

M.Sc. Home Science Grp 'B' (FN)

Food and Nutrition

(As per NEP 2020 guidelines)

Session 2022-23

VII SEMESTER

Paper No.	Subject	Course Type	Credits	UE	CIE	Total
I	Research Methodology	Theory/Major	4	75	25	100
II	Nutritional Biochemistry-I	Theory/Major	4	75	25	100
III	Maternal and Child Nutrition	Theory/Major	4	75	25	100
IV	Applied Nutrition- Health and Fitness	Theory/Major	4	75	25	100
V	Nutritional Biochemistry-I	Practical/Major	4	75	25	100
VI	Other faculty*	Minor	4	75	25	100
VII	Research project	Project	4	75	25	100
	Total		28	525	175	700

*Faculty of Linguistic, Faculty of computer, Faculty of Management, Faculty of Basic Science

VIII SEMESTER

Paper No.	Subject	Course Type	Credits	UE	CIE	TOTAL
VIII	Fundamentals of Statistics	Theory/Major	4	75	25	100
IX	Nutritional Biochemistry-II	Theory/Major	4	75	25	100
X	Advanced Food Science	Theory/Major	4	75	25	100
XI	Public Health Nutrition	Theory/Major	4	75	25	100
XII	Advanced Food Science	Practical/Major	4	75	25	100
XIII	Research Project	Project	4	75	25	100
	Total		24	450	150	600

Bachelor (Research) in Faculty

IX SEMESTER

Paper No.	Subject	Course Type	Credits	UE	CIE	TOTAL
XIV	Techniques & Instrumentation in Nutrition Research-Biochemistry III	Theory/Major	4	75	25	100
XV	Institutional Food Management	Theory/Major	4	75	25	100
XVI	Advanced Nutrition	Theory/Major	4	75	25	100
XVII	Food Microbiology and Food Safety	Theory/Major	4	75	25	100
XVIII	Computer application in designing	Practical/Major	4	75	25	100
XIX	Research Project	Project	4	75	25	100
	Total		24	450	150	600

X SEMESTER

Paper No.	Subject	Course Type	Credits	UE	CIE	TOTAL
XX	Advanced Physiology	Theory/Major	4	75	25	100
XXI	Clinical Nutrition with Compulsory Internship	Theory/Major	4	75	25	100
XXII	Food Processing and Preservation	Theory/Major	4	75	25	100
XXIII	Food Preservation techniques (Practical)	Practical/Major	4	75	25	100
XXIV	Nutrition in Critical Care	Theory/Major	4	75	25	100
XXV	Research Project	Project	4	75	25	100
	Total		24	450	150	600

Master (Research) in Faculty

P.G.D.R IN SUBJECT

SEMESTER XI

Paper No	Subject	Course Type	Credit	CIE	UE	Total
C 1	Thrust areas of Home Science	Major	6	25	75	100
C 2	Essentials of Entrepreneurship	Major	6	25	75	100
C 3	Research Methodology	Major	4	25	75	100
	Research Project (Qualifying)					
			16	75	225	300

Abbreviation

CIE: Continuous Internal Evaluation

UE: University Evaluation

M.Sc. (H.Sc.)
FOOD & NUTRITION
(Group – B)
(2022)

**Bachelor (Research) in
Faculty
Semester VII**

Paper – I
Research Methodology
M.Sc. (Home Science)
(General, Spl. Grp. ‘A’, ‘B’& ‘E’)
Semester VII

Course Type: Theory Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

Objectives:

- To understand the significance of Research Methodology in Home Science Research.
- To study the types, tools and Methods of Research and develop the ability to construct data appropriate to the Research Design.
- To develop skills for preparation of research proposal and writing report.

UNIT- I	Introduction to Research	PERIODS
	1. Meaning, purpose, approaches and scope in various field of Home Science	2
	2. Types of Research	3
	3. Selection of Research problem: need, relevance and feasibility	2
	4. Research Design: meaning, purpose and criteria(Experimental and Observational)	3
	5. Quantitative and Qualitative approaches	2
UNIT- II	Research Process	
	1. Planning the Research	2
	2. Defining the Research problem	2
	3. Research Objectives: Definition and formulation of hypothesis/objectives	2
	4. Review of related literature	2
	5. Basics of Sampling: Sampling vs. Complete Enumeration Objectives, Principles and Limitations of sampling, Sampling Techniques, Size and Error	4
UNIT-III	Data Collection Tools	
	1. Primary and Secondary Data	1
	2. Methods and Tools in Data Collection (Schedule, Questionnaire, Interview, Case Study Method etc.)	4
	3. Measurement and Scaling Techniques	4
	4. Validity, Reliability, Sensitivity of Data Collection Tools	3
UNIT- IV	Report Writing	

	1. Summary, Conclusion and Recommendations	3
	2. Writing References	2
	3. Writing Process of Research Report: Formal Style of writing, Preface, Chapterization, Headings, Tables and Figures, Appendices, Bibliography and Acknowledgement	7

References:

1. C. R. Kothari: Research Methodology- Method and Techniques
2. R. Kumar: Research Methodology: A step by Step Guide for Beginners
3. M. H. Gopal: Introduction to Research Methodology for Social Sciences
4. Good, Carter, Scales and Douglas: Methods of Research

SESSIONAL WORK

- Prepare a research plan in any field of Home Science.
- Prepare a Schedule/Questionnaire of the related topic using scaling techniques.
- Use and importance of coding and preparation of master chart for analysis.

Paper. II
Nutritional Biochemistry I
M. Sc. (Home Science) Gen and Spl. Group 'B'
Semester-VII

Course Type: Theory Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

Objectives:

- Augment the biochemistry knowledge acquired and understand the significance of Biochemistry in Home Science research.
- Understand the mechanisms adopted by the human body for regulation of metabolic Pathways
- Become proficient for specialization in nutrition. Understand integration of cellular level metabolic events to nutritional disorders and imbalances.

	<u>Unit-I -</u>	Periods
1.	Definition, objectives, scope and importance of biochemistry and its relation to nutrition	1
2.	Carbohydrates- <ul style="list-style-type: none"> • definition, classification, and properties of Glycoproteins, Proteoglycans • glycolysis, kreb's cycle, and its significance as amphibolic pathway, • glycogenesis, glycogenolysis, cori cycle and blood sugar regulation. 	10
	<u>Unit-II -</u>	
1.	Definition, classification of lipids	2
	Metabolism of Lipids- <ul style="list-style-type: none"> • Biosynthesis of fatty acids • Beta oxidation theory with energetic • Ketosis, formation and utilization of ketone bodies. 	6
2.	Proteins	
	Definition, classification. <ul style="list-style-type: none"> • Structure and properties of proteins. • Essential and non essential amino acids. 	5
	Metabolism of Proteins – <ul style="list-style-type: none"> • Urea cycle and its regulation. • Lipoproteins- types, composition ,role and significance in And its relationshipwith lipid transport. 	
	<u>Unit-III-</u>	
1.	Enzymes- Definition, types and classification of enzymes	3

2.	Coenzymes, specificity of enzymes, isozymes, enzyme kinetics including factors affecting velocity of enzymes catalysed reaction. Enzyme Inhibition	4
3.	Enzymes in differential diagnosis of diseases and their clinical significance	2
4.	Allosteric Enzymes	1
	Unit-IV-	
1.	Nucleic Acids - Classification, composition, and function of nucleic acids	2
2.	Structure and properties of nucleosides, nucleotides	2
3.	DNA, RNA (mRNA, tRNA, rRNA)	3
4.	Replication, Transcription, Protein biosynthesis	6
5.	Genetic code.	1

Reference books-

1. General biochemistry by Frutton and Simmond.
2. Text book of Biochemistry by West and Todd.
3. Introduction to Modern Biochemistry by Karlson.
4. Principles of Biochemistry by White Handler and Smith.
5. Biochemistry by Kleiner and Orten.
6. Hawk's Physiological Chemistry by Oser.
7. Review of Physiological Chemistry by H.A. Harper.
8. Essentials of food and Nutrition Vol.-I and II by M. Swaminathan.
9. Biochemistry by S.K. Dasgupta. Vol. I, II, III.
10. Essentials of Biochemistry by Dr. M.C. Pant.
11. Biochemistry by Virendra Kumar Shukla.
12. A Text Book of Biochemistry by S.P. Singh.
13. Chemical Analysis- An Instrumental Approach by A.K. Srivastava, P.C. Jain. S. Chand & Company Ltd.
14. Principles of Biochemistry by Leneinger, D.L. Nelson, M.M. Cox.
15. Instrumental methods of chemical analysis by B.K. Sharma.

Sessional Work

1. Seminar presentation on any topic from syllabus.
2. Academic assessment through short and long questions.
3. Discussions on role of nutrients in biochemistry.

Paper- III
Maternal and Child Nutrition
MSc. Food and Nutrition SPL Group ‘B’ / Group ‘A’
Semester-VII

Course Type: Theory Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

Objectives:

- To understand nutritional demands during pregnancy and lactation.
- To acquaint the students with different programs running for controlling undernutrition in infants and mothers.
- To understand nutritional needs during infancy, childhood and adolescence.
- To impart efficient methods of teaching nutrition to children and mothers.

