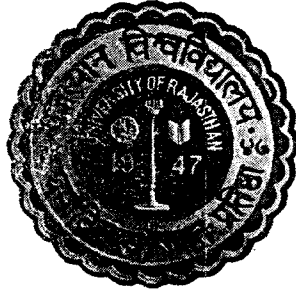


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**University of Rajasthan
Jaipur**


SYLLABUS

M.Sc.

HOME SCIENCE

(ANNUAL SCHEME)

2015-2017


Asst. Registrar (Acad-I)
University of Rajasthan
Jaipur

Appendix III

UNIVERSITY OF RAJASTHAN
JAIPUR
SYLLABUS



SCHEME OF EXAMINATION AND
COURSE OF STUDY

FACULTY OF SCIENCE
M.Sc HOME SCIENCE (ANNUAL SCHEME)
FOODS AND NUTRITION

M. Sc. (Previous) Examination, 2015-2016

M. Sc. (Final) Examination, 2016 - 2017

In Agreement



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NOTICE

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1. The ordinance governing the examinations in the Faculties of Arts, Fine Arts, Social Sciences, Science, Commerce and Law are contained in a separate booklet. The students are advised to refer to the same.
2. Changes in Statutes/ Ordinance/ Rules/ Regulations/ Syllabi and Books may, from time to time, be made by amendment or re-making and a candidate shall, except in so far as the University determines otherwise comply with any change that applies to years he has not completed at the time of change.
3. All court cases shall be subject to the jurisdiction of the Rajasthan University head quarter at Jaipur only and not any other place.

SCHEME OF EXAMINATION

1. Each Theory Paper Duration 3 hrs. Marks 50/100
Dissertation/Thesis/
Survey Report Field
Work, if any.
Marks 50/100

2. The number of papers and the maximum marks for each paper/ practical shall be shown in the syllabus for the subject concerned. It will be necessary for a candidate to pass in the theory part as well as in the practical part (wherever prescribed) of a subject/paper separately.

3. A candidate for a pass at each of the previous and the final examinations shall be required to obtain (i) atleast 36% marks in the aggregate of all papers prescribed for the examination and (ii) atleast 36% marks in practical (s) wherever prescribed at the examination, provided that if a candidate fails to secure atleast 25% marks in each individual paper at the examination and also in the dissertation/survey/ report/field work, wherever prescribed, shall be deemed to have failed at the examination notwithstanding his having obtained the minimum percentage of marks obtained at the previous and the final examination taken together, as noted below :

First Division 60% } of the aggregate marks taken together of the Previous and Final
Second Division 50% } Examinations prescribed in the honours and subsidiary subjects of Pt I. Pt II
and Pt. III examinations taken together.

All the rest will be declared to have passed the examination.

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4. If a candidate clears any Paper (a) Practical (s)/ Dissertation prescribed at the Previous and/ or Final Examination after a continuous period of three years, then for the purpose of working out his division the minimum pass marks only viz. 25% (36% in the case of practical) shall be taken into account in respect of such Paper (s)/Practical (s)/Dissertation are cleared after the expiry of aforesaid period of three years; provided that in case where a candidate requires more than 25% marks in order to reach the minimum aggregate as many marks out of those actually secured by him will be taken into account as would enable him to make up the deficiency in the requisite minimum aggregate.
5. The Thesis/ Dissertation/ Survey report/ Field work shall be type – written and submitted in triplicate so as to reach the office of the Registrar atleast 3 weeks before the commencement of the theory examinations. Only such candidates shall be permitted to offer Dissertation/ Field Work/Survey Report/ Thesis (if provided in the scheme of examination) in lieu of paper as have secured atleast 55% marks in the aggregate of all the papers prescribed for the previous examination in the case of annual scheme irrespective of the number of papers in which a candidate actually appeared at the examination.

Note: Non-collegiate candidates are not eligible to offer dissertation as provision of O. 170-A.

Eligibility

A candidate who has secured more than 55% [36% for SC/ST/Non creamy layer OBC/SBC] or equivalent in the B.Sc. home science (Pass course & Honours), B.Sc. Foods & Human Nutrition and Science graduate shall be eligible for admission to First Semester of a Master of Science course. For candidates from outside state of Rajasthan 60% will be applicable irrespective of the category.

Scheme of Examination for theory papers

Question paper will consist of 3 questions:

Section I- Consisting of 20 compulsory objective type questions carrying 10 marks.

Section II- Consisting of 10 compulsory questions with short answers carrying 10 marks.

Section III- Consisting of 3 long essay type questions with 100% choice carrying 30 marks.

Note: All the three sections should cover the entire syllabus.

M.Sc. Previous Home Science (Foods & Nutrition)

Scheme:

Name of subject/ papers	Duration of Exam.	Max. Marks	Min. Pass Marks	No. of Theory Periods/ WK (hr)	Practical period WK. (hr)
I. Nutritional Bio-Chem. Paper-a	3 hrs.	50	18	2	
II. Nutritional Bio-Chem. Paper-b	3 hrs.	50	18	2	

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Practical in Nutritional Biochemistry	6hrs.	50	18	-	6
III. Biostatistics & Research Methods	3 hrs.	100	36	4	
IV. Food Microbiology	3 hrs.	50	18	4	
Practical in Food Microbiology (on two consecutive days)	3 hrs.	50	18	-	6
V. Principles of Food Science	3 hrs.	50	18	2	
VI. Human Nutritional Requirements	6hrs.	50	18	2	
Practical in Human Nutritional Requirements	3hrs.	50	18	-	6
VII. Problems in Human Nutrition	3hrs.	50	18	2	
Practical in Problems in Human Nutrition	6hrs.	50	18	-	6
Total		600		18	24

M.Sc. (Final) Home Science (Foods & Nutrition)

VIII. Clinical Nutrition and Dietetics	3 hrs.	100	36	4	
Practical in Clinical Nutrition and Dietetics	6 hrs.	50	18	-	6
IX. Public Health Nutrition	3 hrs.	100	36	4	
Practical in Public Health Nutrition	4 hrs.	50	18	-	6
X. Institutional Food Administration & Quantity food production	3 hrs.	100	36	4	
Practical in Quantity Food Production	4 hrs.	50	18	-	6
XI. Dissertation		150	54	4	
XII. Seminar compulsory				2	
Total		600		18	18
Grand Total		1200		36	42

M.Sc. PREVIOUS HOME SCIENCE (FOODS & NUTRITION)

PAPER I NUTRITIONAL BIOCHEMISTRY-a (THEORY)		
Teaching Hours : 2 Hours / Week		
Total Teaching Workload: 48 Hours		
Max. Marks : 50		
Objectives		
1.	To augment the biochemistry knowledge acquired at the undergraduate level.	
2.	To understand the basic nature of bio molecules.	
3.	To become proficient for specialization in nutrition.	
4.	To understand the mode of action of hormones in the human body.	
Contents:		
UNIT-I		Hours
1.	Carbohydrates: Classification, isomers, rings structure, proof of ring structure, reaction due to CHO group, sugar derivatives of biological	8

