contents	Lectures
1	-The Research Process • Scientific approach to enquiry in comparison to native, common sense approach • Knowledge, theory and research • Role, need and scope of research in Nutrition andDietetics • Introduction to Statistics • Definition, conceptual understanding of statistical measures, popular concepts and misuse of statistics - Steps in the Research Process • . Identifying interest areas and prioritizing • Selection of the topic and considerations in selection • Review of related literature and research • Concepts, hypotheses and theories • Research Design • Research questions, objectives and assumptions (with examples to be brought by students as exercise)	10
2	Types of Research • Basic and applied research, Qualitative and Quantitative research (brief review of differences) • Historical research • Descriptive research methods – survey, case study, correlation study, content analysis, causal-comparative research • Analytic studies- pre-experimental, experimental research, quasi experimental research • Qualitative research, ethnography • Evaluative research- general characteristics, use of qualitative methods in enquiry (Exercise to be based on actual research papers published in accredited journals) • Results, Discussion, Conclusion, Summary, Abstract, Bibliography and Appendices	5
3	Test of Significance • Hypothesis- meaning, attributes of a sound hypothesis, Stating the hypothesis and types of hypothesis, Hypothesis testing- null & alternative hypotheses, sampling distribution, standard errors, level of significance, critical regions, Type-I and Type II errors (Hypothesis formations and research questions from Research readings – students identify hypothesis/research questions –Discussion) • Variables- types of variables including discrete and continuous variable(• Tools for Data Collection	7

	Primary and secondary methods of data collection • Different types of questionnaires, rating scales, check lists, schedules, attitude scales, inventories, standardized tests, interviews, and observation validity of tools.	
4	- Probability Distributions and its Properties 1 • Normal distribution • Binomial distribution Probability, use of normal probability tables, area under normal distribution curve	3
5	- Sampling 2-3 • Concept ofpopulation and sample, and utility. • . Types of sampling methods and generalizability of results • Probability sampling- simple random sample, systematic random sample, stratified random sampling etc.-random and non-random samples, random numbers and use • Non-probability sampling-purposive samples, incidental samples, quota samples, snowball samples (Based on Journal contents discuss types of Research with Examples) • Unit-5.General consideration in determination of sample size	5
6	Data Management and Analysis 3-4 Quantitative analysis, descriptive statistics, inferential statistics: Uses and limitations Summation sign and its properties Method of scaling Measures of central tendency-mean, median, mode arithmetic mean and its uses, mid – range, geometric mean, weighted mean, measures of dispersion /variability- range, variance, standard deviation, standard error, coefficient of variation, Kurtosis, Skewness (practical aspects of grouped data-frequency distribution, histogram, frequency polygons, percentiles .	5
7	Data Analysis Coding of data Use of statistical computation tools Practical approach : Use of statistical programs Spread sheets: MS Excel and R-Spread sheet Introduction to R programming language for statistical analysis and graphics / SPSS	6
8	Large and Small Sample tests, its interpretation and practical approach Z-test for single proportions and difference between proportions Large sample test for single mean and difference between mean Small sample tests- One & Two – Sample t-tests, Paired t – test, F – test.	5
9	Chi square test and its interpretation practical approach General features of Chi-square tests, goodness of fit Test for Independence of attributes	5
10	Correlation and Regression, its interpretation and practical approach Basic concepts	5

	Correlation (i) Pearson's correlation (ii) Rank Correlation, Linear regression (i) Simple and Multiple Linear Regression, and its interpretations. Calculation of regression coefficint and Prediction	
11	Analysis of Variance and its interpretation, practical approach One-way analysis of variance Introduction Randomized Designs Introduction to Factorial design	4

References

1. Bell, J. (1997): Doing Your Research Project: A Guide for First-time Researchers in Education and Social Science, Viva Books, New Delhi
2. Bell, J. (1997): How to Complete Your Research Project Successfully: A Guide for First-time Researchers, UBSPD, New Delhi.
3. Bulmer, M.C. (1984): Sociological Research Methods: An Introduction, Macmillan, Hong Kong.
4. Festinger, L. and Katz, D. (ed.) (1977): Research Methods in the Behavioral Sciencess, Amerind Publishing, New Delhi.
5. Holloway, I. (1997): Basic Concepts of Qualitiative Research, Blackwell Science, London.
6. Jain, G. (1998): Research Methodology: Methods and Techniques, Mangal

Statistics

1. Gupta, S. (2001) "Research Methodology and Statistical Techniques",Deep and Deep, New Delhi,
2. Hooda, R.P. (2003) "Statistics for Business and Economics", 3rd ed., Macmillan India Ltd., Delhi,.
3. Dey, B.R. (2005) "Textbook of Managerial Statistics", Macmillan India Ltd., Delhi,
4. Fleming, M.C. & Nellis, Joseph G. (1997) "The Essence of Statistics for Business", Prentice-Hall of India, New Delhi,
5. Sarma, K.V.S. (2001) "Statistics made Simple: Do it yourself on PC", Prentice-Hall, New Delhi.

SEMESTER-II

PAPER II-ADVANCED NUTRITION-II

Total-40 hrs

Contents:

For each of the vitamins and minerals/elements, the following will be discussed:

- Historical background food sources, Metabolism (digestion, absorption, transport, storage and elimination), Bioavailability and factors affecting bioavailability.
- Biochemical and physiological functions Assessment of status
- Interaction with other nutrients, regulation of gene expression (wherever applicable) therapeutic effects,Requirements, methods for estimating requirements and recommended daily allowance. Deficiency, overload and toxicity.