CONTENTS

UNIT-I	PREGNANCY	PERIODS
	1. Pregnancy: The period of physiological stress	2
	2. Physiological changes during pregnancy	1
	3. Nutrition during pregnancy – Nutrient, requirement, diet & dietary pattern	4
	4. Maternal Nutrition&foetal outcome- pre pregnancy weight and foetal outcome, BMI , Weight gain during pregnancy	4
	5. Risk factors during pregnancy	1
UNIT- II	LACTATION	
	1. Breast Feeding- Colostrum, composition and importance, initiation of breast feeding and duration, advantages of breastfeeding	3
	2. Nutrition needs of lactation	1
	3. Diet and Dietary pattern for lactating woman	2
	4. Effect of maternal malnutrition on milk output and quality of milk	1
	5. Introduction of complementary foods- initiation and management	2
	6. Infant milk substitute act, BPNI (Breast feeding promotion Network in India)	1
	7. Management of pre-term, low birth weight babies and IUGR	1
UNIT-III	INFANCY, CHILDHOOD AND ADOLESCENCE	
	1. Importance of focussing health & nutrition interventions in first 1000 days of life & improving delivery of key nutrition interventions, its evidence, impact, significance for controlling under nutrition & new government initiatives (IYCF- Infant and young Child feeding practices, IGMSY- Indira Gandhi Matratv Suraksha Yojana, Janani Suraksha Yojana)	2
	2. Nutritional requirements during infancy, early childhood, childhood and adolescence with special reference to girl child	6
	3. Diet for preschool child, nutritional deficiency diseases and corrective	4

	measures	
	4. Dietary management of common childhood diseases	2
UNIT-IV	GOVERNMENT PROGRAMMES AND NUTRITION COMMUNICATION	
	1. Problems in improving micronutrient deficiencies in children, Pregnant / Lactating women and adolescent girls: issues, weaknesses and newer initiatives of government (Kishorishakti, SABLA), way forward	4
	2. School health programs in India: Current status, bottlenecks	2
	3. School lunch programmes	2
	4. Efficient methods of teaching principles of nutrition to children & mothers	2

References:

1. UNICEF Publications (State of World's Children, tracking maternal & child health, countdown 2015 etc.)
2. Global Strategy for Infant & Young child feeding by WHO & UNICEF, 2003.
3. National IYCF Recommendations, 2006, Ministry of Women & Child Development, GOI, New Delhi.
4. Mapping India's Children (2004), UNICEF in Action.
5. Nita Dalmiya, Ian Darnton Hill, Werner Schultsild (2009); Multiple micronutrient supplementation during pregnancy in developing country settings. Food & Nutrition Bulletin supplement 30(4).2009
6. Wallace, H.M., Giri, K. (1990). Healthcare of women and children in developing countries, 3rd party publishing co. Oakland.
7. Michel Dibble and Vpulsenaratu (2010). Special section on IYCF practices in 4 countries in South Asia: S.Asia infant feeding network FN Bulletin 31(2) 291-375, June 2010.
8. Indian council of Medical Research. Nutrient requirements & recommended dietary allowances for Indians (2009).
9. Indira Gandhi National Open University. School of Continuing Education (2012). Childhood Nutrition: Basic Concepts and Physiological requirements- Course 1.

	SESSIONAL WORK
1.	Plan diet for pregnant and lactating women
2.	Plan and prepare nutrient dense, complementary foods for 6-12 month old infants
3.	Plan and prepare diet for an infant
4	Plan low cost recipe for Balwadi and Aanganwadi and school lunch programmes
5	Plan diet for deficiency diseases and common childhood illnesses
6	Plan diet for different age groups of children & adolescents

Paper- IV
Applied Nutrition - Health and Fitness
MSc. Food and Nutrition SPL. Grp 'B'
Semester-VII

Course Type: Theory Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

Objectives:

- To promote the students understanding about the functional benefits of foods for health and fitness.
- To enable the students to understand the role of nutrition in the dietary management of geriatrics
- To enable the students to understand the physiological demands during different sports activities.

CONTENTS

UNIT -I	ANTIOXIDANTS IN HEALTH & DISEASE	PERIODS
	1.Effect of oxidants on Macromolecules- Carbohydrates, proteins, lipids , nucleic acids.	3
	2.Nutrient antioxidants with potent health effects	2
	3. Non- Nutritive food components with potential effects (Flavonoids-polyphenols and tannates, phytoestrogens, cyanogenic compounds)	2
	4. Pre and Probiotics	2
	5. Foetal origin of Non-communicable disease	1
	6.Nutrigenomics- the future of Nutrition care for health management, treatment and prevention of diseases.	2
UNIT-II	GERIATRIC NUTRITION- MULTIFACETED ASPECT OF AGEING	
	1.Ageing process- changing demographic trends, theories of ageing	3
	2.The ageing process- physiological, biochemical and body composition changes	3
	3.Health and Nutritional problems of the elderly	2
	4. Nutritional requirements and dietary guidelines	2
	5. Community geriatrics- Dimensions, issues and solutions.	2
UNIT-III	NUTRITIONAL MANAGEMENT- HEALTH & FITNESS	
	1.Definitions, components and assessment criteria of- - Specific fitness - Health status	2
	2. Holistic approach to 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-relationships	1 1 3 3
	3. Alternative systems for health and fitness like Ayurveda, yoga, meditation, vegetarianism and traditional diets.	2
UNIT- IV	NUTRITION IN SPORTS	

	1.Physiological aspects- Metabolic changes during sports activity	2
	2.Energy systems for endurance and power activity	2
	3.Fuels for muscle contraction, Nutritional requirements for sports: Pre game, during and post game meal (Short-duration, endurance)	4
	4. Water & Electrolyte balance and replenishments	2
	5.Erogogenic aids, sports drink, uses and abuse of dietary supplements	2

References:

1. Shils ME, Olson JA and Shike N (1994). Modern Nutrition in Health & Disease. 8th Edition, Vol I and II, Philadelphia Lea and Febiger.
2. Bagchi K and Puri S (1999). Diet and Ageing: Exploring some facts. Society of Gerontological research and HelpageIndia, New Delhi.
3. Parizkova J (1997). Nutrition, physical activity and health in early life. Ed. Wolinsky, I, CRC press.
4. McArdle W, Katch F, Katch V (1996). Exercise physiology, exercise energy, nutrition and human performance. 4th Edition. Williams and Wilkins, Philadelphia.
5. Indian Council of Medical Research (2000). Nutrient Requirements and Recommended Dietary Allowances for Indians: A report of the expert group of the ICMR, New Delhi.
6. Hickson JH (2000). Nutrition for exercise & sport. CRC Press. 2nd Edition.
7. Mahan, L.K and Escott Stump .S. (2008). Krause's Food & Nutrition Therapy. 12th Ed. Saunders-Elsevier.
8. Ira Wolinsky (Ed.). Nutrition in Exercise & Sports. 3rd Edition.

Journals:

1. Medicine and Science in sports in exercise
2. International Journal of Sports Nutrition
3. Journal of Applied Nutrition

	SESSIONAL WORK
1.	Market Survey for commercial nutritional products for physical fitness & sports performance available in India
2.	Ayurveda Cooking
3.	Yoga and Pranayaam
4.	Vegetarian , Vegan and traditional Diets
5.	Diet for different sports activities- Endurance & power

Paper. V
Nutritional Biochemistry I
M. Sc. (Home Science) Gen and Spl. Group 'B'
Semester-VII

Course Type: Practical Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

Objectives:

- Augment the biochemistry knowledge acquired and understand the significance of Biochemistry in Home Science research.
- Understand the mechanisms adopted by the human body for regulation of metabolic Pathways
- Become proficient for specialization in nutrition. Understand integration of cellular level metabolic events to nutritional disorders and imbalances.

Practical: - Interactive periods /week.

1. Qualitative test for reducing and non reducing sugars, fat and proteins
2. Separation of water and non water soluble protein from soybean and Bengal gram flour.
3. Estimation of cholesterol.
4. Determination of acid value of an oil/ fat.
5. Quantitative estimation of sugars.
6. Estimation of soluble protein by Biuret method.
7. Simple test of sterol.

Paper VI
(From Other Faculty)

Course Type: Minor

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

*Faculty of Linguistic, Faculty of computer, Faculty of Management, Faculty of Basic Science

Paper – VII
Research Project
M. Sc. (Home Science)
(General, Grp. ‘A’, Grp. ‘B’ and Grp. ‘E’)
Semester VII

CIE – 25 Marks
UE – 75 Marks

Credits: 4

Course Content:

1. Identification of research problem
2. Preparation and finalization of synopsis

Abbreviations:

CIE: Continuous Internal Evaluation

UE: University Exam

Semester VIII

Paper – VIII
Fundamentals of Statistics
M.Sc. Spl (Grp. ‘A’) /(Grp. ‘B’) / (Grp. ‘E’)
M.Sc. (Gen.)
Semester-VIII

Course Type: Theory Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

Objectives:

- To understand the role of Statistics in Research.
- To apply Statistical Techniques to Research Data for analyzing and interpreting data meaningfully.
- To understand the use of Statistical Software in the analysis of data.

