PANJAB UNIVER SITY, CHANDIGARH -160014 (INDIA)
(Estd. under the Panjab University Act VII of 1947—enacted by the Govt. of India)

FACULTY OF SCIENCE

SYLLABI

FOR

M.Sc. Home Science (Foods & Nutrition)

(Semester System)

Examinations, 2020-21

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PANJAB UNIVERSITY, CHANDIGARH

Outlines of tests, syllabi and courses of reading for M.Sc. Home Science (Foods & Nutrition) 1st &2nd Semester System

SCHEME OF STUDIES
SEMESTER I

1st Semester Exam.

CODE	SUBJECT	CREDIT HOURS			THEORY MARKS			PRACTICAL MARKS			
		T	P	TOTAL	PAPER	INT.	TOTAL	PAPER	INT.	TOTAL	TOTAL
1	Nutritional Biochemistry	4	2	6	90	10	100	40	10	50	150
2	Human Nutrition	3	-	3	65	10	75	-	-	-	75
3	Public Health Nutrition I	2	2	4	45	05	50	40	10	50	100
4	Human Physiology	3	-	3	65	10	75	-	-	-	75
5	Research Methodology and Statistics	3	2	5	65	10	75	40	10	50	125
	TOTAL	**15**	**6**	**21**							**525**

SEMESTER II

2nd Semester Exam.

CODE	SUBJECT	CREDIT HOURS			THEORY MARKS			PRACTICAL MARKS			
		T	P	TOTAL	PAPER	INT.	TOTAL	PAPER	INT.	TOTAL	TOTAL
1	Biochemical Food Analysis and Instrumentation	2	2	4	45	05	50	40	10	50	100
2	Clinical and Therapeutic Nutrition I	3	2	5	65	10	75	40	10	50	125
3	Public Health Nutrition II	2	2	4	45	05	50	40	10	50	100
4	Advances in Nutrition	3	-	3	65	10	75	-	-	-	75
5	Computer Applications in Foods	-	2	2	-	-	-	40	10	50	50
6	Nutritional Anthropology	2	-	2	45	05	50	-	-	-	50
7	Dissertation	-	2	2	-	-	-	-	50	50	50*
	TOTAL	**12**	**10**	**22**							**550**

*Marks will be awarded by the supervisor internally on the basis of synopsis/continuous evaluation.

SEMESTER III

3rd Semester Exam.

CODE	SUBJECT	CREDIT HOURS			THEORY MARKS			PRACTICAL MARKS			
		T	P	TOTAL	PAPER	INT.	TOTAL	PAPER	INT.	TOTAL	TOTAL
1	Food Microbiology and Quality Control	4	2	6	90	10	100	40	10	50	150
2	Clinical and Therapeutic Nutrition II	3	2	5	65	10	75	40	10	50	125
3	Food Service Management	2	2	4	45	05	50	-	50	50#	100
4	Nutritional Management in Sports and Fitness	2	2	4	45	05	50	40	10	50	100
5	Seminar	-	1	1	-	-	-	-	25	25	25^
6	Dissertation	-	2	2	-	-	-	-	50	50	50**
	TOTAL	**11**	**11**	**22**							**550**

#No University examination. Continuous evaluation done internally throughout the semester.
^Marks will be awarded internally for presentation on related topics
**Marks will be awarded by the supervisor internally on the basis of data collection/continuous evaluation.

Note: At the end of the 4th semester, students are required to undergo 6 weeks internship in the Dietetics Department of a hospital. The certificate of completion of internship is mandatory for obtaining the degree.

SEMESTER IV

4th Semester Exam.

CODE	SUBJECT	CREDIT HOURS			THEORY MARKS			PRACTICAL MARKS			
		T	P	TOTAL	PAPER	INT.	TOTAL	PAPER	INT.	TOTAL	TOTAL
1	Principles of Food Science	3	2	5	65	10	75	40	10	50	125
2	Entrepreneurial Ventures in Food Industry	2	2	4	45	05	50	40	10	50	100
3	Alternative Medicines and Nutrition	2	-	2	45	05	50	-	-	-	50
4	Dissertation	-	4	4	-	-	-	-	100	100	100
	TOTAL	**7**	**8**	**15**							**375**

. **Guidelines for Continuous Internal Assessment**

I

(a)	Written Test	:	25 (reduced to 5)
(b)	Snap Test	:	25 (reduced to 5)
(c)	Participation in Class Discussion	:	15 (reduced to 3)
(d)	Term Paper	:	25 (reduced to 5)
(e)	Attendance	:	10 (reduced to 2)
	Total		**:100 (reduced to 20 and further reduced to 10)**

II Weightage of 2 marks for attendance component out of 20 marks for Continuous Assessment shall be available only to those students who attend 75% and more of classroom lectures/seminars/workshops. The break-up of marks for attendance component for theory paper shall be as under :

Attendance Component		***Marks for the theory paper***
a) 75% and above upto 85%	:	1
b) Above 85%	:	2

Continuous Internal Assessment Awards must be sent to the Controller of Examinations, by name, **two weeks before** the commencement of the particular examination on the *pro forma* obtainable from the examination branch.

SEMESTER I

COURSE NO. 101 : NUTRITIONAL BIOCHEMISTRY-I (Th.)

Maximum Marks	: 100
Paper	: 90
Int. Asst.	: 10

Credits Hours :4/week
Durations of Exam : 3 hours

Instructions to the paper setter:

Question paper will have four sections/units. Examiner will set a total of nine questions comprising of two questions from each section and one compulsory question of short answer type covering the whole syllabus. Student will attempt one question from each unit and the compulsory question.
All questions may carry equal marks, unless specified.

Objectives:

1. To augment the biochemistry knowledge acquired at the undergraduate level.
2. To understand the mechanism adopted by the human body for various metabolic pathways.

UNIT-I

1. Biological Oxidation- Theory of biological oxidation. Concept of free energy. Oxidation – reduction reactions. Respiratory chain. Oxidative and non-oxidative phosphorylation. High energy compounds.
2. Carbohydrate metabolism: Glycolysis, Tricarboxylic Acid cycle, Gluconeogenesis, Hexose Monophosphate pathway, Glycogenolysis, Glycogenesis.

UNIT-II

3. Protein Metabolism: Review of general reaction of amino acid catabolism and urea cycle. Biosynthesis of proteins. Genetic code
4. Lipid Metabolism: Fat storage, lipid transport and mobilization. Oxidation & biosynthesis of saturated and unsaturated fatty acids. Formation and utilization of ketone bodies.

UNIT-III

5. Enzymes: Review of chemistry of enzymes (classification and enzyme specificity). Factors affecting enzyme activity, Derivation of Michaelis - Menten, Lineweaver-Burk equation.

6. Enzyme inhibition & Regulatory enzymes: Competitive, non–competitive, uncompetitive, product and feed back inhibition.
   Regulatory enzymes: Covalent and allosteric. Involvement of enzymes in metabolic pathways

UNIT-IV

7. Nucleic acids : Structure of DNA and RNA (mRNA, tRNA , rRNA)
   Metabolism: Replication and transcription of nucleic acids

8. Biochemical mode of action of hormones of the thyroid, parathyroid, adrenal medulla, adrenal cortex and pancreas. Regulation of blood sugar level. Regulation of body water and salt level.

RECOMMENDED READINGS:

- Biochemistry, Albert L. Lehninger, 1st edition, Kalyani Publishers, New Delhi, 2005.
- Biochemistry, Satyanarayan, 1st edition, Book and Allied publishers, Kolkata, 2007.
- Introduction to Biochemistry, John W. Suttie, Holt Rinehart and Winston publishing Co., London, 1977.
- Practical Clinical Biochemistry, Harold Varley, 4th edition, Arnold Heinemann Publishing, New Delhi, 1978.
- Text book of Biochemistry, West and Todd, Oxford and IBH Publishing Co., Calcutta, 1974.
- Biochemistry, S.C. Rastogi, 1st edition, Tata MacGrawhill Publishing Co. , New Delhi, 2003.
- Outlines of Biochemistry, Conn and Stumpf, 5th edition, John Wiley and Sons, 2005.
- Biochemistry, Mathews, Van Holde, Ahern, 3rd edition, Pearson Education Singapore, 2005.
- Biochemistry of Nucleic Acids, JN Davidson, 1st edition, English Language Book Society, London, 1965.
- Biochemical, Physiological, Molecular Aspects of Human Nutrition, Martha H. Stipanuk, 2nd edition, Saunders Elsevier, USA, 2000

NUTRITIONAL BIOCHEMISTRY
(PRACTICAL)

Total Marks: 50
Paper: 40
Internal assessment: 10

Teaching periods: 2p/week
Duration of exam: 3 hours
Note:-
1. Practical will be of 4 hrs duration.
2. Practical paper will be set by the external examiner in advance.

Content:
1. Preparation of standards solutions, buffers and measurement of pH.
2. Tests for carbohydrates: Quantitative estimation of sugars in foodstuff.
3. Tests for proteins:
   (i) Quantitative estimation of amino acids by Ninhydrin Method.
   (ii) Estimation of proteins by Lowry method.
   (iii) Estimation of proteins by Biuret method
4. Tests for lipids:
   (i) Quantitative estimation of cholesterol
   (ii) Isolation and estimation of total lipids
   (iii) Quantitative estimation of Phospholipids.
5. Tests for Enzymes:
   (i) Isolation and estimation of activity of :
      (a) Amylase
      (b) Protease
      (c) Alkaline phosphatase
   (ii) Effect of temperature, pH and enzyme concentration on enzyme activity.