S.No.	Contents	Lectures
1.	**Water Soluble Vitamins** Unit 1. Ascorbic acid Unit 2. Thiamin Unit 3. Riboflavin Unit 4. Niacin Unit 5. Pyridoxine Unit 6. Folic acid Unit 7. Vitamin B12 Unit 8. Biotin	10
2.	**Quasi vitamins (in brief)** Unit 1: Choline/ Betaine Unit 2: Myo Inositol Unit 3: Carnitine Unit 4: Bioflavinoids	5
3.	**Macrominerals** Unit 1. Calcium and phosphorus Unit 2. Magnesium etc	5
4.	**Microminerals** Unit 1. Iron	10

	Unit 2. Copper Unit 3. Manganese Unit 4. Iodine Unit 5. Fluoride Unit 6: Zinc Unit 7. Selenium Unit 8. Cobalt Unit 9. Chromium Unit 10 Molybdneum	
5	**Ultra Trace Elements** Unit 1. Vanadium Unit2. Silicon Unit 3. Boron Unit 4. Nickel Unit 5:Lithium, Lead, Cadmium, Sulphur	10

References:

1. Annual Reviews of Nutrition. Annual Review Inc, California, USA.
2. Shils, M.E.; Olson, J.; Shike, M. and Roos, C. (1998): Modern Nutrition in Health and Disease. 9th edition. Williams and Williams. A Beverly Co. London.
3. Bodwell, C.E. and Erdman, J.W. (1988) Nutrient Interactions. Marcel Dekker Inc. New York
4. World Reviews of Nutrition and Dietetics.
5. WHO Technical Report Series.
6. Indian Council of Medical Research. Recommended Dietary Intakes for Indians - Latest Recommendations.
7. Indian Council of Medical Research. Nutritive Value of Indian Foods – Latest Publication.
8. Berdanier, C.D. and Haargrove, J.L. (ed) (1996): Nutrients and Gene Expression: Clinical Aspects. Boca Raton, FL CRC Press.
9. Baeurle, P.A. (ed) (1994) Inducible Gene Expression. Part I: Environmental Stresses and Nutrients. Boston: Birkhauser.
10. Chandra, R.K. (ed) (1992): Nutrition and Immunology. ARTS Biomedical. St. John's Newfoundland.

Journals:

1. Nutrition Reviews
2. Journal of Nutrition
3. American Journal of Clinical Nutrition
4. British Journal of Nutrition
5. European Journal of Clinical Nutrition
6. International Journal of Vitamin and Nutrition Research
7. International Journal of Food Science and Nutrition
8. Nutrition Research

9. Ann Nutr Metab

SEMESTER-II

Paper III-Applied Food Science and Product Modification

Total-40 hrs

S.No.	Contents	Lectures
1.	**Introduction to sensory analysis and uses of sensory tests** Unit 1. Recognition tests for 4 basic tastes, odour and aroma. Unit 2. Tests with other senses. Unit 3. Threshold tests	3
2.	Analytical tests: (i) Difference, (ii) Ranking, (iii) Descriptive, (iv) Scoring and (v) Rating	2
3.	**Conducting the Test:** - Preparing samples, -Presenting samples - Using reference samples, - Reducing panel response error - Consumer oriented tests, - Product oriented tests - Shelf life studies, - Product matching - Product mapping, - Taint Investigation and prevention Reducing viscosity and bulk in foods	10
4.	**Increasing energy density**	2
5	**Applications of fermentation, germination, malting**	3
6.	**Use of different food ingredients for development of health foods** – artificial sweeteners, modified starches, fat replacers, increasing fibre content, functional ingredients, low sodium food adjuncts, protein concentrates, whey.	10
7.	**New Food Products** Unit 1. Definition, Classification Unit 2. Characterization Factors shaping new product development- Social concerns, health concerns impact of technology and market place influence. Unit 3: Planning, standardizing and testing the product, nutritional content	8

8.	**Tapping traditional foods and unconventional sources of foods.** Modifying traditional foods planning, standardizing and testing the product, nutritional content	2

Practical Work **Total-20 hrs**

- Sensory analysis: Different types of sensory tests for basic taste and sensory attributes of products.
- Project on different sensory techniques and responses utilizing prepared products analysis and presentation of sensory data.
- Stepwise development of a new food product, standardization, acceptability studies and submission of project report.
- Survey on types of conveniences foods/consumer behaviour/analysis of food labelling.

References:

1. Lyon, D.H.; Francombe, M.A.; Hasdell, T.A.; Lawson, K. (eds) (1992): Guidelines for Sensory Analysis in Food Product Development and Quality Control. Chapman and Hall, London.