UNIT- I	Introduction to Statistics	PERIODS
	1. Meaning of Statistics and its scope in Home Science and other field of inquiry	2
	2. Processing of Data: Editing, Classification and Coding of Data	3
	3. Tabulation of Data	2
	4. Diagrammatical and Graphical representation of data: Significance of difference between Diagram and Graph, Types of Diagram and Graph (Bar Diagrams, Histogram, Polygon, Ogives)	3
	5. Formation of Discrete and Continuous Frequency Distribution	2
UNIT- II	Statistical Measures	
	1. Measures of Central Tendency (Mean, Median, Mode, Quartiles, Deciles, Percentiles)	6
	2. Measures of Dispersion/Variation (Range, Mean and Quartile Deviation, Standard Deviation, Coefficient of Variation)	6
UNIT- III	Correlation, Regression and Association of Data	
	1. Simple Correlation for Grouped and Ungrouped Data (Karl Pearson's , Spearman Rank Correlation), Basic concepts of Partial and Multiple Correlation	5
	2. Simple Linear Regression for Grouped and Ungrouped Data	5
	3. Measures of Association	2
UNIT- IV	Test of Significance	
	1. Hypothesis, its type and error, Level of Significance, Critical Region, One Tailed and Two Tailed Test	2

	2. Large Sample Test: One sample and two sample test for population Mean and Proportion	2
	3. Small Sample Test: Applications of t- test (for one sample and two problems)	3
	4. Chi Square Test and its applications	2
	5. F- Test and its applications	3
	Computer Applications in data Analysis	
	<ul style="list-style-type: none"> • Use of Statistical Software in data analysis 	

References:

1. Hellan M. Walker.: Elementary Statistical Methods
2. Sharma. Choudhary & Gupta.: Descriptive Statistics
3. Elhance. D.N.: Elementary Statistics
4. S. P. Gupta : Statistical Methods
5. Shukla and Sahai: Principles of Statistics

Sessional Work

- Summarization and Presentation of data using tables and graphs.
- Applications of Statistical Techniques to data analysis and interpretation of data.
- Applications of z, t F and Chi-Square test in hypothesis testing.
- All the above will be done using Statistical Softwares

Paper-IX
Nutritional Biochemistry II
M. Sc. (Home Science) Spl. Group 'B'
Semester-VIII

Course Type: Theory Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

Objectives

- Understand integration of cellular level metabolic events to nutritional disorders
- To familiarize with the applications of the analytical techniques.
- Comprehend better the principles involved in different methods of investigation.
- Become proficient for specialization in nutrition.

	<u>UNIT-I</u>	Periods
1.	Water , electrolyte and acid –base balance	3
2.	Vitamins : Structure and biochemical properties of water soluble and fat soluble vitamins and their coenzyme activity	4
3.	Minerals – Biochemical role of inorganic elements – calcium, phosphorous, iron	3
	<u>UNIT-II</u>	
1.	Hormones - Modes of Hormones action and biological role of hormones of pituitary, adrenal cortex and medulla, thyroid, parathyroid, pancreas.	6
2.	Concepts of energy expenditure and their application- <ul style="list-style-type: none"> • Units of energy measurement of energy expenditure by direct and indirect calorimetry • Calculation of non protein respiratory quotient and its conversion to quantity of carbohydrate and fat (in grams) metabolised. • Determination of amount of protein metabolised and calculation of total heat production of the diet, basal metabolism, BMR and its measurement • Determination of amount of protein metabolised and calculation of total heat production of the diet, basal metabolism, BMR and its measurement • SDA of food and its interpretation, calculation of energy expenditure of an average reference man and woman, regulation of energy balance 	6
	<u>UNIT-III</u>	
1.	Inborn errors of metabolism-	
	<ul style="list-style-type: none"> • Disorders of amino acid metabolism- Albinism, Alkaptonuria, Maple syrup urine diseases, Tyrosinemia, Phenylketonuria. 	4
	<ul style="list-style-type: none"> • Disorders of carbohydrate metabolism- Pentosuria, Fructosuria, 	4

	Hyperglycinemia, Galactosaemia, hereditary disaccharide (sucrose and maltose) tolerance <ul style="list-style-type: none"> Disorders of lipid metabolism –Gaucher’s disease, Niemann pick disease, Fabry’s disease. 	3
2.	Bioenergetics: Electron Transport Chain, oxidative Phosphorylation and synthesis of ATP	3
	UNIT-IV	
1.	Applied instrumentation in biochemistry -physiochemical principles and methodology- colorimetry, photometry, flourimetry, flame photometry and atomic absorption meter	6
2.	Introduction to functional biochemistry of liver - A brief description of liver function tests	3
3.	Introduction to functional biochemistry of Kidney - A brief description of Kidney function tests	3

Sessional work:

1. Estimation of Ascorbic Acid.
2. Estimation of moisture, fat, ash calcium, phosphorous and iron.
3. Buffers- preparation of buffers. Determination of pH of unknown solution.
4. Estimation of protein by Lowry’s method.
5. Estimation of protein by Microkjeldahl method.
6. Estimation of blood sugar.
7. Estimation of lipid profile (total cholesterol, triglyceride, HDL, LDL, VLDL Cholesterol).

Reference books-

1. General biochemistry by Frutton and Simmond.
2. Text book of Biochemistry by West and Todd.
3. Introduction to Modern Biochemistry by Karlson.
4. Principles of Biochemistry by White Handler and Smith.
5. Biochemistry by Kleiner and Orten.
6. Hawk’s Physiological Chemistry by Oser.
7. Review of Physiological Chemistry by H.A. Harper.
8. Essentials of Food and Nutrition Vol. I and II by M. Swaminathan.
9. Biochemistry by S.K. Dasgupta. Vol. I, II, III.
10. Essentials of Biochemistry by Dr. M.C. Pant.
11. Biochemistry by Virendra Kumar Shukla.
12. A Text Book of Biochemistry by S.P. Singh.
13. Chemical Analysis- An Instrumental Approach by A.K. Srivastava, P.C. Jain. S. Chand & Company Ltd.
14. Principles of Biochemistry by Leneinger, D.L. Nelson, M.M. Cox.
15. Instrumental Methods of Chemical Analysis by B.K. Sharma.
16. Nutrition and diet therapy- Sheel Sharma, Pee,pee, publishers, New Delhi-2013
17. Experimental and techniques in Biochemistry 2007, galgotia Publishers, New Delhi.

Paper-X
Advanced Food Science
MSc. Food and Nutrition Spl.Group 'B'
MSc. General
Semester-VIII

Course Type: Theory Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

Objectives :

- Enabling students to comprehend the changes that occur in the physiochemical properties of food stuffs during food preparation.
- Enabling the students to understand and apply the various techniques in the quality evaluation of foods.
- Imparting awareness on the concept of 'food product development'

CONTENTS

UNIT-I	Colloids and Carbohydrates in Food	PERIODS
	1. Introduction to food science.	1
	2. Physical & Chemical properties of foods-Changes occurring on cooking and storages.	2
	3. Colloids – Properties denaturation of proteins, gelatinisation, gel formation, emulsions, foams, browning reactions enzymatic and non-enzymatic.	4
	4. Sugar Cookery: Stages of cookery, fondants, fudges, caramels and brittles, crystallisation of sugar.	2
	5. Starch Cookery: Gelation, factors affecting gelation, starch as thickener, different sources of starch and their properties cereals and millets-their milling and parboiling.	3
UNIT-II	Proteins and Fats in Food	
	1. Protein Cookery	
	(a) Properties of milk protein, other milk products- curds, evaporated, spray dried and condensed milk, Cheese, Khoya, Their use in food preparations.	3
	(b) Cereals, grams and dals-Effect of soaking, germination & fermentation on cereals and pulses, properties of gluten, gluten formation and the factors affecting it.	3
	(c) Eggs-Properties of egg-proteins & uses in egg preparations, egg as binding, foaming and emulsifying agent mayonnaise preparation.	3
	(d) Meat-Postmortem changes, changes on cooking, fish types, changes during heat treatment.	2

	2. Fats & Oils: Properties, smoking points, melting point, hydrogenation, shortening effect. Changes in Storage, rancidity, oxidative and hydrolytic, whipped cream as double emulsion, different commercial products and their uses.	3
UNIT-III	Vegetables & Fruits, Sensory Evaluation	
	1. Vegetables & Fruits: Structure of vegetable tissues, starch, sugars, pectic substances, celluloses and their effect on texture and palatability. Plant pigments, plant enzymes, enzymatic browning, use of plant enzymes for textural changes in foods eg. Effect on meat.	4
	2. Sensory evaluation a) Selection of panel of judges b) Types of tests c) Judging Objective methods of measurement of: a) Colour b) Texture	2 2
UNIT-IV	New Product Development	
	a) Food Additives: Definition, importance, classification & uses	2
	b) Leavening agents : Importance, classification, nature & use	2
	c) Food product development: Definition, factors affecting product development and health concerns.	3

References:

1. Charley, H. (1982): Food Science (2nd Edition), John Wiley and Sons, New York.
2. Potter, N. and Hotchkins, J.H. (1996): Food Science, 5th Edition, CBS Publishers and Distributors, New Delhi
3. Belitz, H.D and Geosch , W (1999): Food Chemistry, 2nd Edition, Springer, New York
4. Manay, N.S and ShadarsSharaswamy , M .1987. Food ,Facts and Principles. Wiley Eastern Ltd, New Delhi.
5. Srilakshmi , B.2001. Food Science. New Age International Pvt Ltd. 2nd Edition.
6. Meyer ,L.H.Food Chemistry, Reinhold Book Corporation, New York.