RECOMMENDED READINGS:

- Biochemistry, Albert L. Lehninger, 1st edition, Kalyani Publishers, New Delhi, 2005.
- Biochemistry, Satyanarayan, 1st edition, Book and Allied publishers, Kolkata, 2007.
- Introduction to Biochemistry, John W. Suttie, Holt Rinehart and Winston publishing Co., London, 1977.
- Practical Clinical Biochemistry, Harold Varley, 4th edition, Arnold Heinemann Publishing, New Delhi, 1978.
- Text book of Biochemistry, West and Todd, Oxford and IBH Publishing Co., Calcutta, 1974.
- Biochemistry, S.C. Rastogi, 1st edition, Tata MacGrawhill Publishing Co. , New Delhi, 2003.
- Outlines of Biochemistry, Conn and Stumpf, 5th edition, John Wiley and Sons, 2005.
- Biochemistry, Mathews, Van Holde, Ahern, 3rd edition, Pearson Education Singapore, 2005.
- Biochemistry of Nucleic Acids, JN Davidson, 1st edition, English Language Book Society, London, 1965.
- Biochemical, Physiological, Molecular Aspects of Human Nutrition, Martha H. Stipanuk, 2nd edition, Saunders Elsevier, USA, 2000

HUMAN NUTRITION
(THEORY)

Maximum Marks: 75
Paper: 65
Credit Hours: 3/week **Internal Assessment: 10**
Duration of Exam: 3 hours

Instructions to the paper setter:

Question paper will have four sections/units. Paper setter will set a total of nine questions comprising of two questions from each section and one compulsory question of short answer type covering the whole syllabus. Student will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

Objectives:
This course should enable the students to –

1. To enable the students to understand what happens to the ingested nutrients at the cellular level and the nutrient interactions
2. To present and discuss methods of determining nutrient requirements for humans and discuss the current figures of nutritional requirements
3. To enable them to translate the knowledge into practical guidelines for dietary needs of humans at different stages of life

UNIT - I

1. Energy needs – Assessment and requirements
   Current approach for estimating RDA for energy intake of different age, sex groups and physiological conditions
2. Metabolic regulation of food intake- weight management through life
   Clinical and biochemical manifestation of over and under nutrition
   Disorders of metabolism – metabolic syndrome/syndrome X and increased cardio metabolic risk.

UNIT - II

3. Dietary carbohydrates – functions of starch, resistant starch, dietary fiber and sugar
   Dietary fiber and its role in health and disease – obesity, satiety, hypertension, glucose tolerance, insulin response, diabetes, heart disease.
   Regulation of level of glucose in blood and hormonal control
4. Functions and human requirements of essential fatty acids
   Role of n3 and n6 fatty acids in health and disease
   Phytochemicals & Plant sterols in human nutrition
   Dietary factors and dyslipidemias- role of MUFA, trans fat, cholesterol, anti oxidants, stanols and sterols
   Lipoproteins-transport and metabolism

UNIT -III

5. Protein turnover, Methods of measuring protein turnover, "N" balance, obligatory loss
   Assessing protein and amino acid requirements – The current approach for various age, sex and physiological groups.
   Assessment of protein quality

Adaptation to fasting and starvation

6. Antioxidants in health and disease

- Effects of oxidants on macromolecules – carbohydrates, proteins lipids, nucleic acids.
- Nutrient anti-oxidants with potent health effects
- Non-nutritive food components with potential effects (Flavonoids – polyphenols and tannates, phytoestrogens, cyanogenic compounds).

UNIT- IV

7. Role of leptin and ghrelin in hunger and satiety and weight management
8. Nutrient-nutrient interrelationship and bioavailability.
   Causes and effect of deficiency
   Causes and effect of excess

RECOMMENDED READINGS:

- Shils ME, Olson JA, Shike M, Ross AC, Cabellaro B and Cousins RJ (2006). Modern Nutrition in Health and Disease (10th ed.). Lippincott, Williams and Wilkins publications.
- Zeigler EE and Filer Jr LJ (1996). Present Knowledge in Nutrition (7th ed.). ILSI Press, Washington DC
- Human energy requirement (2004). Report of a joint FAO/WHO/UNU Expert consultation, Rome, 17-24 October 2001. FAO, Food & Nutrition technical Report series1
- Protein and Amino Acid requirements in Human Nutrition (2007). Joint WHO/FAO/UNU Consultation Technical Report Series No. 035, WHO Geneva
- Indian Council of Medical Research. Nutrient requirements and Recommended Dietary Allowances for Indians. Report of Expert Group, 1978 and 1989 and 2009
- Human Vitamin and Mineral requirements (2002). Report of a Joint FAO/WHO expert consultations, Bangkok, Thailand, WHO & FAO UN, Rome.
- Mukherjee KL (1988). Medical Laboratory Techniques. A procedure manual for routine diagnostic tests (Vol. I, II & III). Tata McGraw Hill Publishing Company Ltd., New Delhi
- Sharma S (1993). Practical Biochemistry. Classic Publishing House, Jaipur
- Varley H (1988). Practical Clinical Biochemistry. Gulab Vazirani Publishers Pvt. Ltd. , New Delhi

PUBLIC HEALTH NUTRITION I
(THEORY)

Maximum Marks: 50
Paper: 45
Credit Hours: 2/week **Internal Assessment: 05**
Duration of Exam: 3 hours

Instructions to the paper setter:

Question paper will have four sections/units. Paper setter will set a total of nine questions comprising of two questions from each section and one compulsory question of short answer type covering the whole syllabus. Student will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

Objectives

1. To understand the concept of Public Health Nutrition and health care delivery system.
2. To understand the causes and consequences of nutritional problems in the community.
3. To orient the students with the strategies for improving the nutritional status of communities.
4. To understand the concept of food and nutrition security.
5. To learn about the various Government programmes aimed at improving health and nutritional status of the population.

UNIT- I

1. Public Health Nutrition
   - Aim, scope and content of Public health nutrition
   - Role of nutrition in national development

2. Health Care Systems
   - Health – definition, dimensions, determinants and indicators
   - Health care systems in the community

UNIT- II

3. Public Health Aspects of Under nutrition
   - Clinical syndromes of Malnutrition(Chronic Energy Deficiency/ PEM/ SAM)
   - Severe Acute malnutrition and mortality
4. Prevention and management of
   - Malnutrition
   - Anemia
   - Iodine Deficiency Disorders

UNIT -III

5. Approaches/ Strategies for Improving Nutrition and Health Status of the Community
   - Health based interventions including immunization, provision of safe drinking water/ sanitation

- Food based interventions including food fortification, dietary diversification, supplementary feeding and biotechnological approaches.

6. Diarrhea and Malnutrition
   - Diarrhea, morbidity, malnutrition and mortality
   - Prevention and management of Diarrhea

UNIT –IV

7. Nutrition, agriculture and food Security

   - Food and nutrition security: definitions, concept and components of food and nutrition
   - Food and nutrition situation and food security in India

8. Food and nutrition security and programmes

   - Food insecurity warning and mapping systems for nutritional vulnerability
   - Public Sector programmes for improving of food and nutrition security
   - Right to Food act
   - Public Distribution System

RECOMMENDED READINGS:

- 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.
- Gopalan, C. (Ed) (1987) Combating Under nutrition- Basic Issues and Practical Approaches, Nutrition Foundation of India.
- Kaufman M. (2007) Nutrition in promoting the public health strategies, principles and practices. Jones and Barlett Publishers.
- Park, K. (2009) Park's Textbook of Preventive and Social Medicine, 20thed. Jabalpur M/s. Banarsidas Bhanot.
- Sheila Chander Vir. (2011). Public Health Nutrition in Developing Countries. Part 1 and 2. Woodhead Publishing India Pvt. Ltd.

PUBLIC HEALTH NUTRITION I
(PRACTICAL)

Total Marks: 50
Paper: 40
Teaching periods: 2p/week **Internal assessment: 10**
Duration of exam: 3 hours

1. To plan and prepare low cost nutritious dishes / menus for vulnerable groups.

2. Development of low cost recipes for infants, preschoolers, elementary school children, adolescents, pregnant and lactating mothers

3. Planning and preparation of diet/ dishes for (PEM/SAM/CED, Anemia)

4. Field visits to ongoing national nutrition programmes

RECOMMENDED READINGS:

- 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.
- Gopalan, C. (Ed) (1987) Combating Under nutrition- Basic Issues and Practical Approaches, Nutrition Foundation of India.
- Kaufman M. (2007) Nutrition in promoting the public health strategies, principles and practices. Jones and Barlett Publishers.
- Park, K. (2009) Park's Textbook of Preventive and Social Medicine, 20thed. Jabalpur M/s. Banarsidas Bhanot.

HUMAN PHYSIOLOGY
(THEORY)

Maximum Marks: 75
Paper: 65
Credit Hours: 3/week **Internal Assessment: 10**
Duration of Exam: 3 hours

Instructions to the paper setter:

Question paper will have four sections/units. Paper setter will set a total of nine questions comprising of two questions from each section and one compulsory question of short answer type covering the whole syllabus. Student will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

Objectives:
1. To enable the students to understand the relevant issues and topics of human physiology.
2. To enable them to understand the integrated functions of all systems and the grounding of nutritional sciences in physiology.