<p>structure, reaction due to CHO group, sugar derivatives of biological importance, polysaccharides (homoglucans and heteroglucans), detailed structure of starch.</p> <p>Lipids: Classification, Structure and chemical properties and characterization of Saturated and unsaturated, Fatty acids, essential FAs and their importance</p> <ul style="list-style-type: none"> • Steroids • Fat • Phospholipids • Rancidity – Definition, types, mechanism, prevention 	8
UNIT-II	Hours
<p>Proteins: Importance, classification of amino acids (Essential and Non Essential Amino Acids), reactions of amino acids, structure of proteins, properties, proof of peptides bond, methods of separation and determination of amino acids and peptides, estimation of amino acid sequence</p> <p>Nucleic Acids : Structure, importance and role of</p> <ul style="list-style-type: none"> • Bases • Nucleotides • Nucleosides • DNA RNA 	8
UNIT- III	Hours
<p>Hormones: Mode of action and biochemical role of</p> <ul style="list-style-type: none"> • Interstitial Cell Stimulation Hormones • Adreno-Cortico Tropic Hormone • Follicle Stimulating Hormone • Growth Hormone • Thyroid Stimulating Hormone • Steroidal Hormone (Adrenal Cortex, Sex Hormones) <p>Blood Chemistry: Composition, haemoglobin, erythropoiesis, plasma proteins (Types, properties and methods of separation of plasma proteins), coagulation of blood.</p>	8
<p>References:</p> <p>Martin DW, Mayes PA, Rodwell VW (1983). Harper's Review of Biochemistry. 19th Edition. LANGE Medical Publications, MARUZEN Asia.</p> <p>Pike R.L. and Brown M.L.(1984). NUTRITION an Integrated approach. 3rd Edition, John Wiley and Sons , N.Y.</p> <p>Oser BL. (1965). Hawk's Physiological Chemistry. 14th Edition. McGraw Hill Book co. New York.</p> <p>Nelson DM and Core MM (2005) Principles of Biochemistry 4th ed. Freeman & Co.</p> <p>Devlin TM (2002). Text Book of Biochemistry with clinical Correction, 5th ed. Wiley & Sons.</p>	

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6.	Chatterjea MN, Shinde Rana (2000). Textbook of Medical Biochemistry. 4 th Edition, Jaypee Brothers Medical Publishers (P) Ltd. New Delhi,	
7.	West ES, Todd WR, Mason HS, Van Bruggen JT (1974). Textbook of Biochemistry. 4 th Edition. MacMillan Co. Collier Ltd. London.	
8.	Murray RK, Granner DK, Meyer PA & Rodwell VW (2003). Harper's Illustrated Biochemistry. 26 th edition. McGraw Hill Asia.	
9.	Robinson CH and Lawler MR (1986). Normal and Therapeutic Nutrition, Macmillan, New York.	
10.	Lehninger AR. (1975). Biochemistry. 2 nd Edition. Kalyani Publishers. White A, Handler P and Smith EL (1959). Principles of Biochemistry. McGraw Hill Book Co., New York.	

PAPER II NUTRITIONAL BIOCHEMISTRY- b (THEORY)		
Teaching Hours : 2 Hours / Week Total Teaching Workload: 48 Hours Max. Marks : 50		
Objectives		
1.	To understand the basic nature and role of bio molecules.	
2.	To understand the mechanisms adopted by the human body for regulation of metabolic pathways.	
3.	To get an insight into interrelationships between various metabolic pathways.	
4.	To link metabolic events occurring at the cellular level.	
5.	To become proficient for specialization in nutrition.	
Contents:		
UNIT-I		Hours
1.	Enzymes: Classification, co-enzymes, methods of isolation, purification and characterization, theories and mechanism of enzyme action, factors affective reaction of enzyme – effect of time, temperature, pH substrate enzyme activator and inhibitor (types of inhibitor), K_m – its derivation and significance, elements of thermodynamics, - enthalpy, entropy and free energy, active site and specificity of enzymes.	10
2.	Vitamins: Chemistry and biochemical role of <ul style="list-style-type: none"> • Water soluble vitamins: B-Complex and C • Fat soluble vitamins: A,D,E and K 	8
UNIT-II		Hours
3.	Intermediary metabolism and its regulation <ul style="list-style-type: none"> • Carbohydrates – Glycolysis, TCA cycle, respiratory chain, high energy link, biological redox potential, Gluconeogenesis, hexose 	14

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	monophosphate shunt. <ul style="list-style-type: none"> • Lipids - α, β and ω oxidation of fatty acids, β oxidation of odd and even number fatty acids, synthesis of fatty acids, phosphatidic acid, ketosis, synthesis of cholesterol. • Nucleotides and Nucleic Acids – separation and determination of nucleotides and nucleic acids. • Proteins – absorption and conversion of amino acids, nitrogen fixation, degradation of ammonia and removal of amino acids through deamination, transamination, decarboxylation and urea cycle. 	
	UNIT- III	Hours
4.	Minerals: Biochemical role of minerals.	8
5.	Organ interrelationship in the metabolism <ul style="list-style-type: none"> • Transport between organs – blood. • The liver and its function in distribution of nutrients • Adipose tissue • Skeletal muscles • The brain • The heart • Diabetes mellitus Metabolic interplay in cancer	8
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2.	Pike R.L. and Brown M.L.(1984). NUTRITION an Integrated approach. 3 rd Edition, John Wiley and Sons, N.Y.
3.	Oser BL. (1965). Hawk's Physiological Chemistry. 14 th Edition. McGraw Hill Book.co. New York.
4.	Nelson DM and Core MM (2005) Principles of Biochemistry 4 th ed. Freeman & Co.
5.	Devlin TM (2002). Text Book of Biochemistry with clinical Correction, 5 th ed, Wiley & Sons.
6.	Chatterjea MN, Shinde Rana (2000). Textbook of Medical Biochemistry. 4 th Edition, Jaypee Brothers Medical Publishers (P) Ltd. New Delhi.
7.	West ES, Todd WR, Mason HS, Van Bruggen JT (1974). Textbook of Biochemistry. 4 th Edition. MacMillan Co. Collier Ltd. London.
8.	Murray RK, Granner DK, Meyer PA & Rodwell VW (2003). Harper's Illustrated Biochemistry. 26 th edition. McGraw Hill Asia.
9.	Robinson CH and Lawler MR (1986). Normal and Therapeutic Nutrition, Macmillon, NewYork.
10.	Lehninger AR. (1975). Biochemistry. 2 nd Edition. Kalyani Publishers. White A, Handler P and Smith EL (1959). Principles of Biochemistry. McGraw Hill Book Co., New York.

	PRACTICAL IN NUTRITIONAL BIOCHEMISTRY	
	Teaching Hours : 2 Practicals / Week (3 hours/Practical) Total Teaching Workload : 48 Practicals Max. Marks : 50	
	Objectives	
1.	To demonstrate the need for careful planning and organization of laboratory work and skilful execution of practical/experiments.	
2.	To develop an understanding of the principles of various biochemical techniques.	
3.	To develop competence in biochemical estimations.	
4.	To apply the knowledge acquired from the biochemical estimation to human nutrition.	
5.	To demonstrate the need for careful planning and organization of laboratory work and skilful execution of practical/experiments.	
6.	To develop an understanding of the principles of various biochemical techniques.	
7.	To develop competence in biochemical estimations.	
8.	To apply the knowledge acquired from the biochemical estimation to human nutrition.	

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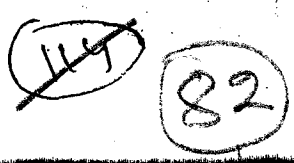
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	Contents:	Practicals
1.	Principles in biochemistry – Introduction to working principles of : <ul style="list-style-type: none"> • Spectrophotometry • Chromatography • Electrophoresis • Acid base titration, redox titration Cleaning of glassware with soap, chromic acid and distilled water	2 2
2.	Titrimetric estimations (a) Determination of strength of acids and bases (single and double titration) (b) Oxidation reduction titration - by $KMnO_4$	5 3
3.	Estimation of vitamin C in lemon juice or any other fresh food stuff.	1
4.	Preparation of buffers and measurements of their pH with indicators and pH meter.	2
5.	Estimation of Protein by Kjeldahl's Method.	3
6.	Colorimetric estimations (in unknown solution). <ul style="list-style-type: none"> • Glucose • Cholesterol 	4 5
7.	Titrimetric estimation: Determination of calcium in milk powder, $CaCO_3$ solution.	5
8.	Colorimetric estimation (in unknown solution) <ul style="list-style-type: none"> • Determination of Iron in Ferrous Ammonium sulphate solution and in blood. • Determination of Haemoglobin in blood by colorimetric method. 	3 2
	 <ul style="list-style-type: none"> • Determination of phosphorus in milk and phosphorus solution by F.S. colorimetric method. • Determination of protein by Lowry/ Biuret method. 	3
9.	Enzymes assays <ul style="list-style-type: none"> • Determination of Alkaline phosphatase Enzyme. • Determination of Transaminase enzyme (GOT and GPT) Paper Chromatographic separation of Amino Acids by <ul style="list-style-type: none"> • Circular method • Ascending and • Descending methods 	2 2 4