Sessional Work

1. Seminar presentation on any topic from syllabus.
2. Academic assessment through short and long questions.
3. Discussions on role of nutrients in food science.

Paper-XI
Public Health Nutrition
MSc. Food and Nutrition Specialization GROUP 'B'
Semester-VIII

Course Type: Theory Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

- To understand the concept of public health nutrition.
- To be familiar with national health care delivery system
- To understand the concept of food and nutrition security
- To gain knowledge regarding national/ public sector policies and programs for improving food and nutrition security.
- To be able to plan, implement and evaluate behavior change communication for promotion of nutrition and health among the vulnerable groups.

CONTENTS

UNIT - I	PUBLIC HEALTH NUTRITION & HEALTH CARE SYSTEM	PERIODS
	1. Aim, scope and content of public health nutrition	2
	2. Current concerns in public health nutrition: An overview	2
	3. Role of Public health nutritionists in National Development - - Health- definition, dimensions, determinants, indicators - - Community health care	4
	4. National Health care delivery system	4
UNIT- II	PUBLIC HEALTH ASPECT OF UNDER NUTRITION	
	1. Aetiology, public health implications, prevention and community based management of PEM, Severe acute malnutrition	6
	2. Micronutrient deficiencies of public health significance	6
UNIT-III	FOOD AND NUTRITION SECURITY	
	1. Concepts and definitions of food and nutrition security at National, regional , household and individual levels.	4
	2. Public sector programmes for improving food and nutrition security	6
	3. National Plan of Action on Nutrition	2
UNIT-IV	BEHAVIOUR CHANGE COMMUNICATION FOR NUTRITION AND HEALTH PROMOTION	
	1. Planning of communication strategies for behaviour change programme. - Stakeholders in nutrition promotion. - Developing nutrition education plan - Identifying communication strategies and approaches for health promotion (e.g social marketing) - Designing nutrition and health messages, selecting	2 2 2 4

	communication channels, developing and field testing of communication materials	
	2. Ethics in Nutrition and Health Communication	2

References:

- Achaya, K.T. (Ed) (1984). Interface between Agriculture, Nutrition and Food Science. The United National University.
- Beaton, G.H and Bengoa, J.M (Eds) (1996) . Nutrition in Preventive Medicine, WHO.
- Gibney M.J., Margetts, B.M., Kearney, J.M. Arab, I., (Eds) (2004). Public health Nutrition, NS Blackwell publishing.
- National consensus workshop on Management of SAM children through Medical Nutrition Therapy (2009)- Compendium of scientific publications Volume I & ii. Jointly organised by AIIMS, SitaramBhartia Institute of Science and Research, IAP (subspeciality chapter on Nutrition, New Delhi. Sponsored by DBT.
- Park, K. (2009). Parks Textbook of Preventive and Social Medicine, 20th Edition, Jabalpur. M/S Banarsidas
- Gopalan, C and Kaur, S. (Eds) (1993). Towards better Nutrition , problems and policies. Nutrition Foundation of india.
- National Nutrition Policy, GOI, 1993.
- National Plan of Action on Nutrition, GOI, 1995.
- Public Health Communication: Evidence for Behaviour change by Robert C.Hornik (2002) by Lawrence Erlbaum Associates, Inc.
- Communication and Health : Systems and Applications. Edited by Eileen Berlin Ray and Lewis Donohew (1990) by Lawrence Erlbaum Associates, Inc.
- Designing health messages: Approaches for communication Theory and Public Health Practice ;Editors : Edward Maibach and Roxanne Louiselle Parrott (1995) by Sage Publications, Inc.

	Sessional work
1.	Planning and preparation of diet/dishes for PEM, VAD and IDA.
2.	Field Visit to ongoing national nutrition programmes
3.	Assessment of Nutritional problem in an identified community and their determinants in different population groups through analysis of secondary data (such as NSSO, NFHS data etc)
4.	Planning of a communication strategy for a nutrition education programme in the community; field testing of messages, materials and methods

Paper -XII
Advanced Food Science
MSc. Food and Nutrition Spl.Group 'B'

Semester-VIII

Course Type: Practical Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

Objectives :

- Enabling students to comprehend the changes that occur in the physiochemical properties of food stuffs during food preparation.
- Enabling the students to understand and apply the various techniques in the quality evaluation of foods.
- Imparting awareness on the concept of 'food product development'

	PRACTICALS
1.	Experience in training for taste perception & thresh holds, hedonic scale for attributes of foods & developing score cards. Triangular tests, duo & trio tests & others.
2.	Standardisation of recipes & methods or reporting recipes.
3.	Experiments on crystallization of sugar & effects of temperature, concentration, acids and other preparation & evaluation of any three preparations. Laddoo, Halwa&GulabJamun.
4.	Experiment on starch gelatinization, viscosity, measurement of starch pastes- comparison of different sources of starch.
5.	Experiment with eggs to study the properties of coagulation foaming, emulsifying, colouring, effect of quality of eggs on these properties. Preparation of cakes, Mayonnaise evaluation.
6.	Milk cookery preparation & evaluation of soup(cream of tomato), cheese, curd, ice-cream.
7.	Meat- Methods of cooking, factors affecting texture of meat.
8.	Pulses- Method of cooking pulses, effect of soaking, alkali, salts, germination.
9	Vegetable & Fruit cooking- Factors affecting colour, texture, flavours, browning reactions & preventive methods.
10.	Fats & Oils – smoking point, absorptions, tests, shortening - effect in food preparations

Paper – XIII
Research Project
M. Sc. (Home Science) (General, Spl. Grp. ‘A’, ‘B’ & ‘E’)
Semester VIII

CIE – 25 Marks

UE – 75 Marks

Credits: 4

Course Content:

1. Review of Literature and methodology of the study
2. Finalization of Data collection tool

Abbreviations:

CIE: Continuous Internal Evaluation

UE: University Exam

Master (Research) in Faculty Semester- IX

Paper -XIV
Techniques and Instrumentation in Nutrition Research:
Nutritional Biochemistry -III
MSc. (Home Science) Specialisation Group 'B'
Semester-IX

Course Type: Theory Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

OBJECTIVES: This course will enable the students to:

1. To understand the principles of various analytical techniques available for nutrition research.
2. Become efficient in the use of some of the most commonly used techniques and instruments in High quality research.
3. To understand the principles and use of instruments used for protein, DNA and radioactive isotopes.

<u>Unit I:</u>	Periods
<ul style="list-style-type: none"> • Radioactive and heavy isotopes, their characteristics, detection, measurement and application in nutrition research. 	3
<ul style="list-style-type: none"> • Immunological Methods: Principle and brief description of Radio immune assay (RIA) and Enzyme linked immune sorbent assay (ELISA). 	3
<u>Unit II:</u>	
<ul style="list-style-type: none"> • Chromatography- Principles and application in paper (Circular, ascending and descending), ion exchange, column, thin layer, gas liquid and high performance, liquid chromatographic techniques. 	3
<ul style="list-style-type: none"> • Electrophoresis- Principles and application in paper and gel electrophoresis 	3
<ul style="list-style-type: none"> • Automation- Clinical biochemistry: Principle and application of auto analyser 	3
<u>Unit III:</u>	
<ul style="list-style-type: none"> • Principle, brief description and application of Nuclear magnetic resonance (NMR) and Dual energy x-ray absorptiometry (DEXA). 	3
<ul style="list-style-type: none"> • Overview of principles and applications of microbiological assays. 	4
<ul style="list-style-type: none"> • Assessment of Nutritional status- <u>Anthropometry</u> (Anthropometric indices, cut offs, classification of nutritional status, growth standards), <u>Clinical assessment and body composition</u>, <u>Dietary assessment</u> (Family diet survey, diet recall, food balance sheet), <u>Biochemical assessment</u> (PEM, Vitamin A deficiency, Anaemia, Iodine deficiency, Vitamin D deficiency). 	5

Unit IV:	
<ul style="list-style-type: none"> • Methods in animal experimentation- Selection of animals, importance of limiting the extraneous stress to experimental animals, preparation of diets for lab animals (natural, purified and chemically defined diets), feeding lab animals (ad-libitum, pair feeding, restricted feeding), taking samples from Animals(blood sampling, anaesthesia, euthanasia), ethical norms of animal experimentation. 	3
<ul style="list-style-type: none"> • Human intervention trials on Nutrition experimentation: Details and ethical norms. 	2

Sessional work:

1. Estimation of total, free and conjugated bilirubin in blood serum.
2. Estimation of total and lipoprotein cholesterol in blood serum. Assay of alkaline phosphatase activity in serum.
3. Assay of activity of transaminases (SGOT, SGPT) in serum.
4. Standardisation of colorimetric and spectrophotometric method.
5. To study the working of an atomic absorptiometer.
6. Separation of the various components of a mixture using chromatographic method.
7. Assessment of nutritional status-
 - Anthropometric tools and measurement of height, weight, MUAC and skin fold thickness.
 - Diet survey and diet calculations

Reference:

1. Sharma S(1993). Practical Biochemistry. Classic Publishers, Jaipur(India)
2. Raghuramulu et al(1983). A manual of laboratory techniques. National Institute of Nutrition, Hyderabad (India).
3. Oser BC (1965) 14th ed. Hawk's physiological chemistry. Tata Mc graw Hill publishing co ltd.
4. Sharma B.K(1999) 8th ed. Instrumental methods of chemical analysis, Get publishing house.
5. Sharma S (2007). Experiments and Techniques in Biochemistry. Galgotia Publication Pvt Ltd.
6. AOAC Official Methods of Analysis- Volume 1(19th Edition)-2012,AOAC International.