UNIT-I

1. Blood :
- Composition of blood: Plasma, RBC, WBC, Platelets
- Erythropoisis
- Blood Coagulation and Blood Groups
- Cardiac cycle and cardiac output
- Blood pressure and factors affecting it.
- Hypertension.
- ECG

2. Immunology and Nutrition:
- Human Immunoglobulins
- Cell mediated and humoral immunity – impact of malnourishment.
- Innate immunity - Activation of WBC and production of Antibodies. T cells, B cells.
- Role of thymus.
- Acquired immunity related disease- AIDS, HIV
- Autoimmune disorders – Role of antibodies in pregnancy screening.
- Effects of Vitamins on immunity

UNIT-II

3. Respiratory system:
- Breathing mechanism
- Exchange and transport of gases and its regulation.
- Lung Volumes and capacities

4. Excretory System:
- Mechanism of urine formation
- The role of the kidneys in maintaining water and electrolyte balance.

UNIT-III

5. Digestive System:

- Functions and regulation of the salivary glands, stomach, pancreas, liver and the intestines.
- Mechanism of digestion and absorption of carbohydrates, proteins and fats.
- Role of enzymes in digestion of carbohydrates, proteins and fats.

6. Endocrine System:

- Definition, functions and kinds of hormones.
- Structure and functions of the following glands: Thyroid, parathyroid, adrenal, pancreas, pituitary and pineal gland

UNIT-IV

7. Reproductive System:

- Structure and function of male and female sex glands and organs.
- Ovarian and menstrual cycle.
- Role of hormones in reproduction: FSH, LH, Estrogen, Progesterone, Testosterone and Human Chorionic Gonadotropic hormone (HCG).
- Placenta.
- Physiology of pregnancy, parturition, lactation and menopause.

8. Nervous System and Senses:

- Basic properties of nerve and receptor organs
- Central Nervous System: Brain Spinal Cord
- Transmission of Nerve impulse
- Autonomic nervous system
- Physiology of vision, hearing, taste and smell.

RECOMMENDED READINGS:

- Jain, A K. (2012). *Textbook of Physiology* (5thed.). Avichal Publishing Company. Vol I and Vol II.
- Best and Taylor's. *Physiological Basis of Medical Practice*. The Williams and Wilkins Company.
- Chatterjee, C.C. (1997). *Human Physiology*. Vol I and Vol II. Medical Allied Agency.
- Ganong W.F. (2003)-*Review of Medical Physiology*.21st ed. McGraw Hill.
- Guyton A.C. and Hall J.E.(2000)*Textbook of Medical Physiology*.10th ed. India: Harcourt Asia.
- Tortora G.J and Grabowski S.R.(2000) *Principles of Anatomy and Physiology*.9th ed.John Wiley and Sons.Inc.
- Chaudhari S K(2000) *Concise Medical Physiology*.3rd Edition. Central .

  West J.B.(1996) *Physiological Basis of Medical Practice*.12th Edition. B. I. Waverly Pvt. Ltd.

Research Methodology and Statistics (Common to all streams)
Theory

Maximum Marks: 75
Paper - 65
Internal Assessment - 10

Credit Hours: 3/week
Duration of Exam: 3 hours

Instruction to the Examiners:

Questions paper will have four units. A total of nine questions comprising of two questions from each unit and one compulsory question of short answer type covering the whole syllabus will be set. All questions may carry equal marks unless specified. Students will be expected to attempt one question from each unit and the compulsory question

Objective:

1. To know the significance of statistics and research methodology in Home Science research.
2. Types, tools, and methods of research and develop the ability to construct data gathering instruments appropriate to the research design.
3. To know about the appropriate statistical technique for based on the specific research design.

UNIT- I

1. Research- meaning, purpose and approaches

- Exploration, Description, Explanation
- Research designs- Experimental and Observational

2. Statistics- Scope and Significance in Home Science discipline

- Descriptive and inferential statistics
- Functions and limitations of statistics

UNIT-II

3. The Research Process

- Defining the research problem, research questions, objectives, hypothesis
- Review of related literature
- Methodology and tools to be used
- Citation formats

4. **Sampling and Tools**

- Universe and sample
- Types of sampling

UNIT-III

5. Understanding various statistical measures

- Simple Arithmetic Mean (direct method)
- Median and Mode
- Standard deviation (assumed mean method)
- Variance

6. Conceptual understanding of Correlation and Regression (Theoretical introduction)

- Karl Pearson coefficient of correlation and its properties

- Regression equation and regression lines

UNIT-IV

7. **Inferential Statistics**
- Level of significance
- Standard error and Confidence limits

8. **Large sample and small sample tests**
- t-test; Significance of difference between means
- F- test
- Chi-square test of independence

References

1. Jain, T, R., Aggarwal, S, C., and Rana, R,K. (2008). Basic Statistics for Economists. V. K. Publications.
2. Gupta, K. R. (2012). Practical Statistics. Atlantic publications
3. Gupta, S. P. (2009). Statisitcal Methods. Sultan Chand and sons.
4. Meyer, S,L., Gamst, C, G., and Guarino, A, J. (2014). Performing data analysis using SPSS. Sage publications.
5. Field, A. (2015). Discovering Statistics using IBM SPSS Statistics. Sage publications.

Research Methodology and Statistics (Common to all streams)
Paper: Practical

Maximum Marks: 50
Paper - 40
Internal Assessment - 10

Credit Hours: 2 /week
Duration of Exam: 3 hours

Objectives:

1. To provide hands on experience to students about data entry and analysis in Excel and SPSS
2. To familirise the students with data handling in statistical software.

Contents

1. Basics of Excel- data entry, editing and saving, establishing and copying a formula.
2. Functions in excel, copy and paste and exporting to MS word document
3. Graphical presentation of data -Histogram, frequency polygon, Ogives, pie-charts and bar diagrams.
4. SPSS, opening SPSS, layout,menu and icons analyzing the data using different statistical techniques.

References

1. Jain, T, R., Aggarwal, S, C., and Rana, R,K. (2008). Basic Statistics for Economists. V. K. Publications.
2. Gupta, K. R. (2012). Practical Statistics. Atlantic publications
3. Gupta, S. P. (2009). Statisitcal Methods. Sultan Chand and sons.
4. Meyer, S, L., Gamst, C, G., and Guarino, A, J. (2014). Performing data analysis using SPSS. Sage publications.
5. Field, A. (2015). Discovering Statistics using IBM SPSS Statistics. Sage publications.

SEMESTER II

BIOCHEMICAL FOOD ANALYSIS AND INSTRUMENTATION (THEORY)

Maximum Marks: 50
Paper: 45
Internal assessment: 05

Credit Hours: 2/week
Duration of Exam: 3 hours

Instructions to the paper setter:

Question paper will have four sections/units. Examiner will set a total of nine questions comprising of two questions from each section and one compulsory question of short answer type covering the whole syllabus. Student will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

Objectives:
1. To augment the biochemistry knowledge acquired at the undergraduate level.
2. To understand the principles and use of instruments used for biochemical analysis of foods.

UNIT-I

1. Biochemical Techniques : Principles and applications of
   - Homogenization and methods of disrupting cells and tissues. Cell fractionation.
   - Spectroscopy- Beer- Lambert law, UV, Visible Spectrophotometry, Colorimetry

2. Biochemical Techniques : Principles and applications of
   - pH meter
   - Centrifugation (Preliminary introduction to various types of centrifuges)

UNIT-II

3. Biochemical Techniques: Principle and applications of:
   - Chromatography: Adsorption (Column and thin layer), Gel filtration, Affinity, Ion-Exchange
   - Electrophoresis: SDS PAGE and native electrophoresis, agarose electrophoresis, Protein separation & Characterization

4. Food analysis: Introduction, Titrable acidity, Moisture and ash, Principles of chemical and instrumental methods for the qualitative and quantitative analysis of moisture, minerals and vitamins.

UNIT-III

5. Carbohydrates: Qualitative and quantitative analysis of food carbohydrates, Dietary fibre, crude fiber

6. Proteins: Methods of estimation of amino acids and proteins, Chemical and biological evaluation of nutritional quality of proteins.

UNIT-IV

7. Fats: Physical and chemical characteristics of various fats and oils, Iodine value, saponification value, acid value, Reichert-Meissel value of important oils. Storage changes in fats and oils

8. Enzymes: Enzymes involved in food deterioration and preventive measures.
   Enzymes as aids in food processing operations and economical significance.
   Biotechnological applications of enzymes.

RECOMMENDED READINGS:

- Official Methods of Analysis. Association of Official Analytical Chemists, 15th ed. (1990).
- Official Methods and Recommended Practices, American Oil Chemists' Society, 4th ed.(1987)
- Food Analysis: Theory and Practice. Pomeranz and Meloan, 3rd. ed., (1994)
- Food Analysis: Principles and Techniques. Gruenwedel and Whitaker, Vol. 1 (1984), Vol 2, (1984)
- Food Analysis, 3rd edition," S.S. Nielsen, Ed., 2003. Kluwer Academic/Plenum Publishers., New York, NY
- Practical Clinical Biochemistry, Harold Varley, 4th edition, Arnold Heinemann Publishing, New Delhi, 1978.
- Text book of Biochemistry, West and Todd, Oxford and IBH Publishing Co., Calcutta, 1974.
- Outlines of Biochemistry, Conn and Stumpf, 5th edition, John Wiley and Sons, 2005.
- Biochemistry, Mathews, Van Holde, Ahern, 3rd edition, Pearson Education Singapore, 2005.
- Biochemical, Physiological, Molecular Aspects of Human Nutrition, Martha H. Stipanuk, 2nd edition, Saunders Elsevier, USA, 2000.

BIOCHEMICAL FOOD ANALYSIS AND INSTRUMENTATION (PRACTICAL)

Maximum Marks: 50
Paper: 40
Internal Assessment: 10

Credit Hours: 2/week
Duration of Exam: 3 hours
Note:
1. Practical will be of 4 hrs duration.
2. Practical paper will be set by the external examiner in advance.
3. Paper setter will also be an examiner.