2. Amerine, M.A.; Pangborn, R.M.; Roessler, E.B. (1965): Principles of Sensory Evaluation. Academic Press, New York.

3. Kapsalis, J.G. (1987): Objective Methods in Food Quality Assessment. CRC Press, Florida.

4. Martens, M.; Dalen, G.A.; Russwurm, H. (eds) (1987): Flavour Science and Technology. John Wiley and Sons, Chichester.

5. Moskowitz, H.R. (eds) (1987): Food Texture: Instrumental and Sensory Measurement. Marcel Dekker Inc. New York.

6. Lawless, H.T. and Klein, B.P. (1991): Sensory Science Theory and Applications in Foods. Marcel Dekker Inc.

7. Jellinek, G. (1985): Sensory Evaluation of Food Theory and Practice. Ellis Horwood, Chichester.

8. Piggott, J.R. (ed) (1988): Sensory Analysis of Foods. Elsevier Applied Science, London.

9. Meilgaard, M.; Civille, G.V.; Carr, B.T. (1987): Sensory Evaluation Techniques, Vols. I and II, CRC Press, Florida.

SEMESTER-II

Paper IV-Nutrition Management-II

Total-40 hrs

S.No.	Contents	Lectures
1.	. **Long term complication** - pathophysiology, diagnosis, types, and treatment i). Macrovascular ii). Microvascular	4
2.	**Nutrition in Diseases of Other Endocrine organs** - Functions of the adrenal cortex, thyroid and parathyroid gland, their insufficiencies, clinical symptoms and metabolic implications. - Dietary treatment as supportive to other form of therapy - Hyper and Hyperthyroidism (goiter) - Hypocalcaemia	5
3.	**Nutrition in Cardiovascular Diseases and Hypertension** A. Blood pressure i) Regulation, Short-term (sympathetic nervous system) and long-term (kidneys) ii) Hypertension – classification (secondary and essential) iii) Risk Factors for hypertension iv) Dietary management-DASH approach	5
4.	**Hyperlipidemia and Hyperlipoproteinemia** i) Classifications ii) Dietary management D. Atherosclerosis - Etiology and understanding the pathogenesis i) Coronary Heart Disease /Congestive Heart Failure - Angina Pectoris and Myocardial Infarction - Clinical manifestation and importance of cardiac enzymes to aid in the detection of CHD - Dietary management	5

5	**Nutrition in Renal Diseases** - Physiology and function of normal kidney – A brief review - Classification of kidney diseases A. GlomeruloNephritis Etiology, characteristics Objectives, Principles of dietary treatment and management B. Nephrotic Syndrome Etiology, Objectives, Principles of dietary treatment and Management C. Uremic Renal Failure i) History, General importance of protein nutrition in renal failure and uremia ii) Causes and Dietary management in Acute Renal Disease iii) Causes and Dietary management in Chronic Renal Disease iv) Dietary modification in chronic renal disease with Complications v) Sodium and Potassium Exchange list D) Types of dialysis and their nutritional care – Haemodialysis, CAPD, Continuous Ambulatory peritoneal dialysis) E) Renal Transplant and its nutritional care F) Nephrolithiases- etiology, types of stones and nutritional care (acid & alkaline ash diet) G) Chronic renal disease in Children (in brief)	13
6.	**NT for Rheumatic disorders (of the musculoskeletal system)** Physiology of inflammation in i)Rheumatic Diseases ii) Osteoarthritis iii) Rheumatoid Arthritis, iv)Gout Pharmacologic therapy and Nutritional Care	8

SEMESTER-II

Paper-IV Nutritional Management II Practical Total-20 hrs

S.No.	Contents	Practical
1.	**1. Nutrition for Diabetes Mellitus and hypoglycaemia** Management of DM - Nutritional management i) Diet planning for Type1, Type2 ii) For Special conditions a) Pregnancy b) Elderly c) Physical activities Acute complications – Pathophysiology, diagnosis, types,	5
2.	**Nutrition in Cardiovascular Diseases and Hypertension** i) Dietary management of Hypertension-DASH approach ii) Dietary management of Hyperlipidemia and Hyperlipoproteinemia iii)Congestive Heart Failure,- Nutritional Care	5
3.	**Nutrition Management for Rheumatic disorders (of the musculoskeletal system)** Physiology of inflammation in i)Rheumatic Diseases ii) Osteoarthritis iii) Rheumatoid Arthritis, iv)Gout Pharmacologic therapy and Nutritional Care	5
4.	**Nutrition in Renal Diseases** Principles of dietary treatment and Management A. GlomeruloNephritis B. Nephrotic Syndrome C. Uremic Renal Failure ii) Causes and Dietary management in Acute Renal Disease iii) Causes and Dietary management in Chronic Renal Disease D) Types of dialysis and their nutritional care –	5

	Haemodialysis, CAPD, Continuous Ambulatory peritoneal dialysis) G) Chronic renal disease in Children (in brief)	

References:

1. Mahan, L.K. and Escott-Stump, S. (2000): Krause's Food Nutrition and Diet Therapy,10th Edition, W.B. Saunders Ltd.

2. Shils, M.E., Olson, J.A., Shike, M. and Ross, A.C. (1999): Modern Nutrition in Health and Disease, 9thEdition, Williams and Wilkins.