PAPER III BIostatistics and Research Methods (THEORY)		
Teaching Hours	: 4 Hours/Week	
Total Teaching Workload	: 96 Hours	
Max. Marks	: 100	
Objectives		

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	<ol style="list-style-type: none"> To understand the basic concepts of research methodology. To be able to understand the various steps of research methods. To enable the students to understand various research designs, sampling techniques, methods of collecting data. To enable the students to prepare and present report for dissertation purpose. To understand the basic concepts of statistics. To enable the students to understand various types of statistical tools and their interpretation 	
	Contents:	
	UNIT-I	Hours
1.	Research purpose and objectives.	4
2.	Definition and Identification of research problem, selection of problem, hypotheses, basis assumption and limitation of problem.	4
3.	Review of literature: Importance, sources and writing review of literature.	6
4.	Research designs: Purpose and types.	6
5.	Technique of sampling- Census and sampling methods, probability and non-probability sampling procedures, sample size.	4
6.	Data gathering instruments, measurements and scales, reliability and validity of measuring instruments- Questionnaire, Schedule, Score card, Checklist.	6
7.	Methods of collecting data: Questionnaire, interview technique, observation, case study, focus group discussion.	4
	UNIT-II	Hours
8.	Planning, executing and analysis of large scale surveys with special emphasis of surveys in Home Science.	4
9.	Presentation and preparation of report for dissertation publication.	4
10.	Bibliography: Importance of method of writing references of book, journals, proceedings and websites.	6
11.	Meaning and scope of Statistics. Classification and Tabulation	1
12.	Measures of Central Tendency and Dispersion (Mean Median, Mode, Quartiles, Range and Standard Deviation).	2
13.	Graphic and Diagrammatic representation of data (Frequency, Histogram, Graphs, Bar-diagram and Pie charts).	7
	UNIT- III	Hours
15.	Elementary ideas on Probability (Simple Probability) Skewness and Kurtosis definition. Elementary ideas of random variable and its density function (Binomial, Poisson, Uniform, Normal varieties, Normal distribution and its properties, Use of Normal probability tables).	7
16.	Elements of testing a Statistical Hypothesis- Formulation of the problem, Definition of type I and II errors. Level of Significance, t-test, Z-test.	6
17.	Design of Experiment: Analysis of Variance.	3

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18.	Correlation and Regression: Correlation and its interpretation. Product moment and Rank order. Correlation Coefficient Regression Equations (without derivation) and its interpretations, use of prediction.	8
19.	Non-parametric Inference: Sign, Mann Whitney and Chi square test (as goodness of fit and independence of attributes in 2*2 and r*c contingency tables).	6
20.	Use of computer of statistical analysis using SPSS.	2
References: <ol style="list-style-type: none"> 1. Simpson and Kafka, Basic Statistics, I.B.H. Publishers. 2. Simpson, George, Kafka, Fritz, <u>Basic statistics: a textbook for the first course</u>, Oxford and IBH Publishers, New Delhi, 1977. 3. Taro Y, Sampling Theory, Prentice-Hall Publishers, New Delhi 1967. 4. Snedecor and Cochran, Statistics Methods, Oxford and I.B.H. Publishers, Calcutta, 1968. 5. Gupta SP, Statistics Methods, Sultan Chand and Co., New Delhi, 2008. 6. Good CV and Carter DE, Methods of Research-Educational Psychological Application, Century Craft, New York, 1954. 7. Kerlinger FA, Foundation of Behavioural Research, Century Craft, New York, 1966. 8. Young PV and Schind CG, Scientific Social Survey and Research, Prentice Hall, New Delhi, 1968. 9. Philips BS, Social Research, Strategy and Tactics, MacMillan, New York, 1976. 10. Mussed P, Hand book of Research Methods in Child Development, John Wiley & Sons Inc, 1960. 11. Devdas RP and Kulandaivel, Hand Book of Research Methodology, Sri Ram Krishna mission vidhyalaya, 1971. 12. Krishnaswami RP, Methodology of Research in Social Sciences, 1st edition, Himalaya Publishing house, Mumbai, 1993. 13. Simpson, George, Kafka, Fritz, <u>Basic statistics: a textbook for the first course</u>, Oxford and IBH Publishers, New Delhi, 1977. 		

PAPER IV FOOD MICROBIOLOGY (THEORY)		
Teaching Hours : 2 Hours / Week		
Total Teaching Workload: 48 Hours		
Max. Marks : 50		
Objectives		
1.	To understand the role of micro-organism in food, food spoilage and to understand advanced techniques of food preservation.	
2.	To learn about food-borne infections and intoxication.	
3.	To understand the criteria for microbiological safety in various food operations to avoid public health hazards due to food contamination.	
4.	To be able to understand the food legislation Acts and Standards operating in India.	
Contents:		Hours

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UNIT-I		
1.	History and development of food microbiology	2
2.	Micro-organisms of importance in food- bacteria, mold and yeast. Classification, morphology and physiology.	4
3.	Factors affecting growth of micro-organisms- pH, moisture, oxidation reduction potential, nutrients, temperature.	4
4.	Principles of preservation <ul style="list-style-type: none"> • General principles of food preservation: asepsis, removal, anaerobic conditions • Preservation by use of <ul style="list-style-type: none"> drying, low temperatures high temperatures irradiation food additives 	6
UNIT-II		
5.	Contamination, preservation, and spoilage of different kinds of foods <ul style="list-style-type: none"> • Cereals and it's products • Sugar and it's products • Vegetables and fruits • Eggs • Milk and it's products • Canned foods 	6
6.	Role of Microbes in health and disease <ul style="list-style-type: none"> i. Probiotics <ul style="list-style-type: none"> Introduction to probiotics, Overview of gut environment, types of probiotics, mechanism of action, health benefits, prebiotics ii. Public health Hazards and Food borne illnesses due to microbial contamination <ul style="list-style-type: none"> Causes, food association, habitat, toxins, disease and symptoms, prevention of the following 	4
7.	Food borne intoxications <ul style="list-style-type: none"> • Botulism • Staphylococci • Mycotoxicosis 	3
8.	Food borne infections <ul style="list-style-type: none"> • Salmonella 	3

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	<ul style="list-style-type: none"> • E. Coli • Clostridium 	
	UNIT- III	
9.	<p>Food Safety requirements for different food service establishments and safety measures</p> <p>(a) Definition of food safety, regulatory agencies, WHO & FAO</p> <p>(b) Food Safety regulations and laws in India</p> <ol style="list-style-type: none"> i. Food Safety and Standards Act 2006 ii. Food safety and Regulations 2011 iii. Prevention of Food Adulteration (4th Amendment) Rules, 2011 <p>(c) Food security assurance systems</p> <ol style="list-style-type: none"> i. Good Hygienic Practices (GHP) ii. Good Manufacturing Practices (GMP) iii. Food Safety Management Systems- HACCP iv. Food Safety Management System- ISO 22000 v. Quality Management System- ISO 9001 	8
10.	<p>Microbiology of Fermented foods.</p> <p>Vinegar, cheese, beer</p> <p>Indian fermented foods- idli, dosa, vada, curd</p>	4
11.	<p>Single cell proteins (SCP)</p> <ul style="list-style-type: none"> • Introduction to single cell proteins, types of single cell proteins, production of SCP, advantages & disadvantages 	4
	REFERENCES	
1.	Frazier WC and Westhoff DC. Food Microbiology, McGraw Hill Co. Ltd., New Delhi, IV ed., 2008.	
2.	Ananthanarayan R and Paniker's CKJ. Text book of Microbiology, VIII ed., International Universities Press, US, 2009.	
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4.	Jay MJ, Loessner MJ and David GA. Modern Food Microbiology. Food Science Text Series, VII ed., 2005	
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9.	Harrigan WF. Laboratory Methods in Food Microbiology. Gulf Professional Publishing, Oxford, UK, 1998.	
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12.	Food Microbiology and Safety Practical Manual. MFNL-003. Indira Gandhi National Open University of Continuing Education The Training Manual For Food Safety Regulators Who Are Involved In Implementing Food, Safety And Standards Act 2006 Across The Country , Volume II Food Safety Regulations and Food Safety management. Foods Safety & Standards Authority Of India (Ministry Of Health & Family Welfare) FDA Bhavan, Kotla Road, New Delhi – 110 002 Website: Www.Fssai.Gov.In
13.	Heritage J, Evans EGV and Killington RA. Introductory Microbiology. III Series. Combridge University Press, Great Britain, 1996.
14.	Bhatnagar A. Microbiology (A Remediation Study), RBSA Publishers, Jaipur, 1995. Sulla SB and Shantharam S. General Microbiology. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi, 2000.
15.	Bella S, Neaves P and Williams AP. Food Microbiology and Laboratory Practice. Blackwell Publishing, Oxford, 2006.