1. Estimation of moisture content and titrable acidity of food products.

2. Tests for carbohydrates:
   (i) Estimation of soluble and insoluble ash content
   (ii) Estimation of dietary fibre

3. Tests for proteins:
   (i) Quantitative estimation of proteins by Kjeldhal's Biuret method Method
   (ii) Separation of amino acids by paper chromatography.
   (iii)Isolation and estimation of Casein from milk.
   (iv)Demonstration of protein separation by gel electrophoresis.

4. Tests for Fats:
   (i) Estimation of free fatty acids
   (ii) Determination of acid and iodine value
   (iii)Determination of RM value

5. Tests for Vitamins & Minerals:
   (i) Estimation of calcium, phosphorous and iron
   (ii) Estimation of vitamins B1, B2 and ascorbic acid

6. Isolation and estimation of phytic acid.

7. Isolation and estimation of trypsin inhibitors activity.

RECOMMENDED READINGS:

- Official Methods of Analysis. Association of Official Analytical Chemists, 15th ed. (1990).
- Official Methods and Recommended Practices, American Oil Chemists' Society, 4th ed.(1987)
- Food Analysis: Theory and Practice. Pomeranz and Meloan, 3rd. ed., (1994)
- Food Analysis: Principles and Techniques. Gruenwedel and Whitaker, Vol. 1 (1984), Vol 2, (1984)
- Food Analysis, 3rd edition," S.S. Nielsen, Ed., 2003. Kluwer Academic/Plenum Publishers., New York, NY
- Practical Clinical Biochemistry, Harold Varley, 4th edition, Arnold Heinemann Publishing, New Delhi, 1978.

- Text book of Biochemistry, West and Todd, Oxford and IBH Publishing Co., Calcutta, 1974.
- Outlines of Biochemistry, Conn and Stumpf, 5th edition, John Wiley and Sons, 2005.
- Biochemistry, Mathews, Van Holde, Ahern, 3rd edition, Pearson Education Singapore, 2005.
- Biochemical, Physiological, Molecular Aspects of Human Nutrition, Martha H. Stipanuk, 2nd edition, Saunders Elsevier, USA, 2000.

CLINICAL AND THERAPEUTIC NUTRITION I (THEORY)

Maximum Marks: 75
Paper: 65
Credit Hours: 3/week **Internal Assessment: 10**
Duration of Exam: 3 hours

Instructions to the paper setter:

Question paper will have four sections/units. Paper setter will set a total of nine questions comprising of two questions from each section and one compulsory question of short answer type covering the whole syllabus. Student will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

Objectives:

1. The course is aimed at giving advanced knowledge in the field of clinical nutrition and dietetics
2. The course will enable the students to gain current knowledge about classification, pathogenesis, diagnosis, aetiology, symptoms and dietetic management of various diseases

UNIT – I

1. Diet prescription and nutritional care process – Essential components of diet prescription and steps involved in nutrition care process
2. Nutrition in hospitalized patients – Causes of malnutrition in hospitalized patients, identification of high risk patients, assessment of nutritional status
3. Diet counseling: Definition, responsibilities of a counselor and tips for successful counseling, components of counseling process, formulation of a proforma for diet counseling.

UNIT- II

4. Aetiopathogenesis, clinical picture, diagnostic tests, treatment, preventive aspects.
   - Peptic ulcer
   - Ulcerative colitis
5. Aetiopathogenesis, clinical picture, diagnostic tests, treatment, preventive aspects.
   - Diarrhoea, dysenteries
   - Malabsorption syndrome
   - IBS

UNIT -III

6. Classification, etiology, clinical features, diagnostic tests, prevention and treatment. Liver disorders:
   - Viral hepatitis types A and B
   - Cirrhosis of liver
   - Hepatic coma

7. Classification, etiology, clinical features, diagnostic tests, prevention and treatment. Renal diseases:
   - Glomerulonephritis
   - Nephrotic syndrome
   - Acute and chronic renal failure – Dialysis

UNIT - IV

8. Nutrition care in immune deficiency diseases: HIV aids
9. Nutrition Care during Cancers

RECOMMENDED READINGS:

- Association of Physicians of India (1998). API Textbook of Medicine, Vol. I and II. Published by Association of Physicians of India.
- Shills ME, Olson JA and Shike N (1994). Modern Nutrition in Health and Disease (8th ed.), Vol. I and II. Lea and Fiebiger, Philadelphia
- American Dietetic Association – Handbook of Clinical Dietetics (1981). Yale University Press, New Haven and London
- Robinson CH, Laer MR, Chenoweth WL and Garovich AE (1998). Normal and Therapeutic Nutrition (17th ed.). Macmillan Publishing Company, New York
- Mahan KL and Stump SE (2007). Krause's Food and Nutrition Therapy (12th ed.). Saunders Publishing

CLINICAL AND THERAPEUTIC NUTRITION I
(PRACTICAL)

Total Marks: 50
Paper: 40
Teaching periods: 2p/week **Internal assessment: 10**
Duration of exam: 3 hours

1. Planning and preparation of diets as per theory
2. Visit to a dietetics department of a hospital and report presentation
3. Market Survey for
    - Nutrition/Dietary Supplements
    - Infant formulas/ foods/ mixes
    - Prebiotic and Probiotic commercial products
    - Therapeutic food products.

RECOMMENDED READINGS:

- Association of Physicians of India (1998). API Textbook of Medicine, Vol. I and II. Published by Association of Physicians of India.
- Shills ME, Olson JA and Shike N (1994). Modern Nutrition in Health and Disease (8th ed.), Vol. I and II. Lea and Fiebiger, Philadelphia
- American Dietetic Association – Handbook of Clinical Dietetics (1981). Yale University Press, New Haven and London
- Robinson CH, Laer MR, Chenoweth WL and Garovich AE (1998). Normal and Therapeutic Nutrition (17th ed.). Macmillan Publishing Company, New York
- Mahan KL and Stump SE (2007). Krause s Food and Nutrition Therapy (12th ed.). Saunders Publishing

PUBLIC HEALTH NUTRITION II
(THEORY)

Maximum Marks: 50
Paper: 45
Credit Hours: 2/week **Internal Assessment: 05**
Duration of Exam: 3 hours

Instructions to the paper setter:

Question paper will have four sections/units. Paper setter will set a total of nine questions comprising of two questions from each section and one compulsory question of short answer type covering the whole syllabus. Student will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

Objectives:

1. To understand the process of planning, monitoring and evaluation of public health nutrition programmes.
2. To give an understanding about IEC and to develop skills in preparation of communication aids for the community.
3. To be familiar with the ongoing national nutrition programmes.

UNIT- I

1. Programmes planning and management in Public Health Nutrition

- Planning: Definition, principles, process and planning cycle
- Management methods and techniques
- Evaluation: Definition, significance, purpose, types and steps of evaluation.

2. National Nutrition Programmes: Objectives and operations of

- ICDS
- Mid Day meal
- School health program

UNIT- II

3. Nutrition Education Communication (NEC)
   - Importance and need for NEC
   - Process of NEC
   - NEC for Behavior change: Need for NEC for behavior change, Behavior and determinants of behavior.

4. Media/Methods of NEC, characteristics and their use.
   - Relevance of Information Education Communication (IEC) to Programs

UNIT –III

5. Approaches for Control of under nutrition in India
National Programmes and guidelines for controlling under nutrition in India with emphasis on

- IYCF
- NRHM
- RCH
- IMNCI

6. Rolling of new WHO standards in India, its importance and implications

- National Nutrition Policy

UNIT- IV

7. Population Dynamics

- Demographic Transition
- Population Structure: Implications on quality of life
- Population Policy

8. Millanium Development Goals (MDGs)

- Millennium Development Goals and its relationship with nutrition
- New Emerging public health Problems of NCDs

RECOMMENDED READINGS:

- Edelstein S. (2006) Nutrition in Public Health. A handbook for developing programmes and services. Second Edition. Jones and Bartlett Publishers.
- Goyet, Fish. V. Seaman, J. and Geijer, U. (1978) The Management of Nutritional Emergencies in Large Populations, World Health Organization, Geneva.
- FAO. (1983) Selecting Interventions for Nutrition Improvement. A Manual Nutrition in Agriculture. No. 3.
- Gibney M.J., Margetts, B.M., Kearney, J. M. Arab, I., (Eds) (2004) *Public Health Nutrition,* NS Blackwell Publishing.
- Klein, R. E. (Ed) (1979) Evaluating the Impact of Nutrition and Health Programmes. London and New York: Plenum Press.
- Owen. A. Y. and Frankle, R. T. (1986) Nutrition in the Community. The Art of Delivering Services, 2nd ed. Times Mirror/ Mosby.
- WFP/ UNHCR (1998) WEP/ UNHCR Guidelines for Selective Feeding Programmes in Emergency Situations. Rome and Geneva: WEP & UNHCR.
- Sheila Chander Vir. (2011). Public Health Nutrition in Developing Countries. Part 1 and 2. Woodhead Publishing India Pvt. Ltd

PUBLIC HEALTH NUTRITION II
(PRACTICAL)

Total Marks: 50
Paper: 40
Teaching periods: 2p/week **Internal assessment: 10**
Duration of exam: 3 hours

1. Development of nutritious food supplements/ dishes for various vulnerable segments of population

2. Assessment of the type of nutritional problems and their determinants in different population groups through analysis of secondary data (such as NSSO, NFHS data)

3. Field visits to ongoing public health nutrition programmes.

4. Assessment of their needs and study the public health nutrition problems in an identified community.

RECOMMENDED READINGS:

- Edelstein S. (2006) Nutrition in Public Health. A handbook for developing programmes and services. Second Edition. Jones and Bartlett Publishers.
- Goyet, Fish. V. Seaman, J. and Geijer, U. (1978) The Management of Nutritional Emergencies in Large Populations, World Health Organization, Geneva.
- FAO. (1983) Selecting Interventions for Nutrition Improvement. A Manual Nutrition in Agriculture. No. 3.
- Gibney M.J., Margetts, B.M., Kearney, J. M. Arab, I., (Eds) (2004) *Public Health Nutrition,* NS Blackwell Publishing.
- Klein, R. E. (Ed) (1979) Evaluating the Impact of Nutrition and Health Programmes. London and New York: Plenum Press.