3. Escott-Stump, S. (1998): Nutrition and Diagnosis Related Care, 4thEdition, Williams and Wilkins.

4. Garrow, J.S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics, 10th Edition, Churchill Livingstone.

5. Williams, S.R. (1993): Nutrition and Diet Therapy, 7th Edition, Times Mirror/Mosby College Publishing.

6. Davis, J. and Sherer, K. (1994): Applied Nutrition and Diet Therapy for Nurses, 2 nd Edition, W.B. Saunders Co.

7. Walker, W.A. and Watkins, J.B. (Ed) (1985): Nutrition in Pediatrics, Boston, Little, Brown & Co.

8. Guyton, A.C. and Hall, J.E. (1999): Textbook of Medical Physiology, 9th Edition, W.B. Saunders Co.

9. Ritchie, A.C. (1990): Boyd's Textbook of Pathology, 9th Edition, Lea and Febiger, Philadelphia.

10. Fauci, S.A. et al (1998): Harrison's Principles of Internal Medicine, 14th Edition, McGraw Hill.

11. World Cancer Research Fund (1997). Food, Nutrition and the Prevention of Cancer- A Global perspective, Washington E.D.WCRF.

Journals and Other Reference Series

1. Nutrition Update Series
2. World Review of Nutrition and Dietetics
3. Journal of the American Dietetic Association
4. American Journal of Clinical Nutrition
5. European Journal of Clinical Nutrition
6. Nutrition Reviews

SEMESTER-II

PAPER V- NUTRITION MANAGEMENT IN EMERGENCIES **Total 40 hrs**

S.No.	TOPICS TO BE COVERED	TEACHING HOURS
1.	**Natural/Manmade disasters** Natural/Manmade disasters resulting in emergency situations- Famine, drought,flood, earthquake, cyclone, war, civil and political emergencies, Factors contributing to the rise and development of emergency situations (Use illustrations from Indian case studies).	15
2.	**Nutritional problems and communicable diseases** Causes, major deficiencies andcommunicable diseases: PEM and other specific deficiencies Cholera, Typhoid, Measles, TB, Plague. Control and prevention, role of immunization and sanitation.	15
3.	**Assessment and surveillance of nutritional status** In emergency affected populations -Scope formalnutrition assessment -Indicators and simple screening methods. -Organization for nutritional surveillance.	4
4.	**- Nutritional relief and rehabilitation:** Assessment of food needs, food distribution strategy,targeting food aid, mass and supplementary feeding, special foods/ rations for nutritional relief, -Organizations for mass feeding/ food distribution, transportation and storage, feeding centers, -Sanitation and hygiene and public nutrition approach to tackle nutritional and health problems in emergencies, ethical considerations.	6

REFERENCE BOOKS:

1.	RB	The management of nutrition in major emergencies	WHO, United Nations High Commissioner for Refugees, International Federation of Red Cross, World Food Programme	2000

2.	TB	Environmental health in emergencies and disasters(A practical guide)	B.Wisner,J.Adams,	2002	
3.	TB	Emergency Food Security Assessment Handbook, First Edition	prepared by the United Nations World Food Programme (WFP)	2005	

DEAN
Faculty of Allied Health Sciences
SGT University, Gurugram

SEMESTER-III

Paper-I Nutritional Management III

Total-40 hrs

S.No.	Contents	Lectures
1.	**Nutritional Anaemia** A. Erythropoiesis and haemoglobin synthesis Nutrients involved in Erythropoiesis B. Classifications of Anemias and Nutritional Care i) Normocytic anemia – aplastic anemia ii) Megaloblastic anemia iii) Microcytic anemia iv) Sickle cell anemia and Thalassemia v) Hemolytic anemia	7
2.	**Food Allergies** i) Definition, Symptoms and mechanism of food Allergy ii) Diagnosis – Biochemical, immune testing (brief), history and food record iii) Elimination diets iv) Food Selection v) Food allergy in infancy (milk sensitive enteropathy, colic prevention of food allergy)	7
3.	**Nutrition in Pulmonary Disease** A. Effects of Malnutrition on Respiration B. Chronic Obstructive Pulmonary Disease i). Etiology and Pathogenesis ii). Nutritional Management C. Respiratory Failure i). Nutritional Care	7
4.	**Nutrition and Cancer** i) Carcinogens in foods ii) Chemoprevention of Cancer: nutrient and non-nutrient dietary components	5

	iii) Etiology and Pathogenesis of carcinogenesis iv) Metabolic and Nutritional Alterations in Malignancy v) Interrelationships of nutritional status and systemic effects of cancer vii) Nutritional impacts of cancer therapy vii) Types of therapy viii) Nutritional support of the Cancer patient	
5	**Nutritional Care in Hyper metabolic Conditions** Burns Sepsis Surgery	4
6.	**Drug- Nutrient Interactions** - Effects of diet and nutritional status on drug absorption, disposition metabolism and action - Effects of drugs on food intake, body weight, nutrient requirements and growth. - Drug induced maldigestion and malabsorbption -Effects of drugs on vitamin and mineral status, requirements and activity, demographics, disease state and risk of drug-nutrient and drug- nutritional status interactions.	10

Semester-III

PAPER I-NUTRITION MANAGEMENT-III PRACTICAL

Total-20 hrs

Topics

1. Nutritional Anaemia

2. Food Allergy

3. Nutrition in Pulmonary Disease

4. Nutrition and Cancer

5. Nutritional Care in Hyper metabolic Conditions

References:

1. Mahan, L.K. and Escott-Stump, S. (2000): Krause's Food Nutrition and Diet Therapy, 10th Edition, W.B. Saunders Ltd.
2. Shils, M.E., Olson, J.A., Shike, M. and Ross, A.C. (1999): Modern Nutrition in Health and Disease, 9th Edition, Williams and Wilkins.
3. Escott-Stump, S. (1998): Nutrition and Diagnosis Related Care, 4th Edition, Williams and Wilkins.
4. Garrow, J.S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics, 10 Th Edition, Churchill Livingstone.
5. Williams, S.R. (1993): Nutriion and Diet Therapy, 7th Edition, Times Mirror/Mosby College Publishing.
6. Davis, J. and Sherer, K. (1994): Applied Nutrition and Diet Therapy for Nurses, 2nd Edition, W.B. Saunders Co.
7. Walker, W.A. and Watkins, J.B. (Ed) (1985): Nutrition in Pediatrics, Boston, Little, Brown & Co.
8. Guyton, A.C. and Hall, J.E. (1999): Textbook of Medical Physiology, 9thEdition, W.B. Saunders Co.
9. Ritchie, A.C. (1990): Boyd's Textbook of Pathology, 9th Edition, Lea and Febiger, Philadelphia.
10. Fauci, S.A. et al (1998): Harrison's Principles of Internal Medicine, 14th,Edition, McGraw Hill.
11. World Cancer Research Fund (1997). Food, Nutrition and the Prevention of Cancer- A Global perspective, Washington E.D. WCRF.

Journals and Other Reference Series

1. Nutrition Update Series
2. World Review of Nutrition and Dietetics
3. Journal of the American Dietetic Association
4. American Journal of Clinical Nutrition
5. European Journal of Clinical Nutrition
6. Nutrition Reviews

SEMESTER-III

PAPER II-PUBLIC NUTRITION AND HEALTH Total-40 hrs

S.No.	Contents	Lectures
1.	**1.Concept of public nutrition** Unit 1. Relationship between health and nutrition Unit 2. Role of public nutritionists in the health care Delivery	3
2.	**Sectors and Public Policies relevant to nutrition and health**	2
3.	**Primary Health Care of the Community** Unit 1. National Health Care Delivery System Unit 2. Determinants of Health Status Unit 3. Indicators of Health	5
4.	**Population Dynamics** Unit 1. Demographic transition Unit 2. Population structure Unit 3. Fertility behaviour Unit 4. Population policy Unit 5. Fertility Unit 6. Inter-relationship between Nutrition and Quality of Life	6
5	**Food and nutrition Security** Unit 1. Food production Access, Distribution, Availability, Losses consumption Unit 2. Food Security Unit 3.Socio-cultural aspects and Dietary Patterns: Their implications for Nutrition and Health	4
6.	**Nutritional Status** Unit1.Determinants of nutritional status of individual & populations Unit 2.Nutrition and Non-nutritional indicators, Socio-cultural, Biological Environmental, Economic Unit 3:Assessment of nutritional status of individuals of different ages- MUAC, Wt for age, Ht for age, Wt for ht, Ponderal index, BMI	5

	Applications and limitations in different field situations choice of an indicator	
7.	**Major nutritional Problems** – etiology, prevalence, clinical manifestations, preventive and therapeutic measures for: Unit 1. Macro and micro nutrient deficiencies Unit2.Other nutritional problems like lathyrism, dropsy, aflatoxicosis, alcoholism and fluorosis. Unit 3. Overweight, obesity and chronic degenerative diseases	5
8.	**National Food , Nutrition and Health Policies** - Plan of action and programmes	3
9.	**Approaches and Strategies for improving nutritional status and health:** Unit 1. Programmatic options- their advantages and demerits, Feasibility Political support Available resources (human, financial, infrastructural) Unit 2. Health-based interventions Food-based interventions including fortification and genetic improvement of foods, supplementary feeding, Nutrition education for behaviour change.	5
10.	**Health economics and economics of malnutrition** Unit 1. Its impact on productivity and national Development Unit 2. Cost-Benefit, Cost effectiveness, Cost efficiency	2

References:

1. Owen, A.Y. and Frankle, R.T. (1986): Nutrition in the Community, The Art of Delivering Services, 2nd Edition Times Mirror/Mosby.
2. Park, K. (2000): Park's textbook of preventive and social medicine, 18th Edition, M/s. Banarasidas Bhanot, Jabalpur.
3. SCN News, UN ACC/SCN Subcommittee on Nutrition.
4. State of the World's Children, UNICEF.
5. Census Reports.
6. Berg, A. (1973): The Nutrition Factor, the Brookings Institution, Washington.
7. Beaton, G.H. and Bengoa, J.M. (Eds) (1996): Nutrition in Preventive Medicine, WHO.
8. Bamji, M.S., Rao, P.N., Reddy, V. (Eds) (1996): Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