	PRACTICAL IN FOOD MICROBIOLOGY	
	Teaching Hours : 2 Practicals / Week (3 hours/Practical) Total Teaching Workload : 48 Practicals Max. Marks : 50	
1. 2. 3.	Objectives To understand the functioning of a microscope. To understand the technique of culturing and staining strategies. To learn the microbiology of foods.	
	Contents:	Practicals

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1.	Principles, use and maintenance of microscope.	2
2.	Functioning and use of various microbiology laboratory equipments	2
3.	Preparation of Culture media	2
4.	Preparation of General Purpose Media,	2
5.	Preparation of Selective and Differential Medium Techniques of Culturing	2
6.	Sub-culturing of a given culture Pure Culture Techniques	4
7.	Isolation of Pure Culture of Bacteria by Streak Plate Method. Quantitative Techniques	4
8.	Estimation of Amount of Bacteria by Pour Plate Method. Quantitative Determination of Viable Microbes.	4
9.	Colony characteristics and staining techniques Preparation of culture media in the Laboratory and streaking Observation of colony characteristics	6
10.	Staining Strategies in the Laboratory Preparation of bacterial smear Simple Staining of Bacterial Culture Gram Staining of Bacterial Culture Negative staining of the given culture(s)	6
11.	Microbiological Study of Water Testing Quality of Water using Presumptive Test. Confirmation of the Presence of Coliform Bacteria Positive Presumptive Test. Performing the Complete Coliform Test	4
12.	Microbiological Analysis of Milk Sample Determination of the Quality of Milk sample by Methylene Blue Reduction Test Detection of Number of Bacteria in Milk by Breed Count	4
13.	Microbiological Analysis of Food Samples: ice cream, butter, cheese, curd, fruits, juices etc. Observation and Recording for these Exercises	4
14.	Sampling and Analysis of Microbial Load on Food Contact Surfaces: Assessing Sanitary Quality of Contact Surface by Swabbing Method. Analysis of Air of Processing Facility for Microbial Load	2
	Field visits to concerned food plants.	

PAPER V PRINCIPLES OF FOOD SCIENCE (THEORY)	
Teaching Hours	: 2 Hours / Week
Total Teaching Workload:	48 Hours
Max. Marks	: 50

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	Objectives	
1.	To enable students to understand the physico-chemical properties of foods.	
2.	To make the students aware about effects of common food processing techniques on food.	
3.	Understand and know various aspects of food product development. To impart systematic knowledge of basic and applied aspects in food processing and technology	
4.	To enable the students to understand food composition and its physico-chemical, nutritional and sensory aspects.	
	Contents:	
	UNIT-I	Hours
1.	Physical, chemical and functional properties of protein, carbohydrates, lipids, water, pigment and flavours.	10
2.	Physical Properties of Food -Hydrogen – ion concentration, oxidation – reduction potentials, surface tension, adsorption, viscosity, plasticity, iso-electric points or proteins, colloidal chemistry of foods - sols, gels, foams and emulsions.	8
	UNIT-II	Hours
6.	Food Processing Technique freezing, thermal processing, dehydration, irradiation	7
7.	Chemical, physical nutritional alteration occurring in food products during food processes: freezing, thermal processing, dehydration, irradiation and environmental control.	7
	UNIT- III	Hours
8.	Quality control and management. Important food quality attributes <ul style="list-style-type: none"> • Sensory quality - colour, texture, flavour and taste Rheology • Microbiological quality nutritional quality evaluation for food products. • Food Adulteration • Self life studies 	8
9.	New Product Development <ul style="list-style-type: none"> • Market Research • Consumer dynamics • Process of development and standardization • Labeling • Marketing • Quality Evaluation 	8

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2.	Potter NM. Food Science, The AVI Publishing Co., Inc., Connecticut, 1995.
3.	Fennema OR. Food Chemistry. Marcel Dekker, Inc., New York, 1996.
4.	Charley H. Food Science, John Wiley and Sons, Inc., New York, 1982.
5.	Crisund RM. experimental study of foods thought on Nigglin Co. 1962.
6.	Lowe B. Experimental Cookery. John Wiley and Sons, Inc. New York, 1955.
7.	Meyer LH. Food Chemistry, CBS Publishers and Distributors, New Delhi, 2004.
8.	Kramer A and Twig B. Quality Control for the Food Industry. Vol. I and II, AVI Publishing Co., London, 1984.
9.	Hubbard MR. Statistical quality control for the food industry. Van Nostrand Reinhold, New York, 1990.
10.	Fuller GW. New Food Product Development from Concept to Market Place, CRC Press, New York, 1999.
11.	Winbond W. Techniques of Food Analysis, Allied Scientific Publishers, 1999. Chandrashekhar U. Food Science and Applications in Indian Cookery, Phoenix Publishing House, 2002.

PAPER VI HUMAN NUTRITIONAL REQUIREMENTS (THEORY)		
Teaching Hours : 2 Hours / Week Total Teaching Workload: 48 Hours Max. Marks : 50		
Objectives		
1.	To understand the basis of human nutritional requirements and recommendations through life cycle.	
2.	To understand the methods of evaluating protein quality and improving the same.	
3.	To understand the nutritional requirements in special conditions.	
Contents:		
UNIT-I		Hours

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1.	Nutritional requirements and recommended allowances for macro and micro nutrients for the entire life span (infancy to old age). A critical review of the following:	1
2.	<ul style="list-style-type: none"> • Methods of determining requirements and allowances and body weights • Energy requirements- units, definition, assessment, methods for determining requirements, energy requirements for infants, children, adolescents, adults, pregnancy, lactation. • Protein requirements – protein quality and protein requirements, human amino acid requirements, quality of protein, methods for arriving at RDAs for Indians, protein requirements during pregnancy, lactation, growth – infants, children and adolescents, adults, protein energy ratio • Lipid requirements –functions of fatty acids, recommendations of dietary fat, RDAs for Indians, sources of fat, recommended intakes, quality of fat. • Dietary fibre – nutritional and health significance, requirements • Mineral requirements -calcium, phosphorus, magnesium, sodium, potassium, iron and zinc- Dietary requirements for different physiological ages and states. Methods for estimating requirements, dietary deficiency, biochemical functions, stores, sources, 	2 3 3 2 1 3
3.	Trace elements requirements – iodine requirements, deficiency, losses, RDAs	1
UNIT-II		Hours
4.	A critical review of the following: <ul style="list-style-type: none"> • Vitamin requirements – Water soluble vitamins – thiamin, riboflavin, niacin, pyridoxine, folic acid, Vitamin B12, ascorbic acid-Functions, sources, requirements, deficiency, stability during processing • Fat soluble vitamins – vitamin A and vitamin D– significance, deficiency, dietary sources, requirements, role. 	6
5.	Dietary guidelines for Indians	2
6.	Critical evaluation of International recommended dietary allowances – American, Canadian, FAO/WHO/UNU.	2
7.	Nutrition requirements for special conditions <ul style="list-style-type: none"> • Natural calamities and emergencies –floods, earthquakes, famine/drought • Gastronautics • High altitude • Extreme environmental temperatures-hot and cold 	6