ADVANCES IN NUTRITION
(THEORY)

Maximum Marks: 75
Paper: 65
Credit Hours: 3/week **Internal Assessment: 10**
Duration of Exam: 3 hours

Instructions to the paper setter:

Question paper will have four sections/units. Examiner will set a total of nine questions comprising of two questions from each section and one compulsory question of short answer type covering the whole syllabus. Student will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

Objectives:
This course should enable the students to –

1. To enable the students to understand the merging concepts of nutrition and recent trends in the field of nutrition.
2. To understand the role and interaction of nutrition and other allied disciplines in health management.
3. To keep the students updated with recent innovations and procedures in the food industry.

UNIT – I

1. Nutrition Transition – Indian scenario
2. Advances in food agriculture and technology
3. Changing trends in life style patterns in different population groups.

UNIT -II

4. Introduction to Pharmacology
    - Pharmacokinetics
    - Pharmacodynamics
    - Pharmacogenomics
5. Effects of food on drug therapy :
    - Enteral nutrition interactions with medication
    - Drug distribution
    - Drug absorption
    - Drug metabolism and drug excretion.

UNIT -III

6. Advances in nutrition
   - Nutraceuticals
   - Active compound in Functional foods and Antioxidants (Beta Carotene, Lutein, Lycopene, Fiber, Omega 3, Anthocyanin, Flavanoids, Selenium, Isoflavones, Lignans, Vitamin A, Vitamin C, Vitamin E, Biotin, Plant sterols)
   - Prebiotic, Probiotic and Synbiotic
7. Molecular aspects of nutrition
   - Nutrigenomics
   - Nutrigenetics

UNIT -IV

8. Understanding food safety measures in the food industry:
   - FSSAI
   - HACCP
   - TQM
   - GMP
9. Latest trends in nutritional labeling
   - Additives
   - Colors
   - Preservatives
   - Allergen Information
   - Sugar derivatives
   - Trans fats

RECOMMENDED READINGS:

- Gopalan C and Kaur S (1993). Towards better nutrition - Problems and Policies. Special Publication Series No. 9. Nutrition Foundation of India, New Delhi, India
- Park K (2007). Park s textbook of preventive and social medicine (19th ed.). M/s Banarsidas Bhanot Publishers, Jabalpur
- Pomeranz Y (1991). Functional properties of food components (2nd ed.). Academic Press, New York.
- Wildman Robert EC (2001). Handbook of Nutraceuticals and Functional foods (1st ed.). CRC series
- Mitchell Bebel Stargrove, Jonathan Treasure & Dwight L. Mckee, Chuchill Livingstone (2003). Herb, Nutrient and Drug Interactions –Clinical Implications and Therapeutic Strategies
- Mahan LK and Stump SE (2007). Krause's Food, Nutrition and Diet Therapy (Hardcover), Saunders publication

COMPUTER APPLICATIONS IN FOODS
(PRACTICAL)

Maximum Marks: 50
Paper: 45
Internal Assessment: 05

Credit Hours: 2/week
Duration of Exam: 2 hours

Objectives:

This course should enable the students to-

1. To enable the students to learn to use the selective software for qualitative and quantitative data analysis.
2. To understand the concept of date entry into excel format for statistical analysis.
3. To study about the various dietary software available.

Content:

1. Basic operation of MS office-MS Word/MS Excel/MS PowerPoint
2. Use of word processing software for creating reports
3. Data entry in excel sheet format for data analysis and statistical tools application (t-test, Chi square, Correlation, Anova)
4. Use of Nutritional software diet cal and nutrical for calculation of nutritive value of diets/foods.

RECOMMENDED READINGS;

1. Computer Applications in Food Technology: Use of spreadsheets in Graphical, Statistical and Process Analysis by R. Paul Singh, AP.
2. Manual of MS office.
3 Diet cal software- A Tool for Dietary Assessment and Planning, Dr. Gurdeep, AIIMS, New Delhi.

NUTRITIONAL ANTHROPOLOGY
(THEORY)

Maximum Marks: 50
Paper: 45
Internal Assessment: 05

Credit Hours: 2/week
Duration of Exam: 2 hours

Instructions to the paper setter:

Question paper will have four sections/units. Paper setter will set a total of nine questions comprising of two questions from each section and one compulsory question of short answer type covering the whole syllabus. Student will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

Objectives:

1. To strengthen students knowledge and skills in understanding and applying Nutrition Anthropology for nutritional status improvements.
2. To train students to apply the concepts and practices of nutritional anthropology to the design, implementation and monitoring – evaluation of nutrition projects and interventions.
3. To enable students understand the linkages between applied research in nutrition anthropology and program improvements.

UNIT - I

1. Research tools in anthropology for formulation of research and programme design
   - Focus Group Discussion
   - Various Types of interviews.
   - Observation methods

2. Research tools in anthropology for formulation of research and programme design
   - Participatory Research methods.
   - Triangulation of methods.
   - Steps for ensuring effective planning and use of these methods.
   - Examples of recent studies relevant to above topics

UNIT -II

3. Introduction to Anthropology and Its Relevance to Nutrition
   Definition and Application of the Discipline of Anthropology as applied to:
   - Health and Disease
   - Nutrition and Nutritional status
   - Direct and Indirect parameters of nutritional/health assessment used in community surveys
   - Emic vs Etic Perspective.

4. Factors Affecting Food choices and household level practices
- Ecological and Geographical
- Poverty, economic status
- Socio cultural; education, ethnic and religious factors.
- Sensory Qualities of Foods and culture
- Gender Discrimination
- Intra Household Distribution of Food

UNIT- III

5. Cultural Interpretation of Malnutrition and Rural Urban differences

   Community beliefs about cause prevention and treatment of under nutrition and micro nutrient deficiencies (PEM,IDA, VAD, IDD) in children and women in developed and developing countries.

   Ethno-physiology: cultural perceptions of body physiology in different stages of the life cycle (child, adolescent, adult) and its impact on home level nutrition and health care.

6. Comparing rural vs urban differences as regards :
- Time and activity patterns; workload of men and women and its impact on food intake and nutritional status (especially vulnerable groups)
- Health care seeking behaviors – treatment of illness.
- Complementary feeding and breast feeding practices; family support.

UNIT- IV

7. Application of Operations Research (Qualitative: Participatory) to Strengthen Interventions for Nutritional improvements

   Experiences in use of qualitative and participatory research approaches in India and other countries for:
   - Interdisciplinary understanding of nutrition-health issues
   - Rapid Rural Appraisals and Program Design

8. Experiences in use of qualitative and participatory research approaches in India and other countries for:
   - Urban malnutrition control in urban health systems
   - Women's reproductive health and related problems like anemia

RECOMMENDED READING:

1. Pelto GH, Pelto RJ and Masser E (1989). Research Methods in Nutritional Anthropology, Tokyo, Japan: The United Nations University
2. MotherCare (1990). Behavioural Determinants of Maternal Health Care Choices in Developing Countries, Mother Care, USA.
3. Koblinsky M (1993). The Health of Women : A Global Perspective. (1993) NCIH,

Washington, DC, USA.

4. Lawrence, M. (2008).Public Health Nutrition Lal S. (2009). Textbook of Community Medicine. CBS Publication
5. “Listening to Women Talk about their Health- Issues and Evidence from India” by Joel Gittelsohn, et.al., Har-anand Publications, The Ford Foundation, 1994.
6. Korrie de Koning & Marion Martin . (1996).“Participatory Research in Health: Issues and Experiences” Zed Book.
7. Joel Gittelsohn et al . (1998). Rapid Assessment Procedures (RAP): Ethnographic Methods to Investigate Women s Health. International Nutrition Foundation.
8. Nevin S.Scrimshaw and Gary R. Gleason. (1992). “RAP: Rapid Assessment Procedures – Qualitative Methodologies for Planning and Evaluation of Health Related Programs” by, International Nutrition Foundation for Developing Countries, USA.
9. Richard Heaver. (1991). Participative Rural Appraisal: Potential Applications to Family Planning, Health and Nutrition Programs. Asia Technical Department, Departmental Papers Series, No.3.
10. Michel Dibble and Vpul Senaratu (2010) Special section on IYCF practices in 4 Countries in South Asia: S Asia

SEMESTER III

CODE	SUBJECT	CREDIT HOURS			THEORY MARKS			PRACTICAL MARKS			
		T	P	TOTAL	PAPER	INT.	TOTAL	PAPER	INT.	TOTAL	TOTAL
1	Food Microbiology and Quality Control	4	2	6	90	10	100	40	10	50	150
2	Clinical and Therapeutic Nutrition II	3	2	5	65	10	75	40	10	50	125
3	Food Service Management	2	2	4	45	05	50	-	50	50#	100
4	Nutritional Management in Sports and Fitness	2	2	4	45	05	50	40	10	50	100
5	Seminar	-	1	1	-	-	-	-	25	25	25^
6	Dissertation	-	2	2	-	-	-	-	50	50	50**
	TOTAL	**11**	**11**	**22**							**550**

* No university examination. Continuous evaluation done internally throughout the semester. ^Marks will be awarded internally for presentation on related topics

**Marks will be awarded by the supervisor internally on the basis of data collection /continuous evaluation.

SEMESTER IV

CODE	SUBJECT	CREDIT HOURS			THEORY MARKS			PRACTICAL MARKS			
		T	P	TOTAL	PAPER	INT.	TOTAL	PAPER	INT.	TOTAL	TOTAL
1	Principles of Food Science	3	2	5	65	10	75	40	10	50	125
2	Entrepreneurial Ventures in Food Industry	2	2	4	45	05	50	40	10	50	100
3	Alternative Medicines and Nutrition	2	-	2	45	05	50	-	-	-	50
4	Dissertation	-	4	4	-	-	-	-	100	100	100
	TOTAL	**7**	**8**	**15**							**375**

Students are required to undergo 6 weeks internship in the Dietetics Department of a hospital. The certificate of completion of internship in mandatory for obtaining the degree.