9. Gopalan, C. and Kaur, S. (Eds) (1989): Women and Nutrition in India, Nutrition Foundation of India.
10. Gopalan, C. and Kaur, S. (Eds) (1993): Towards Better Nutrition, Problems and Policies, Nutrition Foundation of India.
11. Gopalan, C. (Ed) (1987): Combating Undernutrition – Basic Issues and Practical Approaches, Nutrition Foundation of India.
12. Achaya, K.T. (Ed) (1984): Interfaces between agriculture nutrition and food science, The United Nations University.
13. National Family Health Survey I & II (1993, 2000): International Institute for Population Studies, Mumbai.
14. National Plan of Action on Nutrition (1995): Food & Nutrition Board, Dept. Of WCD, Govt. of India.
15. National Nutrition Policy (1993): Dept. of WCD, Govt. of India.
16. Nutrition Education for the Public (1997): FAO Food and Nutrition Paper, 62, FAO.
17. Allen, L. and Ahluwalia, N. (1997) Improving Iron Status Through Diet: The Application of Knowledge Correcting Dietary Iron Bioavailability in Human Populations.OMNI/USAID, Arlington, VA, USA
18. Nestel, P. (ed) (1995). Proceedings: Interventions for Child Survival. OMNI/USAID Arlington, VA, USA
19. Documents and Reports published by the International Vitamin A Consultative Group
20. Documents and Reports of the International Nutritional Anemia Consultative Group 21. Howson, C.; Kennedy, E. and Horwirz, A. (eds) (1998). Prevention of Micronutrient Deficiencies: Tools for Policymakers and Public Health Workers. Committee on Micronutrient Deficiencies, Board on International Health, Food and Nutrition Board, National Academy Press, Washington D.C. USA.
22. Micronutrient Initiative (1998) Food Fortification: to end Micronutrient Malnutrition. The Micronutrient Initiative, Ottawa, Canada.
23. Murray, C.; Lopez, A. (eds) (1994) Global Comparative Assessments in the Health Sector Disease Burden, Expenditures and Intervention Packages. Collected articles from the Bulletin of the World Health Organization, Geneva, Switzerland.
24. Murray, C. and Lopez, A. (eds)(1996) Global Burden of Disease and Injury Harvard University Press, Cambridge, MA, USA.
25. Ross, J.; Horton, S. (1998) Economic Consequences of Iron Deficiency. The Micronutrient Initiative, Ottawa, Canada.
26. World Health Organization (1998) World Health Report: Life in the 21st century. Report of the Director General. WHO, Geneva, Switzerland

27. Ramakrishnan, U. (eds) (2001). Nutritional Anemias. CRC Press in Modern Nutrition, CRC Press, Boca Raton, FL.

SEMESTER-III

PAPER-III: FOOD SERVICE MANAGEMENT **Theory: - 50 hrs**

S. No.	Topics to be covered	Teaching Hours
1	(1) Introduction, Definition of food service industry, principles of food service industry, objectives, types of food service industry (2) Hospitals, school meals, hostels, Industrial canteens, commercial hotel, canteens Institutions catering to different types of handicapped personnel.	3
2	Theories of management and approaches -Classical or traditional theory, Neoclassical approach, Quantitative approach, MBO approach, System approach, Behavioural and Human relations, Contingency approach, JIT approach, Total quality management approach, Management science or operation research.	3
3	Developing objectives and goals - Definition, importance, types of goals, Policies, procedures, rules.	3
4	Principles and procedures of management-Definition of management, organization & interaction at work •principles of management, functions of management , Managerial roles & responsibilities, the manager& leadership quality.	3
5	Tools of management –Definition, classification:- tangible tools, intangible tools, Organization	3

	chart,structure,function, work improvement techniques.	
6	Personnel management -Definition, scope, concept of personnel management, approaches of personnel management, personnel policies, staff employment, training, placement, promotion, personnel records, and work appraisals.	5
7	(1) Material management, Quantity food preparation and service- Definition. Principles of quantity food purchase- selection, buying and accounting of different foods. (2) Inventory management- assessing requirements, receiving of stock, release of stocks. Record maintenance. (3) Factors in menu planning for large groups, systems for maintaining quality in food preparation and service (4) Kitchen control and maintenance of Kitchen records.	8
8	(1) Financial management-Definition, scope of financial management, financial accounting, management accounting, budgeting, costing, cost control, accounting.	6
9	Hygiene and sanitation in preparation and serving area - Personal hygiene, types, sourcesof contamination, prevention, safety measures, methods of controlling infestation, methods of dish washing.	6

PRACTICAL SESSION*	
*Report submission (internal valuation)	Total-20 hrs

1. Standardization of recipes- costing of recipes. Must Know
   Cereal and cereal products
   Vegetables.
   Fruits.
   Meat, chicken and other fleshy foods.
   Sugar and jaggery
   Milk and its products.
   Pulses.
   Nuts and Oil seeds.
2. Survey of hostels and cafeteria to assess various aspects of food service management. Submit a report. Desirable to Know

Reference Books:

(1) Sathe, A.Y., A First Course in Food Analysis,1999.
(2) Sethi, Mohini, Catering Management :An Integrated Approach,2015.
(3) Sethi, Mohini, Fasting and Feasting - Then and Now,2008.
(4) Sethi, Mohin, Institutional Food Management,2004.