Paper- XV
Institutional Food Management
MSc. Food and Nutrition SPL. Group 'B'
MSc. GENERAL
Semester-IX

Course Type: Theory Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

Objectives :

- To develop a knowledge base about the different types of food service units and its evolution.
- To impart necessary expertise to function as a food service manager.
- To provide practical experience in managing food material for food service management.
- To equip individuals to understand human resources.

CONTENTS

UNIT-I	FOOD SERVICE MANAGEMENT & ORGANIZATION	PERIODS
	1. Definition, principles and functions	2
	2. Types of catering establishments (Conventional, commissary, ready prepared, assembly / serve)	1
	3. Management Theories (Classical, scientific, behavioural systems approach, contingency approach, MBO, JIT , TQM)	2
	4. Managerial operations <ul style="list-style-type: none"> - Functions of Manager - Principles of Management - Definition of organisation& steps in organising 	1 2 1
	5. Tools of Management <ul style="list-style-type: none"> - Tangible Tools- organisation chart, job description, job specification, job analysis: pathway chart, process chart, work schedule, production schedule, staff and service analysis, budget. - Intangible tools – Communication, Leadership, decision making 	2 1
UNIT-II	MATERIAL MANAGEMENT	
	1. Menu planning : Functions, factors affecting menu planning, menu construction, types of menu, menu card, Characteristics of cuisines- Indian, Chinese, Continental, French, Thai and Mexican	2
	2. Purchase: Market, buyer, vendor, methods of purchase: Formal and informal purchasing procedure	2
	3. Storage: Types of storage, store room requirement, appropriate temperature for storing different foods, storeroom records	2

	4. Food Production: Production planning and control: importance of planning, production forecast, estimating quantities to buy quantity preparation techniques, production schedule, product evaluation, standardization of recipes, recipe adjustments and portion control	4
	5. Food delivery and service: Centralised and decentralised, factors affecting selection, styles of service , delivery and service equipment.	2
UNIT-III	ORGANIZATION OF SPACES, EQUIPMENT , SANITATION & SAFETY	
	1. Kitchen spaces: Types of kitchen, designing kitchens	1
	2. Planning service areas	1
	3. Architectural considerations for a food service establishment	1
	4. Feasibility assessment in terms of layout design and costs	1
	5. Classification and selection of equipment	1
	6. Care and maintenance of equipment	1
	7. Importance of hygiene and sanitation in food service units	1
	8. Sanitation measures for food, personnel and unit hygiene, training techniques for food service personnel in sanitation.	1
	9. Safety- Causes of accidents, types, safety techniques, 3Es of safety	1
	10. Food laws/ Food bill - FPO, ISI, Agmark, PFA, New Food Bill 2006.	2
	11. Quality Standards- HACCP, ISO	1
UNIT- IV	FINANCIAL MANAGEMENT	
	1. Importance of Financial management in food based enterprise	1
	2. Budgets and Budgeting process	1
	3. Records: Menu, purchase, store, production, sales, personnel utilities	1
	4. Basic concepts n Business transactions: Cash memo, receipt, pay-in slip, cheques, vouchers	1
	5. Books of Account: Journal, sales, return book, purchase return book, sales book, purchase book, cash book, ledger	2
	6. Pricing and its methods, costing, concepts and controlling techniques, cost effective procedures, concept of break even point (BEP)	4
	7. Reports : Cost analysis: concept of trial balance, profit and loss account.	2

References:

1. West B.Bessie& Wood Levelle (1988). Food service in Institutions. 6Th Edition. Revised by Hargar FV, Shuggart SG &Palgne Palacio June, Macmillian Publishing Company, New York.
2. SethiMohini (2005). Institutional Food Management. New Age International Publishers.
3. Kotler Philip . Marketing Management (2001). Millennium edition. Prentice Hall of India.

4. Kinght JB &Kotschevar LH (2000). Quantity Food Production, planning & Management. 3rd Edition, John Wiley & sons.
5. Koontz Hand Dannel, C.Keiser J and Kaillo E. Controlling and Analysis of Cost in Food Service operation. Wiley &Sons . New York.

	Sessional work
1.	Market Survey: To assess products and commodities in the market , to formulate price list, to list and categorise food production and service equipments
2.	Planning Menus (for any 3) <ul style="list-style-type: none"> - Institutions that cater to children - Food service units in hostels - Canteen - Conferences
3.	Standardising recipes for 6,25 and 50 portions Any two of the following: <ul style="list-style-type: none"> - Snacks - Cakes - Cereal preparation - Curry preparation
4.	Canteen project
5.	Product development: <ul style="list-style-type: none"> - Healthy food - Party food
6.	Regional/ International cuisine Preparation of recipes from Regional,Chinese, Continental and American cuisines
7.	Cost Analysis of Menus
8.	Visit to different types of Food service Institutions to study the following: <ul style="list-style-type: none"> - Organization - Physical plan and layout - Food service equipment - Sanitation and hygiene

Paper- XVI
Advanced Nutrition
MSc. Food and Nutrition Spl. GROUP ‘B’
Semester-IX

Course Type: Theory Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

Objectives :

- To understand the historical perspectives of nutrient requirements.
- To learn to critically evaluate the methodology and derivation of requirements for specific macronutrients.
- To learn the importance of nutrition in emergency conditions.
- To appreciate the importance of nutrition immunity interactions and their implications.
- To learn various measures for enhancing nutritional quality of diets
- To stay updated with emerging nutrition concepts.

CONTENTS

UNIT- I	Human Nutrient Requirements – Macro & Micronutrients	Periods
	1. Historical perspectives of Nutrient requirements	2
	2. Methods of assessment of nutrient needs- a critical review	2
	3. Critical evaluation of sensitive methods and derivations of requirements and recommended dietary allowances of macro & micronutrients for all age groups:- - Energy - Carbohydrates & Dietary fiber - Proteins & amino acids - Lipids - Water - Vitamins - Minerals & trace elements	8
UNIT - II	Nutrition in Emergency & Special Conditions	
	1. Famine, draught, floods, earthquakes, cyclones, war , civil and political emergencies and its impact on nutrition- health	3
	2. Major deficiency diseases in emergencies and natural calamities, PEM and other nutritional deficiencies	1
	3. Assessment & surveillance of nutritional status in emergency affected populations.	1
	4. Communicable diseases- control & treatment in emergency, role of immunization and sanitation	2
	5. Disaster management cell functions and convergence	1
	6. Extreme temperatures- low & high	1
	7. High altitude	1
	8. Space Nutrition- Physiological changes in space travel, packaging for space travel, nutritional considerations	2

UNIT-III	Epidemiology, immunity & infection	
	1. Definition, aims, basic measurements and applications	2
	2. Study designs- methods applied in conducting nutrition research	2
	3. Measuring exposure (diet) outcome (disease) relationship and their interpretation	2
	4. Host defense mechanisms and nutrients essential in the development of immune system	2
	5. Effect of infections on the nutritional status of an individual	2
	6. Nutrient deficiencies and excesses affecting the immune-competence and susceptibility to infections	2
UNIT-IV	Improving Nutritional Quality of Diets	
	1. Assessment of protein quality	3
	2. Dietary diversification	2
	3. Bioavailability of Nutrients	2
	4. Nutrient losses during cooking and processing	3
	5. Nutrigenomics, nutraceuticals and bioactive compounds	2

Sessional Work

1. Seminar presentation on any topic from syllabus.
2. Academic assessment through short and long questions.
3. Discussions on any specific topic from entire syllabus.

References:

- Bamji M.S., Rao N.P., Reddy V. Eds (2009). Textbook of Human Nutrition. 3rd Edition. Oxford and IBH Publishing Co.Pvt. Ltd.
- ICMR (2010). Nutrient requirements and recommended dietary allowances for Indians.
- FAO/WHO (2004). Vitamin and mineral requirements in Human Nutrition. Report of a joint expert consultation group.
- Goyet, Fish. V. Seaman, J. and Geijer, U. (1978). The management of Nutritional emergencies in Large populations, World Health Organization, Geneva.
- WFP/ UNHCR (1998). Guidelines for selective feeding programmes in Emergency situations. Rome and Geneva: WFP/UNHCR
- Bonita R, Beaglehole R, Kjellstrom (2006). Basic epidemiology. Second edition. WHO
- Frank G.C. (2008). Community Nutrition- Applying epidemiology to contemporary practice. Second edition. Jones and Bartlett publishers.
- Park, K. (2009). Parks textbook of preventive and social medicine, 20th Edition, Jabalpur. M/S Banarsidas

Paper- XVII
Food Microbiology and Food Safety
MSc. Food and Nutrition Spl. Group 'B'
M.Sc. General
Semester-IX

Course Type: Theory Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

Objectives:

- Making the students understand the basis of microbial growth in various foodstuffs and its beneficial and harmful effects.
- Making the students learn the ways and means to prevent microbial contamination during and after food processing to contain spoilage and poisoning.
- Helping the students understand the role of microorganisms in food product development.