FOOD MICROBIOLOGY AND QUALITY CONTROL

(THEORY)

Maximum Marks: 100

Paper: 90

Credit Hours: 4/week **Internal Assessment: 10**

Duration of Exam: 3 hours

Instructions to the paper setter:

Question paper will have four sections/units. Paper setter will set a total of nine questions comprising of two questions from each section and one compulsory question of short answer type covering the whole syllabus. Student will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

Objectives

This course should enable the students to –

** To understand the nature of microorganisms involved in food spoilage, food infections and intoxications and also those used in food biotechnology (food fermentation and various food processing industries)

** To gain knowledge of principles of various techniques used in the prevention and control of the microorganisms in foods(food preservation)

** To understand criteria for microbiological safety in various foods operations to avoid public health hazards due to food contamination

UNIT I

1. History of development of food microbiology

- Bacteria, Yeast and Moulds: general features and their importance in food microbiology
- Role and significance of microorganisms in foods

2. Factors affecting physiological growth of microorganisms

- Temperature
- pH
- Water activity
- Availability of oxygen

UNIT II

3. **Food spoilage: Microorganisms involved in spoilages of various foods**
   - Milk and Bread
   - Canned food
   - Vegetables and fruits
   - Meat, Eggs and Fish

4. **Physical and chemical means used in destruction of microbes**
   - Sterilization
   - Disinfection
   - Filtration
   - Radiation
   - Use of High Temperature
   - Use of Chemical Agents-Alcohol, Halogens And Detergents

UNIT III

5. **Importance of microbes in food biotechnology**
   - Genetically engineered organisms
   - Prebiotic, Probiotics and single cell proteins

6. **Application of food microbiology**
   - Microorganisms in food fermentation
   - Traditional Fermented foods and their health benefit

UNIT IV

7. **Food borne illnesses: food infection and food poisoning**
   - Symptoms
   - Mode of transmission and methods of prevention.(Salmonella typhi, Helicobacter pylori,Campylobacter jejuni, Yersinia enterocolitica Bacillus cereus, Staphylococcus aureus, Clostridium botulinum, Escherichia coli, Mycotoxins)

8. **Assessing the microbiological quality of food**
   - Principles of Quality Control
   - Management systems in Food Quality Control (HACCP, TQM, GMP and Food audit, food vending and packaging standards)
   - Safety management at household and industrial level.

RECOMMENDED READINGS

- Banwart GJ.(1987) Basic Food Microbiology . CBS Publishers and Distributors. Frazier WC, Westoff DC.(1998)Food Microbiology. 4th ed. Tata McGrawHill Publishing Co. Ltd.

- Garbutt John (1997) Essentials of Food Microbiology. Arnold London. Jay JM, Loessner DA, Martin J.(2005) Modern Food Microbiology. 7th ed. Springer

- Pelczar MJ, Chan ECS, Krieg N. (1993) Microbiology. 5th ed. Tata McGraw-Hill Publishing Co. Ltd.

- Prescott LM, Harley JP, Klein DA.(2008) Microbiology. 6th ed. WMC Brown Publishers.

- Topley and Wilson's (1983) Principles of Bacteriology, Virology and Immunity, Edited by S.G. Wilson, A. Miles and M.T. Parkar, Vol. I: General Microbiology and Immunity, II: Systematic Bacteriology. 7th Edition. Edward Arnold Publisher.

FOOD MICROBIOLOGY AND QUALITY CONTROL (PRACTICAL)

Total Marks: 50
Paper: 40
Internal assessment: 10

Teaching periods: 2p/week

Duration of exam: 3 hours

1. To study morphology and structural features of various bacteria and fungi commonly associated with Foods.
2. Isolation of microorganisms by Pure Culture Technique and Microbial count by Standard Plate Count Method.
3. Microbiological analysis of Water, Milk, Canned product, Fruit juices and Street foods.
4. Use of Biochemical tests for identifying bacteria.

RECOMMENDED READINGS

- Bell C, Neaves P, Williams AP.(2006) Food Microbiology and Lab Practice.
- Yousef AL (2003). Food Microbiology. A Laboratory Manual. Wiley Interscience New Jersey.
- Cappuccino JG, Sharman N(2002). Lab Manual of Microbiology. Pearson Education Publishing Co.
- Benson HJ (1990). Microbiological Application.5th ed. WMC Brown Dubugue

CLINICAL AND THERAPEUTIC NUTRITION II
(THEORY)

Maximum Marks: 75
Paper: 65
Credit Hours: 3/week **Internal Assessment: 10**

Duration of Exam: 3 hours

Instructions to the paper setter:

Question paper will have four sections/units. Paper setter will set a total of nine questions comprising of two questions from each section and one compulsory question of short answer type covering the whole syllabus. Student will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

Objectives:
This course should enable the students to –

1. The course is aimed at giving advanced knowledge in the field of clinical nutrition and dietetics
2. The course will enable the students to gain current knowledge about classification, pathogenesis, diagnosis, etiology, symptoms and dietetic management of various diseases
3. The course will also enable the students to get acquainted with the recent researches and trends in clinical nutrition.

UNIT – I

1. **Nutritional support- Principles and Importance**

2. **Types of feeding**

   - Tube feeding
   - Intravenous feeding

3. **Recent advances in techniques and feeding substrates**

UNIT- II

4. **Aetiopathogenesis, clinical picture, diagnostic tests, treatment, preventive aspects, lifestyle and dietary management**

   - Cardio Vascular Disease and Atherosclerosis
   - Ischemic Heart Disease
   - Hyperlipidemia
   - Hypertension

5. Concept of

- Nutritional significance of fatty acids – SFA, MUFA, PFA
- Role of n-3 and n-6 fatty acids; Trans fatty acids
- Role and mechanism of action of Dietary Fibre in CVD
- Electrolyte imbalance w.r.t Sodium, Potassium

UNIT -III

6. Aetiopathogenesis, clinical picture, diagnostic tests, treatment, preventive aspects, lifestyle and dietary management

- Gout
- Arthritis
- Osteoporosis

7. Etiology, clinical features and dietary management

- Burns
- Surgery
- Stress and trauma

UNIT - IV

8. Classification, etiology, clinical features, diagnostic tests, prevention and treatment, lifestyle and dietary management

- Diabetes Mellitus

9. Concept of

- Glycemic Index, Glycemic Load
- Nutritional significance of Dietary Fiber – Types, sources, role and mechanism of action

10. Nutritional management during special conditions

- Space travel, High altitudes
- Inborn errors of metabolism – Phenylketonuria, Galactosemia

RECOMMENDED READINGS

- Dave, Nilambari (2004). Nutrition and Diet Therapy, 1st Edition, Dr. Nilambari Dave, Head, Dept. of Home Science, Saurashtra University, Rajkot.
- Mahan, L.K. and Escott-stump S. (2000): Krause's food nutrition and diet therapy, 10th Edition, W.B. Saunders Ltd.,
- Shills, M.E. Olson, J.A. Shilke, M. and Ross. A.C. (1999). Modern in Health and Disease, 9th Edition, Williams and Wilkins.
- Escott-Stump, S. (1998) : Nutrition and Diagnosis Related Care, 4th Edition, Williams and Wilkins.
- Garrow, J.S. James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietitics, 10th Edition, Churchill Livingstone.
- Williams, S.R. (1993): Nutrition and Diet Therapy, 7th Edition. Times Mirror / Mosby College Publishing.
- Davis. J. and Sherer. K. (1994): Approval nutrient in pediatrics, Boston, little, Brown & Co.,
- Walker, W.A. and Watkins, J.B. (Ed.) (1985): Nutrition in Pediatrics, Boston, little, Brown & Co.,
- Guyton, A.C. and Hall, J.E. (1999): Textbook of Medical Physiology, 9th Edition, W.B.
- Ritchie, A.C. (1990): Boyd's textbook of Pathology, 9th Edition, Lea and Febiger, Philadelphia.
- Fauci, S.A. et al. (1998): Harrison's Principles of Internal Medicine, 14th Edition, McGraw Hill. 32
- World Cancer Research Fund (1997): Food, Nutrition and the Prevention of Cancer. A Global perspective Washington, E.D. WCRF.