SEMESTER-III

PAPER IV-FOOD PACKAGING TECHNOLOGY — Total-40 hrs

S.No.	Contents	Lectures
1.	Food packaging - Need and role in extending shelf life of foods. Design and testing of package materials, package performance. - Principles in the development of safe and protective packing, safety assessment of food packaging materials.	8
2.	Food packaging systems, product characteristics and package requirements: Different forms of packaging such as rigid, semi-rigid, flexible forms and different packaging system for (a) dehydrated foods (b) frozen foods (c) dairy products (d) fresh fruits and vegetables (e) meat, poultry and sea foods.	10
3.	Types of packaging materials (metals, glass, paper and plastics), their characteristics and uses. • Paper: pulping, fibrillation and beating, types of papers	

	and their testing methods; Glass: composition, properties, types of closures, methods of bottle making; • Metals: Tinplate containers, tinning process, components of tinplate, tin free steel (TFS), types of cans, aluminum containers, lacquers; • Plastics: types of plastic films, laminated plastic materials, co-extrusion.	12
4.	A. Package accessories and advances in packaging technology (active packaging, modified atmosphere packaging, aseptic packaging, packages for microwave ovens, biodegradable plastics, edible gums and coatings). B. Packaging equipment and machinery: Vacuum, CA and MA packaging machine; gas packaging machine; seal and shrink packaging machine; form and fill sealing machine; aseptic packaging systems; retort pouches, bottling machines; carton making machines, package printing.	10

SEMESTER-III

PAPER- V Food processing & preservation technology **Total-50 hrs**

S.No.	TOPICS TO BE COVERED	TEACHING HOURS
1	Principles of fresh food storage: Nature of harvested crop, plant product storage; effect of cold storage and quality – storage of grains.	5
2	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 (RTE) products. Drying – water activity, microbial spoilage due to moisture. Dehydration of fruits, vegetables, milk, animal products Newer methods of thermal processing – batch and continuous	12
3	Processing and preservation by low Temperature –	13

	refrigeration, freezing, CA, MA , and dehydro-freezing. Food irradiation, history and mechanism, the electro-magnetic spectrum, forms of radiant energy. Principles of using electromagnetic radiation in food processing, ionizing radiations and non ionizing radiations, advantages and disadvantages. Controlling undesirable changes in food during irradiation.	
4	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. Physical and chemical changes during drying control of chemical changes, desirable and undesirable changes. Packaging and storage of dehydrated products. Ultra-filtration, reverse osmosis, Freeze drying and freeze concentration.	10
5	Processing and preservation by non-thermal methods: High pressure, pulsed electric field, hurdle technology. GRAS and permissible limits for chemical preservatives and legal aspects for gamma irradiation. Use and application of enzymes and microorganism in processing and preservation of foods; food fermentations, pickling smoking etc; Food additives; Definition, types and functions, permissible limits and safety aspects.	10

Practical

- Blanching and browning control
- Preparation of fruit preserves (jam, jelly).
- Preparation of vegetable preserves (pickle)
- Preservation by chemicals
- Preservation and bottling of fruits & vegetables

- Sensory analysis of preserved/ processed food
- Dehydrated products – vegetables dices tray drying, of seasonal fruit.
- Tomato processing
- Fruit pulping / juice / beverage preparation
- Preparation and standardization of traditional Indian fermented foods
- Bread making - texture.
- Confectionery
- Visit to food processing and preservation unit.
- **Text books and Reference materials**

1. Desrosier NW & James N. (2007). Technology of food preservation. AVI. Publishers

SEMESTER-IV

Paper I- Functional Foods and Nutraceuticals

Total-40 hrs

S.No.	Contents	Lectures
1.	**Introduction:** Definition, history, classification–Type of classification (Probiotics, probiotics and symbiotic; Nutrient vs. Non-nutrient; according to target organ; according to source or origin).	4
2.	**Probiotics** Unit1.Taxonomy and important features of probiotic micro-organisms. Unit 2. Health effects of probiotics including mechanism of action. Unit 3. Probiotics in various foods: fermented milk products, non-milk products etc. Unit 4. Quality Assurance of probiotics and safety.	8
3.	**Prebiotics** Definition, chemistry, sources, metabolism and bioavailability, effect of processing, physiological effects, effects on human health and	

	potential applications in risk reduction of diseases, perspective for food applications for the following: Non-digestible carbohydrates/oligosaccharides: Dietary fibre, Resistant starch, Gums	8
4.	**Other Food Components with potential health benefits:** Definition, chemistry, sources, metabolism and bioavailability, effect of processing, physiological effects, effects on human health and potential applications in risk reduction of diseases, perspective for food applications for the following: Polyphenols: Flavonoids, catechins, isoflavones,tannins, Phytoesterogens, Phytosterols, Glucosinolates, Organo sulphur compounds,Other components – Phytates, Protease inhibitors, saponins, Amylase inhibitors, haemagglutinins, and other plant material	15
5	**Non- nutrient effect of specific nutrients:** Proteins, Peptides and nucleotides, Conjugated linoleic acid and n-3 fatty acids, Vitamins and Minerals.	5

References:

1. Cho S. S. and Dreher, M.L. (2001): Handbook Dietary Fibre, Marcel Dekker Inc., New York.

2. Yurawecz, M.P., M.M. Mossoba, J.K.G. Kramer, M.W. Pariza and G.J. Nelson eds (1999) Advances in Conjugated Linoleic Acid Research, Vol. 1. AOCS Press,Champaign.

3. Wildman, R.E.C. ed. (2000) Handbook of Nutraceuticals and Functional Foods, CRC Press, Boca Raton.

4. Fuller, R. ed. (1992) Probiotics the scientific basis, London: Chapman and Hall, New York.

5. Fuller, R. ed. (1997) Probiotics Applications and Practical Aspects, London: Chapman and Hall, New York.

6. Salminen, S. A. Von Wright (eds) (1998): Lactic acid bacteria: microbiology and functional aspects, 2nd edition, Marcell Dekker Inc. New York.