CONTENTS

UNIT -I	INTRODUCTION TO MICROBIOLOGY	PERIODS
	1. Definition, scope of Food Microbiology	2
	2. An Introduction to microbial world: Bacteria, Fungi , Yeast, Viruses. - Bacterial groups based on their morphology: Gram positive , gram negative, motile/ non-motile bacteria, sporulating/ non sporulating bacteria. - Bacterial groups based on their physiological growth factors: Temperature, pH, water activity, availability of oxygen. Intrinsic and extrinsic parameters that affect microbial growth and their relevance to food spoilage and preservation.	5
	3. Fungi and Yeast : General features and their importance in food microbiology	3
	4. Viruses and Bacteriophages: Definition, their general characteristics and multiplication	2
UNIT-II	FOOD SPOILAGE AND DESTRUCTION OF MICROBES	
	1. Food Spoilage :Definition, microorganisms involved in spoilage of various foods: Milk, bread, canned food, vegetables and fruits, fruit juices, meat, eggs and fish.	6
	2. Physical and chemical means used in destruction of microbes: Definition of sterilisation and disinfection. Role of heat, filtration and radiation in sterilization, use of chemical agents- alcohol halogens and detergents.	6

UNIT-III	CONTAMINATION- INTOXICATION & INFECTION	
	1. Sources of food contamination, food poisoning Symptoms & control . - Food Borne Intoxication: Botulism and Staphylococcal intoxication	4
	- Food borne infections- Salmonellosis, Clostridium perfringens, bacillus cereus gastroenteritis	4
UNIT- IV	MICROORGANISMS IN FOOD	
	1. Microorganisms in food enzyme and technology: - Food Fermentation	2
	- Enzymes and food production	2
	- Microorganisms as food	2
	- Probiotics and Single cell proteins	2
	2. HACCP system and food safety used in controlling microbiological hazards	2

References:

1. Text Book of Zoology P.S Dhami, Pardeep Publication.
2. Food Microbiology Frazier, willian C and West off Dannis C, Tata McGraw Will Publish Company Ltd.
3. Pelczar, M.L. and Reid, R.D. Microbiology. Mc Graw Hill Book Company, New York.
4. Jay, J.M: Food Microbiology; 6th Edition, Aspen publishers, Inc., Maryland.
5. Adams, M.R. and Moss M.G: Food Microbiology, 1ST Edition, New age International (P) Ltd.

	SESSIONAL WORK
1.	Identification of microbes
2.	Preparation of chart and models (same as theory)
3.	Identification of slides of microbes.
4.	Sterilization
5.	Techniques of culturing from liquid and solid media
6.	Staining of bacteria: Gram staining and spore staining
7.	Determination of plate count
8.	Bacteriological analysis of water and milk

Paper- XVIII
Computer Application in Designing
MSc. Food and Nutrition Spl. Group 'B' / Group A/ Group E
M.Sc. General
Semester- IX

Course Type: Practical Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

Objectives:-

1. To enable students to learn /acquaint the CAD based application.
2. To understand the work of computers while designing.
3. To develop creativity in designing A.V.Aids.

Practical:

S.No.	Topics	No. of Classes
1.	Use of computer peripherals Scanner Printer Storage device	2 2 2
2.	Use of designing softwares Power point Coral draw Photo Shop Page Maker	3 7 4 4
3.	Planning and preparation of communication material for rural women related to agriculture/ home science Slides Leaflet/Folder Booklet/flip Book Cover page of different publications	4 4 6 2
4.	Field testing of developed communication material	2
5.	Evaluation of the developed material	2
	Total	44

References:

List of books related Computer Designing, Coral draw, photo shop and Page maker

1. Computer Graphics and Virtual Reality 2ed Willey Publication by R. K Mourya
2. Photoshop CS6 in Simple Steps by Congent Learning Solution Incorporation

3. Graphic Design Exercise Book - Revised Edition **Author:** Jessica Glaser
4. PageMaker 7 from A to Z **Author:** Marc Campbell Publisher Laxmi Publications
5. CorelDRAW X6 The Official Guide Paperback – by Gary David Bouton

Paper – XIX
Research Project
M. Sc. (Home Science)
(General, Spl. Grp. 'A', 'B' & 'E')
Semester IX

CIE – 25 Marks

UE – 75 Marks

Credits: 4

Course Content:

1. Data collection for the Study
2. Interpretation of the data

Semester-X

Paper- XX
Advanced Physiology
MSc Food and Nutrition Spl.Group B/Group A
M.Sc General
Semester-X

Course Type: Theory Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

CONTENTS

UNIT -I	INTRODUCTION TO LYMPHATIC & CIRCULATORY SYSTEM	PERIODS
	1. Lymphatic system and its functions.	2
	2. Circulatory System: blood – composition, blood cells - development and function of blood cells, blood clotting, blood grouping and haemoglobin	5
	3. Heart and its anatomy. Circulation of blood, cardiac cycle, blood pressure and factors affecting blood pressure.	4
UNIT-II	RESPIRATORY AND DIGESTIVE SYSTEM	
	1. Respiratory system: anatomy, physiology and mechanism of respiration, regulation of respiration.	5
	2. Digestive system: anatomy of gastrointestinal tract and accessory organs. Digestion and absorption of food.	6
UNIT-III	EXCRETORY AND ENDOCRINE SYSTEM	
	1. Excretory system: anatomy and functions of kidney, formation, composition and excretion of urine.	5
	2. Endocrine glands, mode of action of hormones	5
UNIT- IV	REPRODUCTIVE AND NERVOUS SYSTEM	
	- Reproductive system: structure and functions of male and female reproductive organs.	5
	- Nervous system: anatomy and functions.	5

Reference Books:

1. Best CH & Taylor NB. 1989. The Human Body. ASI Publ. House. (Source: National Book Depot, Bombay).
2. Chatterjee CC. 1992. Human Physiology. Vols. I, II. Medical Allied Agency.
3. Guyton AC. 1991. Text Book of Medical Physiology. WB Saunders.

4. Mukherjee KL. 1994. Medical Laboratory Technology. Vol I. Tata McGraw Hill.
5. Wilson KJW & Ross JS.1987. Ross and Wilson Anatomy and Physiology in Health and Illness. 6th Ed. Churchill Livingstone.

	SESSIONAL WORK	Periods
1.	Microscopic examination of prepared slides of different human organs	2
2.	Estimation of haemoglobin	2
3.	Identification of blood groups	2
4.	Preparation of blood smear.	1
5.	Measurement of blood pressure.	2
6.	Estimation of blood glucose	2
7.	Preparation of TEC and TLC	2
8.	Preparation of blood Haem-crystals	1
9.	Demonstration and study of models of human body system.	2

Paper-XXI
Clinical Nutrition with Compulsory Internship
MSc. Food and Nutrition Spl. Group 'B'
MSc. GENERAL
Semester-X

Course Type: Theory Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

Objectives:

- To understand causative factors and metabolic changes in various diseases/ disorders.
- To gain knowledge of the principles of diet therapy.
- To learn principles of dietary counselling
- To understand the rationale of prevention of various diseased / disorders

CONTENTS

UNIT-I	NUTRITIONAL ASSESSMENT & CARE OF PATIENTS	PERIODS
	1. Nutrition care process	
	- Nutritional screening and assessment of patients-outpatient & hospitalised	2
	- Nutritional interpretation of routine medical and laboratory data	2
	- Nutrition care plan and implementation	2
	- Monitoring & follow up	1
	2. Diet counselling	1
	3. Diet, Nutrition and drug interaction	2
	4. Nutrition support : Enteral & Parenteral Nutrition	2
Unit-II	WEIGHT MANAGEMENT, DIABETES & HEART DISEASE	
	Pathophysiology, metabolic & clinical aberrations, diagnosis , complications, treatment, MNT, dietary counselling and recent advances in –	
	1. Weight imbalance disorders- Overweight and Underweight	3
	2. Diabetes Mellitus – Type 1, Type 2 & Gestational Diabetes	4
	3. Cardiovascular disease- Hypertension, hyperlipidaemia, metabolic syndrome, myocardial infarction, congestive heart failure, coronary bypass surgery.	5
UNIT-III	GASTROINTESTINAL TRACT, LIVER & KIDNEY DISORDERS	
	Pathophysiology , metabolic & clinical aberrations, diagnosis, complications, treatment, MNT, Dietary counselling and recent advances in:	
	1. Gastrointestinal tract disorders – GERD, Peptic ulcer, diarrhoea, lactose intolerance, celiac	5

	disease, diverticular disease, Crohn's disease and ulcerative colitis	
	2. Liver, Gallbladder & Pancreatic disorders- Cirrhosis, Encephalopathy, liver transplant, cholecystitis, cholecystectomy, Pancreatitis.	5
	3. Kidney Disorders – Nephrotic syndrome, glomerulonephritis, acute renal failure, chronic kidney disease, dialysis, transplant, renal stones.	5
UNIT-IV	METABOLIC STRESS AND CANCER	
	Metabolic & Clinical aberrations, diagnosis, complications, treatment, MNT and dietary counselling in : 1. Metabolic stress – Surgery, Burns, sepsis and trauma	5
	2. Cancer- Role of diet in aetiology and management , effect of cancer therapy on MNT	4

References:

1. Lee RD & Neiman DC (2009). Nutritional Assessment. 5th Edition. Brown & Benchmark.
2. Mahan , L.K. and Escott Stump. S(2008). Krause's Food & Nutrition Therapy.12th Edition. Saunders- Elsevier.
3. Shils, M.E., Shike ,M, Ross, A.C., Caballero B and Cousins RJ (2005). Modern Nutrition in Health & Disease. 10th .Lipincott, William and Wilkins.
4. Gibney MJ, Elia M, Ljungquist&Dowsett J. (2005).Clinical Nutrition. The Nutrition society textbook series. Blackwell publishing company.
5. Marian M. Russel M, Shikora SA. (2008). Clinical Nutrition for surgical patients. Jones and Bartlett publishers.
6. World Cancer Research fund & American Institute for Cancer Research (2007). Food, Nutrition, Physical activity and the prevention of cancer – A global perspective. Washington E.D.WCRF.