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	UNIT- III	Hours
8.	Evaluation of protein quality <ul style="list-style-type: none"> • Analytical methods for the determination of nitrogen and amino acids in foods. • Evaluation of protein quality of foods from their amino acids content • Biological methods • Clinical methods • Biochemical methods 	3 3 4 2 2
9.	Relationship of stress and physiological state to the biological evaluation of protein quality.	2
REFERENCES		
1.	Evaluation of protein quality. Publication 1100, National Academy of Sciences, National Research Council, Washington, DC, 1963.	
2.	Nutritional evaluation of protein foods. PL Pellet and VR Young, The United Nations University, 1980.	
3.	Raghuramulu N, Madhvan Nair K and Kalyansundaram S. A laboratory of manual techniques, NIN & ICMR Hyderabad, 2003.	
4.	Swaminathan M. Essentials of Foods and Nutrition, The Bangalore Printing & Publishing Co. Ltd. II ed., 2008.	
5.	Goodhart and Shills ME. Modern Nutrition in Health and Disease, Henry Kimpton Publishers, USA, 1974.	
6.	Pike RL and Brown ML. Nutrition an Integrated Approach, John Wily and Sons, NewYork, 1984.	
7.	Energy and protein requirements. Report of Joint FAO/WHO/UNU Experts Consultation, Technical Report Series of No. 724, WHO, Geneva, 1985.	
8.	Anonymous, Nutrient Requirements and Recommended Dietary Allowances for Indians, ICMR, Hyderabad, 2010.	
9.	Human energy requirements. Report of Joint FAO/WHO/UNU Expert Consultation, FAO Technical Report Series No. 1, WHO, Geneva, 2004.	
10.	Protein and amino acid requirements in human nutrition. Report of Joint FAO/WHO/UNU Expert Consultation, Technical Report Series No. 935, WHO, Geneva, 2007.	
11.	Word Review of Nutrition and Dietetics, Vol. 32, Kargel, Basel, 1978.	
12.	Vitamin and Mineral Requirements in Human Nutrition, Report of Joint FAO/WHO Expert Consultation on Human vitamin and mineral requirements: WHO, Geneva, 2004.	
13.	Indicators for Assessing Vitamin A Deficiency and their Application in Monitoring and Evaluating Intervention Programme. Micronutrient series. WHO/NUT/96.10. WHO, Geneva, 1996.	
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PRACTICAL IN HUMAN NUTRITIONAL REQUIREMENTS		
Teaching Hours : 2 Practicals / Week (3 hours/Practical) Total Teaching Workload : 48 Practicals Max. Marks :50		
1.	Objectives To calculate requirements of energy, protein, minerals and vitamins for different age groups	
2.	To compare intakes with the RDAs	
3.	To evaluate protein quality by using different methods	
	Contents:	Practicals
1.	Energy requirements • Calculation of BMR using different methods- 3 sets of data • Calculation of energy requirement for • Reference man and woman • Adults of different body weights and age categories • Children of different ages • Adolescents of different ages • Pregnant woman • lactating woman • Energy balance study for one week. • Calculation of energy requirement by indirect calorimetry	4 6 2 2
2.	Protein requirements • Calculation of protein allowances for • Children of different ages • Adolescents of different ages • Pregnant woman • lactating woman	4
3.	Lipids • Determination of the types of fat and fat composition of the diets through 24 hour recall and compare it with suggested values for SFA, PUFA, MUFA and Essential fatty acids. • Calculation of dietary fatty acids according to FAO/WHO recommendations for • Adult man and woman • Pregnant and lactating woman • Children of different ages • Adolescents of different ages	2 10
4.	Fibre • Determination of dietary fibre through 24 hour recall and comparison with suggested values for fibre	2

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5.	Minerals <ul style="list-style-type: none"> • Estimation of calcium requirement through factorial approach • Estimation of iron requirement during pregnancy • Research design for calcium and iron balance 	2 2 4
6.	Vitamins <ul style="list-style-type: none"> • Determination of Vitamin C requirement using load test 	2
7.	Evaluation of protein quality <ul style="list-style-type: none"> • Calculation of chemical score of different foods and food products. • Calculation of NDpCal% of <ul style="list-style-type: none"> ▪ A snack meal ▪ A mix for PDS system. • Research design for evaluation of protein quality by biological and clinical methods. 	2 2 2

PAPER VII PROBLEMS IN HUMAN NUTRITION (THEORY)		
Teaching Hours : 2 Hours / Week		
Total Teaching Workload: 48 Hours		
Max. Marks : 50		
Objectives		
1.	To create understanding about nutritional assesment techiques applicable for individuals and community.	
2.	To create understanding of various nutritional problems.	
3.	To create understanding about various inborn errors of metabolism and their dietary management.	
Contents:		
UNIT-I		
1.	Prevalence, etiology, biochemical and clinical manifestations, diagnostic technique, preventive and therapeutic measures for the following nutritional problems: <ul style="list-style-type: none"> • Protein Energy malnutrition • Vitamin A deficiency • Anaemia • Iodine Deficiency Disorders • Fluorosis • Rickets, osteomalacia and osteoporosis • Beriberi • Pellagra • Scurvy • Zinc Deficiency 	3 3 2 2 1 1 1 1 1 1
UNIT-II		

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2.	Assessment of Nutritional Status, Various techniques for assessment of nutritional status: <ul style="list-style-type: none"> • Anthropometric measurements: Definition, measurements, tools/instruments. Technique for measurements, standards for references, indices, classification, interpretation of data. Use of anthropometry for onetime assessment, growth monitoring and emergency situation. • Biochemical estimations for diagnosis of protein energy malnutrition, vitamin A deficiency, anaemia, iodine deficiency disorders, fluorosis: Parameters, techniques for estimation, reference value. • Clinical examination • Dietary survey 	4 4 3 4
3.	Vital statistics	1
UNIT- III		
4.	Introduction to causative factors, biochemical and clinical manifestation, treatment and therapeutic measures of following Inborn errors of metabolism:	6
5.	<ul style="list-style-type: none"> • Disorders of amino acid metabolism i.e. Phenylketonuria, hypertyrosinaemia, hypervaltaemia, hyperhistidinaemia, hyperlysinaemia, homocystinuria. • Carbohydrate metabolism i.e. Pentosuria, galactosuria • Lipid metabolism i.e. Hyper chylomicronaemia, pure hypercholesterolaemia 	3 3
6.	Food Safety and contamination Naturally occurring toxins and antinutritional factors: Lathyrism, Epidemic dropsy.	4
REFERENCES		
1.	Sheila C Vir. Public Health Nutrition in Developing Countries Pt 1 and 2 . Published by Wood head publishing India PVT LTD, New Delhi. Cambridge, Oxford, Philadelphia, 2010.	
2.	Sehgal S and Raghuvanshi Rita S. Textbook of Community Nutrition, Indian Council of Agricultural Research, Published by: Directorate of Information and Publication of Agriculture, Indian Council of Agriculture Reserach, Krishi Anusandhan Bhavan, Pusa, New Delhi, 2011.	
3.	Bamji MS, Rao PN and Reddy V. Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 1996.	
4.	Robinson CH and Lawler MR. Normal and Therapeutic Nutrition, Macmillon, New York, 1986.	
5.	Waterlow JC. Protein Energy Malnutrition, Edward Arnold, A division of Hodder and Stoughton, 1992.	