7. Goldberg, I. Ed (1994): Functional Foods: Designer Foods, Pharma Foods, Nutraceuticals, Chapman & Hall, New York.

8. Wood, B.J.B. ed. (1992): The lactic acid bacteria in health and disease, Elsevier Applied Science, London.

9. Gibson, G., Williams, C. eds (2000): Functional Foods. Woodhead Publishing Ltd. U.K.

10. Young, J. (1996): Functional Foods: Strategies for successful product development. FT Management Report Pearson Professional Publishers, London.

11. Frei, B. (1994): Natural antioxidants in human health and disease. Academic Press, San Diego.

12. Tannock, G.W. (1999): Probiotics: A critical review, Horizon Scientist Press, UK

SEMESTER-IV

Paper II- Management of Health and Fitness Total-40 hrs

S.No.	Contents	Lectures
1.	**Introduction to Fitness and Training Benefits of Exercise** Unit 1.Components of physical fitness. Unit 2.Assessment of nutritional status Unit 2. Holistic approach to management of health and fitness including diet and exercise (Aerobic and anaerobic). Unit 3. Alternative systems for Health and fitness Unit 4. Effect of anaerobic exercise on musculoskeletal system. Unit 5. Endurance , strength/ Power, Speed, Coordination, agility, balance etc	10
2.	**Cardio--respiratory System** Unit 1 Effect of aerobic exercise on heart rate, blood pressure and lung function Unit 2 Assessment of Cardio-respiratory fitness using Maximum aerobic capacity (VO2max). Unit 3 Assessment of coronary risk profile- RISKO factor	8

	Unit 4.Recognizing symptoms to stop any exercise, Emergency procedures.	
3.	**Substrate for exercise, Utilization of lipid and** carbohydrate in relation to exercise type, intensity and duration.	2
4.	**Water and Electrolyte Balance:** Regime of hydration and dehydration. Symptoms and effect of dehydration. Sports Drink.	2
5	**Effect of Specific** nutrients on Work Performance and Physical Fitness and Training Diets. - Market survey and consumption pattern –Merits and demerits of nutragenic aids and supplements.	4
6.	**Exercise prescriptions in Special Conditions:** Unit 1. Exercise regime for pre and post-natal fitness. Unit 2.Obesity and weight control – Prevention of weight cycling. Unit 3Diabetes Unit 4 Hypertension and Coronary Heart Disease Unit 5.Osteo Arthritis and Osteoporosis Unit 6. **Spondylitis,** Back aches	10
7.	**Formulating dietary guidelines for:** Fitness and health Obesity management and Critically analyzing different established weight reduction diet plans. Management of diabetes mellitus and Management of CVD.	4

References:

1. Mahan, L.K. & Ecott-Stump, S. (2000): Krause's Food, Nutrition and Diet Therapy, 10th Edition, W.B. Saunders Ltd.

2. Sizer, F. & Whitney, E. (2000): Nutrition – Concepts & Controversies, 8Th Edition, Wadsworth Thomson Learning.

3. Whitney, E.N. & Rolfes, S.R. (1999): Understanding Nutrition, 8th Edition, West Wadsworth, An International Thomson Publishing Co.

4. Ira Wolinsky (Ed) (1998): Nutrition in Exercise and Sports, 3rdEdition, CRC Press.

5. Parizkova, J. Nutrition, physical activity and health in early life, Ed. Wolinsky, I., CRC

Press.

6. Shils, M.E., Olson, J.A., Shike, N. and Ross, A.C. (Ed) (1999): Modern Nutrition in Health & Disease, 9th Edition, Williams & Wilkins.

7. McArdle, W. Katch, F. and Katch, V. (1996) Exercise Physiology. Energy, Nutrition and Human Performance, 4th edition, Williams and Wilkins, Philadelphia.

Journals:

1. Medicine and Science in Sports and Exercise.

2. International Journal of Sports Nutrition.

SEMESTER-IV

M.Sc. Dissertation

Submission of Dissertation

The research project is to be carried out over a period of approximately 6 months and will be carried out in the lab/ hospitals, subject to approval by all concerned. Students will select research project with their respective supervisors. The projects will be selected such that a student can reasonably be expected to make an original contribution to the chosen area of research within the time period allotted. The purpose of the project is to provide the student with training in academic research and acquisition of practical skills, including the design of a research project, planning of experiments, dealing with practical problems, recording of, presenting and analyzing data.

Unit I- Thesis Proposal Development is an independent tutorial conducted by the student's advisor, and involves a comprehensive literature survey of the chosen research area. Through regular meetings, the student and advisor discuss this literature in detail and the topic for research project will be finalized in the third semester.

Unit II- Thesis proposal Each student must submit to the university with the signed approval of the advisor, a thesis proposal defining the thesis project, the methods and design of the experiments needed for completion, the progress to date and plans for completion in the third semester.

Unit III – Thesis preparation: This is involving preparation of the thesis. The thesis must include a cover page, abstract, table of contents, introduction of the thesis topic with a comprehensive review of literature, appropriately organized methods, results and discussion section for the experiment performed and final conclusions section summarizing the outcome

of the project. The student should submit a draft of the thesis to the advisor by the end of the fourth semester.

DEAN
Faculty of Allied Health Sciences
SGT University, Gurugram