	SESSIONAL WORK
1.	Assessment of patient needs- Nutritional assessment & screening
2.	Market survey of commercial nutritional supplements <ul style="list-style-type: none"> - Collection of information on commercial food formula available in the market - Intravenous nutrition supplement – TPN, Cost , Composition, dosage , indications.
3.	Planning & preparation of diets using exchange lists for <ul style="list-style-type: none"> - Overweight & underweight - Diabetes mellitus - Peptic ulcer - Diarrhoea - Ulcerative colitis - Cirrhosis - Cholelithiasis - Hypertension - Hyperlipidaemia

	<ul style="list-style-type: none"> - Glomerulonephritis - Nephritic syndrome - Acute & chronic renal failure - Dialysis - Burns
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INTERNSHIP

Duration : 3 Months

Training : Hospital Setting

Norms :

For MSc. Food & Nutrition specialization students 3 months internship in any of the following 3 hospitals :-

- a) All India Institute of Medical Sciences, New Delhi.
- b) Christian Medical College, Ludhiana
- c) PGI, Chandigarh

For MSc. General Students, 3 month Internship in NABH Accredited hospital with Dietetics Department.

Evaluation:

1. The students will have to prepare a report and submit.
2. A presentation has to be made in seminar on their work experience.

Paper-XXII
Food Processing and Preservation
MSc. Food and Nutrition Spl. Group 'B'
M.Sc General
Semester-X

Course Type: Theory Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

Objectives :

- Enabling students to understand the principles and processes involved in food processing
- Familiarizing the students with the technological innovations for various food stuffs.
- Making students aware of the role packaging plays in the delivery of food stuffs.

CONTENTS

UNIT- I	FOOD PRESERVATION	PERIODS
	1. Principles underlying food preservation operations :- i) Thermal ii) Refrigeration and freezing iii) Dehydration iv) Radiation	2 2 1 1
	2. Use of chemical additives, ionizing radiations, pickling and curing in preservation.	4
UNIT -II	PROCESSING TECHNOLOGY OF FOODS	
	1. Cereals: Wheat milling process, baking technology, production of bread, barley malting. Rice processing, fractionation, parboiled rice.	4
	2. Fruits & Vegetables: Changes during ripening	2
	3. Canning process of fruits & vegetables	2
	4. Milk and Milk products: Milk processing, separation, standardization, pasteurization, homogenization, ultrahigh sterile milk.	4
	5. Meat & Fish processing : Rigor mortis, ageing, tenderizing, curing, salting, pickling.	2
UNIT-III	FORTIFICATION AND EXTRUSION TECHNOLOGY	
	1. Fortification Technology - Objectives - Nutritional significance - Selection of Vehicle - Fortification of salt, cereal products & dairy products	2
	2. Extruded Food: An introduction to extrusion technology	2
UNIT-IV	PACKAGING TECHNOLOGY, FOOD LABELLING & FOOD LAWS	

	1. An Introduction to packaging technology - Objectives - Basic packaging materials and their protective qualities - Effect of packaging on the nutritive value of foods	2
	2. FPO and other food laws governing Indian Food Industry	2

References:

- Dey S: Outlines of Dairy Technology, Oxford University Press, Delhi.
- Desrosier NW: Elements of Food Technology, Connecticut, USA: AVI publishing co.
- Mat : Cereal Technology, Connecticut, USA: AVI publishing co.
- Siddapa, GS (1986), Preservation of Fruits & Vegetables, ICAR Publication.
- National Dairy development board, Amul, Milk and Milk products processing
- Gould GW. New Methods of Food Preservation. Blacklie. Academic & Professional, London.

Sessional Work

1. Seminar presentation on any topic from syllabus.
2. Academic assessment through short and long questions.
3. Discussions on any topic from entire syllabus.

Paper-XXIII
Food Preservation Techniques
MSc. Food and Nutrition Spl. Group 'B'
M.Sc General
Semester-X

Course Type: Practical Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

Objectives :

- Enabling students to understand the principles and processes involved in food processing
- Familiarizing the students with the technological innovations for various food stuffs.
- Making students aware of the role packaging plays in the delivery of food stuffs.

	Practical work
1.	Dehydration of fruits and vegetables and shelf life studies: is effect on colour, texture and flavour.
2	Preservation of fruits and vegetables using low temperature
3.	Preservation of fruits and vegetables using heat, salt and sugar
4.	Processing of tomato products
5.	Processing of Jams, jellies and marmalades
6.	Processing of pickles and brines.
7.	Prepare simple extruded foods

Paper-XXIV
Nutrition in Critical Care
MSc. Food and Nutrition Spl. GROUP 'B'
Semester-X

Course Type: Theory Major

Credits: 4

Teaching Periods: 4/ week

CIE – 25 Marks

UE – 75 Marks

Objectives :

- Understand the physiology, metabolism and special nutritional requirement for critically ill
- Be familiar with the special nutritional support teaching and feeding formula to meet their nutritional needs

CONTENTS

UNIT-I	NUTRITION FOR CRITICALLY ILL	PERIODS
	1.Nutritional screening and nutritional status assessment of the critically ill	2
	2.Nutritional support systems and other life saving measures for the critically ill.	2
	3.Role of immune enhancers, conditionally essential nutrients, immune-suppressants and special diets in critical care.	2
	4.Complications of nutritional support systems including refeeding syndrome	2
	5.Rehabilitation diets- stages	2
	6.Diet related ethical issues in the terminally ill	2
UNIT-II	ENTERAL & PARENTERAL NUTRITION	
	1.Enteral Nutrition : Introduction, Advantages, indication, enteral feeding methods (gastric or trans-pyloric tube feeding), techniques of tube placements: complication of tube feeding, measures of monitoring EN.	6
	2.Parenteral Nutrition : Introduction, indications of parenteral nutrition, components and requirements for PN solution, delivery and monitoring for PN , complications of PN (technical, metabolic or infective)	6
UNIT- III	SOME SPECIAL CONDITIONS	
	1.Role of immune-enhancer, immunosuppressants and special diet in critical care.	2
	2.Diet and metabolic aspects and special nutritional requirements in ESRD and multiple organ failure	3
	3.Lung disorders- Brochopulmonary dysplasia, COPD	2
	4.Musculoskeletal and rheumatic disorder- Osteoporosis, arthritis, SLE, Multiple sclerosis	3
	5.Complementary and adjunctive therapies- Naturopathy, Ayurveda ,Phytotherapy	2
UNIT-IV	SURGERY AND OTHER COMPLICATIONS	
	Clinical and metabolic aspect and special nutritional requirement in following conditions:	
	a) Stress, trauma, sepsis and burns	3
	b) C.V complications and surgery	2

c) Kidney transplant, dialysis	2
d) Hepatic failure and transplant	2
e) GI tract surgery	1
f) Diabetic complications	1
g) Neurosurgery	1

Reference's:

1. Shils, M.E., Shike M, Ross, A.C., Caballero B and Cousins RJ (2005). Modern Nutrition in Health and Disease. 10TH Ed. Lipincott., Willian and Wilkins.
2. Mahan , L.K. and Escott Stump.S. (2008). Krause'S Food & Nutrition Therapy 12th Ed. Saunders- Elsevier.
3. Gibney MJ, Elia M, Ljungquist&Dowsett J. (2005). Clinical Nutrition. The Nutrition Society of Textbook series. Blackwell Publishing company.
4. Zaloga , G.P (1994). Nutrition in critical care. Times Mirror/ Mosby.
5. Phileps , G.D and Lodgers C.L. (1986). Parenteral and Enteral Nutrition- A practical guide Churchill. Livingstone.