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8.	Mc Laren DS. A colored Atlas and Textbook of Diet-Related Disorders, 1992.
9.	Passmore R and Eastwood MR. Human Nutrition and Dietetics, ELBS, Churchill Livingstone, London, Baltimore, 1986.
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14.	Shills ME, Young VR and Bombay KN. Modern Nutrition in Health and Disease, Varghese Company, VII Edition, 1989.
15.	Beaton GH and Bengoa JM. Nutrition in preventive Medicine. The major deficiency-syndrome Epidemiology and approaches to control, World Health Organization, Geneva, 1986.
16.	Talwar GP. Textbook of Biochemistry and Human Biology, Prentice Hall of India Pvt. Ltd., New Delhi, 1980.
17.	Textbook of Biochemistry and Human Biology Edited by G.P. Talwar, Prentice Hall of India Pvt. Ltd., New Delhi, 1980.

PRACTICAL IN PROBLEMS IN HUMAN NUTRITION		
Teaching Hours : 2 Practicals / Week (3 hours/Practical)		
Total Teaching Workload : 48 Practicals		
Max. Marks : 50		
Objectives		
1.	To develop an understanding of the principles of various techniques of nutritional assessment.	
2.	To develop competence in recording and interpretation of anthropometric measurements.	
3.	To develop skills in conducting dietary surveys and data interpretation.	
4.	To develop understanding and skills in clinical observation.	
Contents:		Practicals
1.	Preparation of event calendar of past five years for assessment of age	2
2.	Assessment of nutritional status of infants using anthropometric measurements : <ul style="list-style-type: none"> • Preparation of questionnaire, learn techniques of recording weight length and MUAC. • Data collection (at least 10 infants) • Data interpretation using who Z scores and report. 	4

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3.	<ul style="list-style-type: none"> • Data interpretation using who growth. <p>Assessment of nutritional status of preschool children using anthropometric measurements.</p> <ul style="list-style-type: none"> • Preparation of questionnaire, learn techniques of recording height and weight using bathroom weighing scale as well as Salter weighing balance and MUAC. • Data collection (at least 10 preschool children). • Data interpretation using who growth standards and report writing. 	4
4.	<p>Assessment of nutritional status of school going children using anthropometric measurements :</p> <ul style="list-style-type: none"> • Preparation of questionnaire, data collection (at least 10 children). • Data interpretation using WHO growth standards and report writing. • Assessment of nutritional status of adolescent boys and girls using anthropometric measurements. • Preparation of questionnaire and data collection. • Data interpretation using WHO growth standards and BMI for age and height for age indices and report writing. 	4
5.	<p>Assessment of nutritional status of adults using anthropometric measurements.</p> <ul style="list-style-type: none"> • Preparation of questionnaire, learning techniques of measuring waist circumference and hip circumference and calculation of WHR. • Data collection. • Determination of haemoglobin level in blood sample of any age group. 	6
6.	<p>Assessment of nutritional anaemia among college going students using haemoglobin estimation and clinical signs and symbols of anaemia.</p> <ul style="list-style-type: none"> • Preparation of questionnaire, learn the techniques. • Data collection (at least 10 students) • Data interpretation and report writing • Assessment of food and nutrient availability of inmates of any hostel/ orphanage / old age home etc using food inventory methods. • Preparation of questionnaire and learn the techniques. • Data collection on 1st day of week. • Data collection on 7th day of week. • Data interpretation and report writing 	6
7.	<p>Assessment of food and nutrient intake using 24 hours dietary recall methods</p> <ul style="list-style-type: none"> • Preparation of questionnaire and learn the technique. • Standardization of recipes, cups, spoons, glasses • Data collection, conversion of cooked foods into raw ingredients 	6

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8.	and food and nutrient calculation, report writing. Assessment of food consumption pattern using diet history method. <ul style="list-style-type: none"> • Preparation of questionnaire, learn the technique. • Data collection, interpretation of results and report writing. • Assessment of diet and nutrient intake using qualitative as well as quantitative food frequency questionnaire. 	8
9.	Visit to malnutrition treatment centres in hospital – Observation of clinical symptoms of PEM and other symptoms of SAM child	4
10.	Planning and preparation of diets of in-patient admissions of severe acute malnutrition in children.	4

M.Sc. FOODS AND HUMAN NUTRITION (FINAL)

PAPER VIII CLINICAL NUTRITION AND DIETETICS (THEORY)	
Question paper will consist of 3 sections: Section I- Consisting of 20 compulsory objective type questions carrying 20 marks. Section II- Consisting of 10 compulsory questions with short answers carrying 20 marks. Section III- Consisting of 3 long essay type questions with 100% choice carrying 60 marks. Note: All the three sections should cover the entire syllabus.	
Teaching Hours	:4 Hours/Week
Total Teaching Workload	:96 Hours
Max. Marks	: 100
Objectives	
<ol style="list-style-type: none"> 1. Identification of high-risk patients, malnutrition in hospital patients. 2. To enable the students to understand the special nutrition concerns and the dietary management of various diseases. 3. To give practical insight for assessment, nutritional care and counselling to patients. 4. To give practical insight for assessment, nutritional care and counselling Sports Persons 5. To impart advanced knowledge to students about clinical nutrition and dietetics. 6. To enable the students to understand the special nutrition concerns and the dietary management of various diseases. 7. To give practical insight for assessment, nutritional care and counseling to patients. 	
Contents :	
UNIT-I	Hours
1. Nutrition Care Process in Hospitalized Patients	8

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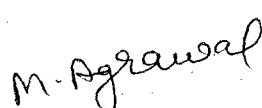



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2	<ul style="list-style-type: none"> • Nutrition care process • Methods of feeding (Enteral and Parenteral feeding) • Interpretation of routine medical and laboratory data • Nutritional Assessment of hospitalized patients <p>Methods of nutritional Process</p> <ul style="list-style-type: none"> • Assessment of Problem in food behaviours • Stages of Change • Behaviour Change Communication. 	2
3.	<p>Nutritional care of hospitalized children</p> <ul style="list-style-type: none"> • Nutritional care of neonates • Nutrient modifications and special feeding problems • Nutritional care of Malnourished children 	5
4.	<p>Geriatric Nutrition</p> <ul style="list-style-type: none"> • Ageing process, • Nutritional and Medical problems of elderly • Nutritional care and lifestyle modifications in elderly persons 	2
5.	<p>Classification, Etiology, Clinical features , diagnosis, prevention and dietary management of Gastrointestinal Diseases</p> <ul style="list-style-type: none"> • GERD, • Peptic Ulcer, • Constipation, • Diarrhea, • Celiac Disease, • Irritable Bowel Disease, • Ulcerative Colitis 	10
6.	<p>Classification, Etiology, Clinical features , diagnosis, prevention and dietary management of Liver and Pancreatic Diseases</p> <ul style="list-style-type: none"> • Hepatitis, • Liver Cirrhosis, • Fatty Liver, • Hepatic Coma, • Pancreatitis 	7
UNIT-II		
7	<p>Food Allergies Clinical features, diagnosis and management of Food Allergy and food intolerance.</p>	2
8.	<p>Nutrition in health and fitness</p> <ul style="list-style-type: none"> • Interrelationship between health, nutrition, exercise and fitness 	6


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9.	<ul style="list-style-type: none"> • Energy input and output • Effect of specific nutrients on work performance and fitness Sports nutrition <ul style="list-style-type: none"> • Energy Sources during different exercises • Nutritional Requirements of athletes • Water and electrolyte balance. 	6
10.	Body Composition <ul style="list-style-type: none"> • Body composition and cellular basis of growth • Significance and methods used for measurement of body composition in nutrition. • Application of body composition in nutrition • Cellular Growth and development during life cycle 	8
11	Nutritional Management of neurological disorders Classification and dietary management of <ul style="list-style-type: none"> • Stroke • Alzheimer's Disease • Epilepsy • Parkinson's Disease 	4
12	Nutrition and Cancer <ul style="list-style-type: none"> • Role of nutrition in etiology of cancer • Nutritional effects of cancer and it's therapies • Nutritional care of cancer patients 	4
UNIT III		
13.	Nutrition in Surgery and Burns <ul style="list-style-type: none"> • Pre and post operative nutritional care • Nutrition support in burns 	2
14	Nutrition in Renal Disorders:- <ul style="list-style-type: none"> • Glomerulonephritis, • Nephrotic Syndrome, • Acute Renal Failure • Chronic Renal Failure 	8
15	Pathophysiology, Aetiology, Clinical features prevention and dietary management of Cardiovascular Diseases: <ul style="list-style-type: none"> • Hypertension, • Coronary Heart Disease, • Hyperlipidemias 	8
16	Pathophysiology, Aetiology, Clinical features, prevention and dietary management of Diabetes mellitus <ul style="list-style-type: none"> • Type 1 Diabetes • Type 2 Diabetes 	6