JOURNAL AND OTHER REFERENCES SERIES

- Nutrition Update Series
- World review of nutrition and dietetics.
- Journal of the American Dietetic Association
- American Journal of Clinical Nutrition
- European journal of Clinical Nutrition

CLINICAL AND THERAPEUTIC NUTRITION II (PRACTICAL)

Total Marks: 50

Paper: 40

Teaching periods: 2p/week **Internal assessment: 10**

Duration of exam: 3 hours

1. Market survey of commercial nutritional supplements and nutritional support substrates.
2. Interpretation of patient data and diagnostic tests and drawing up of patient diet prescription, using a case study approach.
3. Preparation of diet counseling aids for common disorders.
4. Planning and preparation of diets for patients with common multiple disorders and complications and discharge diet plans.

NOTE: Students are required to undergo 6 weeks internship in the Dietetics Department of a hospital. The certificate of completion of internship in mandatory for obtaining the degree.

RECOMMENDED READINGS

- Dave, Nilambari (2004). Nutrition and Diet Therapy, 1st Edition, Dr. Nilambari Dave, Head, Dept. of Home Science, Saurashtra University, Rajkot.
- Mahan, L.K. and Escott-stump S. (2000): Krause's food nutrition and diet therapy, 10th Edition, W.B. Saunders Ltd.,
- Shills, M.E. Olson, J.A. Shilke, M. and Ross. A.C. (1999). Modern in Health and Disease, 9th Edition, Williams and Wilkins.
- Escott-Stump, S. (1998) : Nutrition and Diagnosis Related Care, 4th Edition, Williams and Wilkins.
- Garrow, J.S. James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietitics, 10th Edition, Churchill Livingstone.
- Williams, S.R. (1993): Nutrition and Diet Therapy, 7th Edition. Times Mirror / Mosby College Publishing.
- Davis. J. and Sherer. K. (1994): Approval nutrient in pediatrics, Boston, little, Brown & Co.,
- Walker, W.A. and Watkins, J.B. (Ed.) (1985): Nutrition in Pediatrics, Boston, little, Brown & Co.,
- Guyton, A.C. and Hall, J.E. (1999): Textbook of Medical Physiology, 9th Edition, W.B.
- Ritchie, A.C. (1990): Boyd's textbook of Pathology, 9th Edition, Lea and Febiger, Philadelphia.
- Fauci, S.A. et al. (1998): Harrison's Principles of Internal Medicine, 14th Edition, McGraw Hill. 32
- World Cancer Research Fund (1997): Food, Nutrition and the Prevention of Cancer. A Global perspective Washington, E.D. WCRF.

FOOD SERVICE MANAGEMENT

(THEORY)

Credit Hours – 2/Week **Maximum Marks – 50**

Paper - 45

Duration of Exam -03 hrs

Internal Assessment – 05

Instruction to the Paper Setter:

Question Paper will have four sections. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

Objectives

1. To understand the different kinds of food service units and system.
2. To provide practical level experience in managing food service units.
3. To import necessary expertise to run a food service unit.
4. To critically evaluate the functioning of food service units.

UNIT – I

1. **Concept and Evolution of the food service industry. Kinds of food service system**
   - Conventional
   - Commissary
   - Ready Prepared
   - Assembly serve

2. **Types of Food Service**
   - Silver Service
   - Pre-plated service
   - Cafeteria Service
   - Buffet Service

Preparation for service

- Organizing Mise-en-scene
- Organising Mise-en-place

UNIT – II

3. **Food Service Organization and Management**
   - Types of organizations, division of labor, organization chart
   - Tools of organization
   - Principles and functions of management(Planning, Organizing, Directing, Coordinating. Evaluating, Controlling)Management by objectives(MBO)

4. **Quantity Food Production: Production planning and control**
   - Importance of planning
   - Procedures involved in development of recipes
   - Standardization and Portion Control

UNIT – III

5. **Human Resource Management**
   - Manpower planning: Function of a Personnel Manager
   - Manpower placement: Selection and Recruitment Process

6. **Training**
   - Importance
   - Principles
   - On the Job Training
   - Performance Appraisal: Importance, Methods, Limitations

UNIT – IV

7. **Financial Management**
   - Food Cost, Labor Cost, Overhead Cost
   - Budgets
   - Records
   - Cost Control Techniques

8 **Food Cost Analysis**
   - Basic concepts in Accountancy: Cash Memo, Receipt, Pay in slip, Cheques vouchers
   - Books of Account: Journal, Sales Return Book, Sales Book, Purchase Book, Cash Book, Ledger

RECOMMENDED READINGS

- West & Bessie & Wood Levelle (1998) Food Service in Institution 6th Edition Revised By Harger FV, Shuggart SG & Palgne Palacie, Macmillan Publishing Company New York.
- West Wood A: Harper Food Service in Institution.
- Oliver B, Watson; School Lunch Room Service
- Sethi Mohini (2005) Institutional Food Management, New Age International Publisher.
- Tripathi PC (2000) Personnel Managmenet 15th edition Sultan Chand, New Delhi.
- West, Bessin, Broods; Food Service in Institution.
- A.M. Home Economics Association; Hand Book of Food Preparations.

FOOD SERVICE MANAGEMENT

(PRACTICAL)

Credit Hours – 2/Week **Maximum Marks – 50**

(Only Internal)

NOTE: 1. The marks will be awarded at the end of the semester.
2. The marks will be awarded by the Internal Examiner only.

1. Standardization of selected quality recipes in relation to nutritive value, cost, time, equipment
2. Project Report on visits to different food service institution / hospitals / hotels.
3. Practical training in management and running of a food service institution like canteen /Cafeteria etc.
4. Preparation, participation and practical training in institutional activities.

RECOMMENDED READINGS:

- West & Bessie & Wood Levelle (1998) Food Service in Institution 6th Edition Revised By Harger FV, Shuggart SG & Palgne Palacie, Macmillan Publishing Company New York.
- West Wood A: Harper Food Service in Institution.
- Oliver B, Watson; School Lunch Room Service
- Sethi Mohini (2005) Institutional Food Management, New Age International Publisher.
- Tripathi PC (2000) Personnel Managmenet 15th edition Sultan Chand, New Delhi.
- West, Bessin, Broods; Food Service in Institution.
- A.M. Home Economics Association; Hand Book of Food Preparations.

NUTRITIONAL MANAGEMENT IN SPORTS AND FITNESS

(THEORY)

Maximum Marks: 50
Paper: 45

Credit Hours: 2/week **Internal Assessment: 05**
Duration of Exam: 3hours

Instructions to the paper setter:

Question paper will have four sections/units. Paper setter will set a total of nine questions comprising of two questions from each section and one compulsory question of short answer type covering the whole syllabus. Student will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

Objectives :

To enable the students to-

1. Understand the components of health and fitness and the role of nutrition in these.
2. To develop knowledge on sports specific nutrition and their guidelines.
3. To help students understand the role of ergogenic aids- their dose, safety and efficacy to enhance sports performance.

UNIT I

1. Introduction to sports nutrition

- Classification of sports activities
- Meaning and definition
- Role of nutrition in sports
- Principles/guidelines for developing nutrition plans for different categories of athletes/sports persons

2. Fitness and nutritional assessment

- Concepts and their inter relationship- Nutrition, exercise, physical fitness and health
- Concept of -Nutritional status and Body composition
- Fitness with reference to sports
- Flexibility
- Coordination
- Equilibrium
- Speed

- Agility
- Strength
- Endurance

UNIT II

3. Macronutrient in sports : Carbohydrate

- Carbohydrate as an energy source for sports and exercise.
- Carbohydrate stores, fuel for aerobic and anaerobic metabolism
- Glycemic Index and Glycemic load
- Importance of CHO loading
- Pregame and post game meals/Pre competition and Post competition meals

4. Macronutrient in sports : Fats and Protein

- Role of fat as an energy source
- Fat stores, regulation of fat metabolism
- Factors affecting fat oxidation
- Protein requirement and metabolism
- Factors affecting protein turnover

UNIT III

5. Effects of specific Nutrients on sports performance and physical fitness

- Caloric needs and expenditure
- B complex Vitamins
- Minerals (Na, K, Ca, Cl, Zn, Fe)
- Sweat mineral loss

6. Effects of specific Nutrients on sports performance and physical fitness

- Role of antioxidants and exercise induced oxidative stress
- Water: Functions, electrolyte balance and role during exercise

UNIT IV

7. Management of the following conditions among sports persons:

- Aerobic and anaerobic activity
- Vegetarian athletes
- Female sportsperson-Menarche and Menstruation-Amenorrhea and Anemia
- Energy requirements for
  - -Strength and power athletes
  - -Endurance athletes

8. Dietary supplements and Ergonomic aids:

- Definition and concept-Ergogenic Aids
- Dietary /commercial supplements- use and abuse of sports/energy drinks and sports/ energy bars
- Brief overview of laws governing the use of ergogenic aids

RECOMMENDED READINGS

- Antoonio, J and Stout, J.R. (2001). Sports supplements. Lippincottt Williams & Wilkins.
- Jordan Matt. (2007) Sports Nutrition. Createspace Independent publishers
- Girarh Eberle Suzanne (2007) Endurance sports nutrition. Human kinetics publishers
- Acardle William D. (1999) Sports and exercise nutrition. Lippincottt Williams and Wilkins.
- Kanabur V Vajayanthi. (2008) Spots nutrition. Kanishka Publishing House.
- Srivastava K Vijay (2007). Nutrition and diet for sportsmen. Sports publications
- Austin krista and Seebohar Boh (2011) Performance Nutrition. Human Kinetics
- Satyanarayana V (2015) Sports Nutrition and weight management. Sports Publication
- Bernrdot Dan (2011) Advanced sports nutrition. 2nd Ed. Human kinetics Publishers.
- Zimmermannn, M. (2007). Handbook of Nutrition, Saurab Printers Pvt Ltd.
- Joshi Shubhangini A. (2015) Nutrition and dietetics. Mc Graw Hill Education