	SESSIONAL WORK
1.	Preparation of blenderised formulae for enteral feeding- -Standard tube feed formula. -High Calorie high protein tube feed formula - Diabetic feeds -Renal Feeds -Hepatic feeds
2.	Collection of information on commercial food formula available in the market and their evaluation
3.	Intravenous nutrition supplement (TPN)- (Cost , Composition, dosage, indications and contraindications)
4.	Dietary management in arthritis
5.	Dietary management of dialysis and kidney transplant
6.	Ayurveda Cooking
7.	Dietary management in burns
8.	Diet in different surgical conditions

Paper-XXV
Research Project
MSc. Food & Nutrition Specialization
Semester-X

UE – 75 Marks
CIE – 25 Marks

Credits: 4

Course Content:

Report writing and finalization of Research project

PGDR

PAPER – C1

Thrust Areas of Home Science

PGDR (Home Science)

Semester XI

Course Type: Theory Major

CIE – 25 Marks

UE – 75 Marks

Teaching Periods: 6/Week

Credits: 6

Objectives:

- To understand the need and significance of Research in different areas Home Science.
- To know the different funding agencies for Research Projects
- To gain the knowledge of different Research Applications in various fields of Home Science

UNIT- I	INTRODUCTION TO RESEARCH IN HOME SCIENCE	PERIODS
	Need of research in different fields of Home Science	6
	Identification of thrust areas of Home Science	6
UNIT- II	SIGNIFICANCE OF RESEARCH IN HOME SCIENCE	
	Scope and Significance of Research Conducted in different areas of Home Science	12
UNIT- III	SOURCES AND PRIORITY OF FUNDING AGENCIES FOR PROJECTS AND RESEARCH	
	Understanding types of Grant and Funding	4
	National and international funding agencies (UGC, DST, NIPCED, UNICEF, INSA)	4
	Process to get funding for a research project	4
UNIT- IV	RESEARCH APPLICATIONS OF HOME SCIENCE	
	Research Applications of Home Science in formal and informal institutions	7
	Relevance of Home Science in Current Era	5

SESSIONAL WORK: Assignments related to the respective units

References:

1. Research Projects and Research proposals. A guide for Students seeking funding by Paul G. Chaplin. Cambridge University Press.
2. Desrosier NW: Elements of Food Technology, Connecticut, USA: AVI publishing co.
3. Principles of Home Science: S.R.Sharma, Vijay Kausik; Anmol Publications PVT. LTD, New Delhi
4. Encyclopedia of Home Science: S. A Srivastava
5. Education and Communication for Development : O. P. Dahama and O.P. Bhatnagar; Oxford & IBH Publishing Co. PVT Ltd. New Delhi
6. Child Development : E. B. Hurlock
7. Human Development: F. P. Rice; Perntice Hall, New Jursey
8. Research Trends in Home Science and Extention: Prakash Singh; Akinik Publications, New Delhi
9. Teaching of Home Science, Seema Yadav; Anmol Publications PVT. LTD. New Delhi

Abbreviations:

CIE: Continuous Internal Evaluation

UE: University Exam

Paper – C 2
Essentials of Entrepreneurship
PGDR (Home Science)
Semester XI

Course Type: Theory Major

CIE – 25 Marks

UE – 75 Marks

Teaching Periods: 6/Week

Credits: 6

Objectives:

1. The main aims of the course are to familiarize students with various concepts used in understanding processes involved in entrepreneurship and business formation and development.
2. Understand theories of entrepreneurship and business development
3. Understand the key resources required to develop an existing business such as ideas and finance, launch a new venture, or initiate a business enterprise
4. Be able to state, understand and evaluate the key factors needed to develop a successful business
5. Understand the central role of opportunity recognition and marketing to business development

UNIT- I	Concept of Entrepreneurship	PERIODS
	Definition, Concept of entrepreneurial development, Theory of Entrepreneurial origin, Need for Self Employment	3
	Economic empowerment, Gender discrimination from societal perspective, Status of women in India in the last decade	3
	Desired qualities in entrepreneurs	3
	Development of women entrepreneurs in India	3
UNIT- II	Establishing a Small Scale Enterprise	
	Environment scanning	3
	Enterprise selection, market assessment, enterprise feasibility study, SWOT analysis	3

	Resource mobilization finance technology, raw material, site and manpower	3
	Costing, Quality control, profitability and future growth	3
UNIT-III	Operating the Small Scale Enterprise	
	Schemes available for women entrepreneurs	4
	Financial management issues in SSE- definition and scope	4
	Marketing management issues in SSE- marketing strategies and marketing mix variables	4
UNIT- IV	Project Planning	
	Planning basic concepts, need, and feasibility	4
	Project identification basic goal	4
	Monitoring and evaluation	4

SESSIONAL WORK

1. Prepare case profiles of any five entrepreneurs in India.
2. Review employment trends of women in the organized and unorganized sectors.
3. Visit small enterprises and prepare report on it.
4. Prepare a project plan for any business.

References:

1. Dr. G.K. Varshney (2019), Fundamentals of Entrepreneurship, Sahitya Bhawan Publication.
2. S A Kumar, S C Poornima, M K Abraham, K Jayshree (2021), Entrepreneurship Development Paperback, New Age International publishers.
3. Charantimath Poornima M.(2018), Entrepreneurship Development and Small Business Enterprises, Third Edition, Pearson Education .
4. Chandra, P. (1992) project preparation, appraisal, budgeting and implementation, Tata Mc graw Hill, New Delhi.
5. Goel, E.B. (1991) project management. Tata Mc graw Hill, New Delhi.

Abbreviations:

CIE: Continuous Internal Evaluation

UE: University Exam

Paper – C3
Research Methodology
PGDR (Home Science)
Semester XI

Course Type: Theory Major

CIE – 25 Marks

UE – 75 Marks

Teaching Periods: 4/Week

Credits: 4

Objectives:

- To understand the significance of Research Methodology in Home Science Research.
- To study the types, tools and Methods of Research and develop the ability to construct data appropriate to the Research Design.
- To be able to appreciate and understand importance of writing scientifically.
- To understand the role of Statistics in Research.
- To apply Statistical Techniques to Research Data for analyzing and interpreting data meaningfully.
- To understand the use of Statistical Software in the analysis of data.

UNITS	COURSE AND DETAIL	PERIODS
UNIT- I	INTRODUCTION TO RESEARCH Research Methodology, Meaning of Research, Scientific Thinking, Objectives of Research, Types of research-analytical, applied fundamental, quantitative and qualitative, Conceptual and Empirical, Significance of research, Criteria of good research, Basis of selection of the broad areas of research, selection of Institute, selection of research supervisor, Major research centers in India. Ranking Institutions (Criteria and Selection Procedure), Problems encountered by researchers in India.	12

UNIT- II	<p align="center">IDENTIFYING THE RESEARCH PROBLEM</p> <p>(a) What is research problem, Selection of the problem, Technique involved in defining a problem, Formulation of hypothesis, Meaning and need for research design, Research Designs- Exploratory, Descriptive, Experimental and Historical. Basic principles of research design, Execution of the research.</p> <p>(b) Sampling techniques, pilot study, Qualitative and Quantitative Data, Scaling and Measurement Techniques- Likert, Guttman and Thurstone scale, testing of validity and reliability.</p>	<p align="center">7</p> <p align="center">5</p>
UNIT-III	<p>DATA GATHERING INSTRUMENTS/ TOOLS AND ANALYSIS OF DATA THROUGH COMPUTER APPLICATIONS</p> <p>Collection and analysis of data, Data Analysis by using of computer software (Excel, SPSS) - Coding, Tabulation, measures of central tendency, measures of dispersion, correlation, regression and test of significance (Z-Test, t-Test, Chi-Square test, F –test, ANOVA).</p>	<p align="center">12</p>
UNIT- IV	<p>(a) INTERPRETATION AND REPORT WRITING</p> <p>Meaning of Interpretation, Necessity of interpretation, Techniques and precautions in Interpretation, Significance of report writing, Research papers and reviews, Different steps in writing report, Layout of the research report, precautions of writing research reports, developing a research proposal, Basic knowledge of organizing conferences, symposia, workshop, and exhibitions.</p> <p>(a) LITERATURE SURVEY</p> <p>References, Abstraction of a research paper, possible ways of getting oneself abreast of current literature, High rank Journals, Impact Factors, h – factor, Citation Index.</p> <p>(b) SCIENCE AND ETHICS</p> <p>Intellectual property and Intellectual property rights, Indian patent system, Research agreement, Ethical theory and applications, Ethical issues in science research and reporting the problem of plagiarism and related issues, International norms and standards.</p>	<p align="center">4</p> <p align="center">4</p> <p align="center">4</p>

SESSIONAL WORK

- Prepare a research plan of any field of Home Science.
- Prepare a Schedule/Questionnaire of the related topic using scaling techniques. Gathering information from pilot survey and make a sample master chart for analysis.

References:

1. Research Methodology, Methods and Techniques. C.R. Kothari, New Age International (P) Limited Publishers.
2. Research Methodology – Deepak Kumar Bhattacharya Excel Books.
3. The Ethics of Science: An Introduction. David B Resnik, Routledge Publisher, USA.
4. Ethical values for Excellence in Education and Science. J.N. Kapur. VishvaPrakashan, New Delhi.
5. OSU Safety Manual 1.01
6. Practical skills in Chemistry, JR Dean, AM Jones, D. Holmes, R. Read, J. Weyers and A. Jones. Pearson Education Ltd. (Prentice Hall).
7. The Student's Guide to Preparing Dissertations and Thesis. London: Kogan.
8. MLA Handbook for writers of research papers, East West Press, New Delhi.
9. Thesis Writing: A manual for Researchers. New Age International Ltd.
10. Write and publish a scientific paper by Robert A. Day Oryse Press.
11. Research Projects and Research proposals. A guide for Students seeking funding by Paul G. Chaplin. Cambridge University Press.
12. Write Mathematics Right: L Radhakrishnan, Narosa.
13. Satarkar, S.V. (2000), Intellectual Property Rights And Copy Right, Ess Ess Publications.

Abbreviations:

CIE: Continuous Internal Evaluation

UE: University Exam

Research Project
(Qualifying)

M.Sc (Home Science)
Group 'B'
Food & Nutrition