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17	Pathophysiology, Etiology, Clinical features, prevention and dietary management of Obesity and Eating disorders <ul style="list-style-type: none"> • Obesity • Anorexia Nervosa • Bulimia Nervosa 	6
18	Nutrition related problems and Support in Human Immuno Deficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS)	2
References : <ol style="list-style-type: none"> 1. Mahan KL and Stump SE., Krause's Food, Nutrition & Diet Therapy. WB Saunders Company, Pennsylvania, USA, 2004. 2. Bamji MS, Rao NP Reddy V E., Text Book of Human nutrition 2nd Edition. Oxford & IBH Publishing Co. Pvt. Ltd., 2003. 3. Wardlaw GM and Margaret KW., Perspectives in Nutrition. 5th Edition. Mc Graw Hill Publications, Ohio, USA, 2007. 4. Joshi YK. , Basics of Clinical Nutrition. 2nd Edition. Jaypee Brothers medical Publishers (P) Ltd. New Delhi, 2008. 5. Shils ME, Olson JA, Shike N and Roos., Modern Nutrition in Health and Disease, 8th Edition, Lea and Febiger, Philadelphia, 1984. 6. Williams SR., Essentials of Nutrition and Diet Therapy. Times Mirror/Mosby College Publishing, 1990. 7. Sutor CW and Crowley MF., Nutrition: Principles and Application in Health Promotion, Published by J. B. Lippincott, 1984. 		

PRACTICAL IN CLINICAL NUTRITION AND DIETETICS	
Teaching Hours	: 4 practicals /Week (3 hours/practical)
Total Teaching Workload	: 48 practicals
Max. Marks	: 50
Objectives <ol style="list-style-type: none"> 1. To make students understand the nutritional assessment of hospitalized patients 2. To teach students how to plan diet for patients 3. To make students familiar with hospital environment by visit. 4. To make students understand the nutritional management of patients suffering from renal diseases, coronary heart diseases etc. 5. To teach students how to plan nutritional support for patients suffering from cancer, Alzheimers, epilepsy etc. 6. To make students familiar with hospital environment by visits 	
Contents	Hours

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Practicals

1. **Diet in Hospitals:**
 Visit to ICU to see various methods of feeding
 Planning and preparation of diet for tube feeding
 Nutritional Assessment of hospitalized patients
 Visit to Pediatrics Hospital to study the feeding of sick children
 Planning and preparation of diet for a sick child
 Planning and preparation of diet for elderly persons
2. **Diseases of Gastro Intestinal Tract:**
 Planning and preparation of diet for Celiac Disease
 Planning and preparation of diet for Irritable Bowel Disease,
 Planning and preparation of diet for Malabsorption Syndrome
 Planning and preparation of diet for Ulcerative Colitis
3. **Diseases of Liver and Pancreas:**
 Planning and preparation of diet for Hepatitis
 Planning and preparation of diet for Hepatic Coma
 Planning and preparation of diet for Liver Cirrhosis
 Planning and preparation of diet for Pancreatitis
 Planning nutrition support for fatty liver
4. **Diet in Health and Fitness:**
 Adaptation of traditional diets for healthy life style.
 Planning and preparation of snacks and drink suitable for various sports activities.
 Planning and preparation of diets for endurance activities
5. **Diet in other degenerative disorders:**
 Planning nutrition support for epilepsy patient
 Planning nutrition support for Alzheimers patient
 Planning nutrition support for cancer patients
 Planning and preparation of diet for Pre and post operative nutritional care
6. **Planning nutrition support for Burns patient**
7. **Diseases of the Kidney:**
 Planning and preparation of diet for Glomerulonephritis
 Planning and preparation of diet for Nephrotic Syndrome
 Planning and preparation of diet for Chronic Renal Failure
8. **Diet in Cardiovascular Diseases:**

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	Planning nutrition support for Atherosclerosis	4
	Planning and preparation of diet for Hypertension	
	Planning and preparation of diet for Coronary Heart Disease	
	Planning nutrition support for Hyperlipidemias	
9.	Diet in Diabetes Mellitus:	2
	Planning and preparation of diet for Type 1 Diabetes	
	Planning and preparation of diet for Type 2 Diabetes	
10.	Diet in Eating Disorder:	4
	Planning and preparation of diet for Overweight and Obesity	1
	Planning nutrition support for anorexia nervosa	
	Planning nutrition support for Bulimia nervosa	
11.	Planning nutrition support for AIDS patient	
12.	Case study of two patients in hospital (patient profile, anthropometry, drugs prescribed, laboratory investigations, diet and follow up).	4

PAPER IX PUBLIC HEALTH NUTRITION (THEORY)

Question paper will consist of 3 sections:

Section I- Consisting of 20 compulsory objective type questions carrying 20 marks.

Section II- Consisting of 10 compulsory questions with short answers carrying 20 marks.

Section III- Consisting of 3 long essay type questions with 100% choice carrying 60 marks.

Note: All the three sections should cover the entire syllabus.

Teaching Hours	:4 Hours /Week
Total teaching Workload	:96 hours
Max. Marks	:100

Objectives: To enable students to

1. Understand the principles of community organization
2. Acquire skill in developing leadership in rural people
3. To develop understanding about group behaviour and dynamics for effective communication and group management

Contents		Hours
UNIT- I		
1.	Public Nutrition and Health Care System Concept and scope of public health nutrition Levels of Health care and Health care system in India	2

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2.	National Policy: Health, nutrition and population	3
3.		3
4.	Brief note on : Dual burden of malnutrition, national health Mission, Millennium Development goods	2
5.	Nutritional Epidemiology Definition, aims, basic measurement and applications	2
6.	Study designs - methods applied in conducting nutrition research	5
7.	Measuring exposure (diet) outcome (diseases) relationship and their interpretation	5
UNIT- II		
8.	Public Health Aspects of under nutrition Etiology, Public Health Implications, preventive/curative strategies for: - Chronic energy deficiency - Protein energy malnutrition - Micronutrient deficiency	6
9.	Approaches/strategies for improving nutrition and health status of community: • Health based interventions including immunization, provision of safe drinking water, hygiene, prevention and management of diarrheal diseases. • Food based interventions including food fortification, dietary diversification, supplementary feeding and biotechnological approaches.	12
10.	Education based interventions including growth monitoring and promotion, and nutrition health education	6
11.	Programme planning and management in public health nutrition Steps in programme planning / planning cycle	5
12.	Application of management methods and techniques in the health care delivery system	3
UNIT III		
13.	Programme Monitoring and Evaluation Definition, significance and purpose of monitoring nutrition programme	4
14.	Identification and selection of indicators for monitoring nutrition programmes	6

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15.	Definition, significance and purpose of evaluation nutrition programs	6
16.	Identification and selection of indicators for evaluation	6
Nutrition Communication		
17.	Definition and need for nutrition - health education	2
18.	Concept and objectives of communication for behavior change	3
19.	Designing nutrition - health education plan	4
20.	Characteristics of commonly used nutrition and health education materials, including social marketing	3
Nutrition Surveillance		
21.	Objectives, Purposes and indications used in nutrition surveillance	3
22.	Agencies for nutrition surveillance in India	3

PRACTICAL IN PUBLIC HEALTH NUTRITION	
Practical	: 2 Practical/Week (3 Hours/Practical)
Total Practical Workload	: 48 Practicals
Max. Marks	: 50
Objectives	
<ol style="list-style-type: none"> 1. Development, implementation and evaluation of programmes 2. Preparation of communication/teaching aids 3. Planning and preparation of nutrient rich recipes 	
Contents	Hours
1. Community work	4
2. Development of plan for Nutrition education program	4
3. Preparation of communication / teaching aids	16
4. Program implementation and Evaluation	2
5. Collection, analysis and presentation of literature	
Maternal and child Health :	
<ul style="list-style-type: none"> • Each student will collect a document on Maternal child Health referring the web-site : www.mhfw.org • Collection of document • Reading, Analysis and preparation of PPT on the collected document 	8

Shruti

M. Agrawal

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Asstt. Registrar (Acad-I)
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	• Each student will prepare a leaflet/chart on the content related to	6
6	(a) Food Security (b) Water, hygiene and Sanitation	2
	Planning and preparation of low cost nutritious recipes	2
	Planning of recipes	
7	Preparation of energy and protein rich snack for severely malnourished children	2
	Preparation of recipe based on pre-mix provided at AWC	2
	Skill development	
	One practical class on skill development on any one area of Public Health Nutrition	

PAPER X INSTITUTIONAL FOOD ADMINISTRATION AND QUANTITY FOOD PRODUCTION (THEORY)

Question paper will consist of 3 sections:

Section I- Consisting of 20 compulsory objective type questions carrying 20 marks.

Section II- Consisting of 10 compulsory questions with short answers carrying 20 marks.

Section III- Consisting of 3 long essay type questions with 100% choice carrying 60 marks.

Note: All the three sections should cover the entire syllabus.

Teaching Hours : 4 Hours / week

Total teaching workload : 96 hours

Max. Marks : 100

Objectives

This course will enable the students to understand:

1. The various aspects of food service planning
2. The management of food service organisations.
3. Developing in students the skill of menu planning for quantity and quality food preparation.
4. The aspects of food service management.
5. The management of personnel in smooth running of an organisation.

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Handwritten signatures and marks:
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6. How to maintain a food service facility as a sanitary, safe and secure place		
CONTENTS :		Hours
UNIT- I		
1.	Introduction to Foodservice systems <ul style="list-style-type: none"> • Development of food services in Institutions. • Consumer behaviour and eating trends- teenagers, family, business- corporate world. • Food services facility planning – introduction to foodservice facilities planning, the planning process, the planning team, planning the prospectus, functional planning, planning the atmosphere, workplace design, equipment requirements (writing equipment specifications, purchasing, factors affecting equipment selection, type of equipments), space requirements, layout of facilities. 	10
2.	Organisation and Management <ul style="list-style-type: none"> • Organization – definitions, nature and characteristics of organisation, theories of organisation, steps in process of organisation, principles of organisation, departmentation, types of organisations. • Systems approach to Management, management by objectives • Management – definitions, management process, roles of a manager, level and skills of management, principles of management, tools of management, management of resources, functions of management. • Financial Management – Key accounting concepts, basic financial statements, tools for comparison and analysis, budgeting, book keeping- principles of double entry, records. • Energy management-energy utilisation, energy conservation, energy management systems • Time management. 	4 4 6 6 2 2
UNIT- II		
3.	Food Management <ul style="list-style-type: none"> • Food acceptability and sensory evaluation – definition, application, difference between organoleptic and sensory evaluation, qualification and types of panellists, testing area, 	3

Anshu m. Agrawal
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 Sunita Singh

Asstt. Registrar (Acad)
 University of Rajasthan
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	<p>methods of sensory testing.</p> <ul style="list-style-type: none"> • Menu planning – importance of menu planning in food service organisation, types of menu and their application, factors affecting menu planning, steps in menu planning, quality food standards, standardised recipes. 3 • Food Purchasing – Market and the buyer, forecasting in foodservice, methods of purchasing, mode of purchasing (centralized and group purchasing), purchasing process and records, vendor selection and evaluation, Food selection. 3 • Food production – Food production planning, production schedules, principles of food production, methods of food production, production controls, quantity and quality control. 2 • Receiving and store room management - Elements of receiving, receiving process, dry storage, and low temperature storage. 2 • Food cost control – factors affecting food cost, records for control, pricing the products. 1 • Food Laws and standards 	
4.	<p>Food service Management</p> <ul style="list-style-type: none"> • Food service systems- Conventional, Commissary, Ready Prepared and Assemble serve. 2 • Delivery and service of food in different food service systems- Hospitals, Schools, Industries, and Airlines. 3 • Types of service- Self, Tray, Waiter, and Portable Meals. 2 3 • Dining room management- furnishings and equipment for dining rooms 	
UNIT III		

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2.	Personnel Management <ul style="list-style-type: none"> • Functions of personnel manager • Leadership – qualities and responsibilities of a leader, styles and theories of leadership, motivation, theories of motivation, philosophies of human nature-theories • Human resource planning-human resource inventory, human resource forecasting, human resource development plans. • Employment process- recruitment, selection, orientation, training, development • Performance appraisal and MBO • Employee facilities and benefits • Labour Cost Control- factors affecting labour control, records for control. • Labour management relations- reasons why workers join unions, development of labour unions, structure of unions, union and contract negotiations • Personnel functions- kitchen, dining room • Labour Laws affecting foods service operations. 	<p>2 2 2 2 2 2 2 2 2 2</p>
3.	Plant and equipment management <ul style="list-style-type: none"> • Maintenance of equipments and facilities- manual and mechanical ware washing, sanitary facilities and equipment, preventive maintenance, pest control • Sanitation – principles of food sanitation, sanitation of food, personnel, physical plant and equipment, controlling microbial quality of food, food service sanitation, development of quality assurance (sanitation) programme. • Safety – Accident prevention, fire prevention, 3 Es of safety, safety and health programme, HACCP, Food Safety and Standards Act of India. • Security- management of security system, main security risks. 	<p>5 5 4 1</p>

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University of Rajasthan

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2.	<p>Planning and preparation of meals for various occasions giving general consideration, assumptions, organization chart, budget breakup, menu, cost calculations, comparison of actual and estimated costs and evaluation, for example:</p> <ul style="list-style-type: none"> • Hostel mess • Railway canteen • Office canteen • College canteen • Mid day meal • Conference <p>Visit to different institutes for eg:</p> <ul style="list-style-type: none"> • Girls' hostel • Railway canteen • Office • College • Akshaya patra 	11
3.	<p>Quantity cookery classes for preparation of food items for eg: Coconut cookies, Samosas, Chole tikki, Masala idlies, Masoor dal pakories, Bhelpuri, Dahi wada, Chikki etc.</p>	11
4.	Term paper in any area of IFA	24
5.		

PAPER XI DISSERTATION	
Teaching Hours	: 4 Hours / week
Total teaching workload	: 96 hours
Max. Marks	: 150
Objectives : <ul style="list-style-type: none"> • To enable student to make and present a plan for research. • To impart systematic and practical knowledge of research & its applied aspects. • To develop scientist quality in student. • To enable student to write & present thesis. • To impart systematic and practical knowledge of research & its applied aspects. • To develop scientist quality in student. 	
Contents	
Hours	

Shruti

M. Agrawal³⁸

Shruti

Santhi Singh

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1.	Identification, analysis and selection of research problem and its relevance	12
2.	Collecting relevant review and research paper regarding to research	12
3.	problem	
	Synopsis writing and power point presentation	2
	• Introduction	2
	• Rationale of the study	2
	• Objectives	2
	• Review of literature (minimum 20 literatures should be cited)	1
	• Brief methodology	1
	• Plan of action	2
	• Bibliography	
		29
5.	Data collection, analysis & interpretation of data in form graphs, charts, tables & others	4
	Thesis writing and presentation I	4
	Introduction	4
	Review of literature	3
6.	Materials and methods	2
	Result and discussions	2
	Thesis writing and presentation II	2
	Conclusion	2
	Summary	2
7.	Bibliography	2
	Annexures	2
	Writing and submission of one research paper based on conducted research findings	4
References: Refer available journals, research studies and abstract books		

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Boyle

Joshi

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Smith

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