NUTRITIONAL MANAGEMENT IN SPORTS AND FITNESS (PRACTICAL)

Maximum Marks: 50

Paper: 40

Credit Hours: 2/week **Internal Assessment: 10**

Duration of Exam: 3hours

1. Anthropometric Measurements: Height, Weight , Circumferences, Skinfolds.
2. Physiological Measurements: Blood Pressure, Lung Capacity, Pulse rate.
3. Planning and preparation of diets for various sports. –Short term events, long duration events.
4. Tests for various fitness for:
   - Flexibility
   - Coordination
   - Equilibrium
   - Speed
   - Agility
   - Strength
   - Endurance

RECOMMENDED READINGS

- Antoonio, J and Stout, J.R. (2001). Sports supplements.Lippincottt Williams & Wilkins.
- Jordan Matt. (2007) Sports Nutrition. Createspace Independent publishers
- Girarh Eberle Suzanne (2007) Endurance sports nutrition. Human kinetics publishers
- Acardle William D. (1999) Sports and exercise nutrition. Lippincottt Williams and Wilkins.
- Kanabur V Vajayanthi. (2008) Spots nutrition. Kanishka Publishing House.
- Srivastava K Vijay (2007). Nutrition and diet for sportsmen. Sports publications
- Austin krista and Seebohar Boh (2011) Performance Nutrition. Human Kinetics
- Satyanarayana V (2015) Sports Nutrition and weight management. Sports Publication
- Bernrdot Dan (2011) Advanced sports nutrition. 2nd Ed. Human kinetics Publishers.
- Zimmermannn, M. (2007). Handbook of Nutrition, Saurab Printers Pvt Ltd.
- Joshi Shubhangini A. (2015) Nutrition and dietetics. Mc Graw Hill Education

SEMINAR (FOODS AND NUTRITION)

Maximum Marks: 25

Course No: 5 **Internal Assessments: 25**

Credit Hours: 1/ week

Objective

1. To develop understanding in relevant areas of Foods and Nutrition.
2. To provide understanding of the scientific basis for central role and interrelation of *nutrition* in good health, disease management, prevention and control.
3. To generate and develop awareness and interest in interdisciplinary fields of nutrition.

Content:

- Seminars will be based on relevant areas of Foods and Nutrition.
- The marks will be given by a panel of four experts.
- Marks will be awarded internally for presentation on related topics.

DISSERTATION (SYNOPSIS)

Maximum Marks: 50

Course No: 6

Credit Hours: 2/ week

Objective

To understand an independent piece of research work in the relevant area of Foods and Nutrition.

Note:

1. The research work should contribute to the advancement of knowledge in the field. The students must be guided and supervised by a member of the teaching faculty of the department. Each student must submit a written dissertation at the end of the 4th semester of M.Sc.

Dissertation should include introduction, methodology, results, discussion, summary, conclusion and references.

2. Marks will be awarded by the supervisor internally on the basis of selection of the topic and synopsis presentation.

PRINCIPLES OF FOOD SCIENCE

(THEORY)

Maximum Marks: 75
Paper: 65

Credit Hours: 3/week **Internal Assessment: 10**
Duration of Exam: 3 hours

Instructions to the paper setter:

Question paper will have four sections/units. Examiner will set a total of nine questions comprising of two questions from each section and one compulsory question of short answer type covering the whole syllabus. Student will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

Objectives:
This course should enable the students to –

1. Understand the basic concepts of food science and its applications in processing of food.
2. Learn about the quality parameters of various foods.
3. Gain practical knowledge about food components and their role in cooking.

UNIT – I

1. **Processing of foods**
   - Historical perspective
   - Primary, secondary and tertiary processing

2. **Traditional technologies used in food processing**
   - Mechanical
   - Thermal

3. **Effects of processing on components, properties and nutritional value of foods**

UNIT –II

4. **Cereal cookery/Starch cookery**
   - Composition and properties of different types of starches
   - Application in food systems
   - Gluten formation
   - Retro gradation of starch
   - Gelatinization and dextrinisation

5. **Sugar cookery**
   - Composition and properties of different types of sugars
   - Application in food systems
   - Crystallization and caramelization
   - Maillard reaction and its industrial application.

UNIT –III

6. **Fats and Oils**
   - Types of fats
   - Properties – Smoking point, melting point, hydrogenation, shortening effect.
   - Changes during storage
   - Rancidity – Oxidative and lypolytic

7. **Protein rich foods of animal and plant origin**

   - Pulse cookery: Factors affecting the quality of cooked products, Effect of soaking, germination and fermentation
   - Milk cookery: Properties of milk proteins – physical and functional properties and its uses in cookery
   - Egg cookery: Properties of egg proteins – physical and functional properties and its uses in cookery
   - Meat Cookery: Properties of meat proteins; Post mortem changes, changes during heat treatment

UNIT -IV

8. **Vegetables and fruits**
   - Types of starches
   - Pectic substances
   - Plant pigments
   - Plant enzymes and uses
   - Browning reaction
   - Effect of cooking on pigment, texture of fruits and vegetables

9. **Basic concepts of new product development**
   - Need, scope, importance
   - Market research and consumer dynamics
   - Process of product development and standardization
   - Sensory evaluation
   - Packaging, labeling and marketing

RECOMMENDED READINGS

- Food Science and experimental foods, Swaminathan, N. (1987) Ganesh Publications, Madras.
- Food chemistry, Meyer L.M.(1969) Van Noustrand Reinhold co., New York.
- Foundations of Food Preparation, Peckham, C.G. (1979),The Macmillan co., London.
- Food Theory and Applications, Paul P.C. and Palmer H.H. (1972), John wiley and Sons, New York.
- The experimental study of foods, Griswald R.M. (1962), Houghton, Muffin Co., New York.
- Introductory foods, Bennion M. and Hughes, D. (1975), Macmillan publishing Co., New York.
- Food facts and principles, Sakuntala Manay and shadaksaraswamy, M (1987) Allied Publishers, New Delhi.
- Beltz, H.D. 2005. *Food Chemistry*. Springer Verlag.
- Fennema, O.R, 2006, Food Chemistry, Academic Press.
- Meyer, L.H. 1987. *Food Chemistry*. CBS publishers and Distributors, New Delhi.
- Potter, N.N. and Hotchikiss, J.H. (2006), Food Sciences, Fifth edition, CBS publishers and Distributors, New Delhi.
- Desrosier NW & James N. (2007). Technology of food preservation. AVI. Publishers
- Fellows, P.J. (2005). Food processing technology: Principle and Practice. 2nd Ed. CRC Publishers
- Jelen, P. (2005). Introduction to Food Processing. Prentice Hall
- Lyon, D.H.; Francombe, M.A.; Hasdell, T.A.; Lawson, K. (eds) (2002): Guidelines for Sensory Analysis in Food Products Development and Quality Control. Chepman and Hall, London.
- Lawless, H.T. and Klein, B.P. (2001): Sensory Science Theory and Applications in Foods. Marcel Dekker Inc. New York.
- Piggott, J.R. (ed) (2008): Sensory Analysis of Foods. Elservier Applied Science London.
- Ranganna S. 2006. HandBook of Analysis and Quality Control for Fruits and Vegetables Products 2nd Ed. Tata McGraw- Hill Publishing company Limited. New

PRINCIPLES OF FOOD SCIENCE

(PRACTICAL)

Total Marks: 50
Paper: 40

Teaching periods: 2p/week **Internal assessment: 10**
Duration of exam: 3 hours

1. Cereal cookery - Preparation of rice based products - *Idli, Dosai, Appam* to study the effect of fermentation and soaking.
2. Preparation of wheat based products - *Chappathi, paranthas, poories* - with different proportion of wheat flour - study the development of gluten.
3. Pulse cookery - Effects of soaking, acid, alkali and sprouting and different methods of cooking on cooking time and quality of pulses.
4. Vegetable cookery - Effect of acid, alkali and methods of cooking on pigments.
5. Egg, meat, fish, poultry - Methods of cooking on acceptability of the various fleshy foods, foam formation and factors affecting foam formation. Special effect on colour and tenderness.
6. Fats and oils - Smoking point of different fats and oils - Determination of best frying temperature for different oils, factors affecting fat absorption.
7. Sugar cookery - Stages of sugar cookery, use of sugar in Indian recipes. Crystallization and factors affecting crystallization.
8. New product development – as per theory

RECOMMENDED READINGS

- Food Science and experimental foods, Swaminathan, N. (1987) Ganesh Publications, Madras.
- Food chemistry, Meyer L.M.(1969) Van Noustrand Reinhold co., New York.
- Foundations of Food Preparation, Peckham, C.G. (1979),The Macmillan co., London.
- Food Theory and Applications, Paul P.C. and Palmer H.H. (1972), John wiley and Sons, New York.
- The experimental study of foods, Griswald R.M. (1962), Houghton, Muffin Co., New York.
- Introductory foods, Bennion M. and Hughes, D. (1975), Macmillan publishing Co., New York.
- Food facts and principles, Sakuntala Manay and shadaksaraswamy, M (1987) Allied Publishers, New Delhi.
- Beltz, H.D. 2005. *Food Chemistry*. Springer Verlag.
- Fennema, O.R, 2006, Food Chemistry, Academic Press.
- Meyer, L.H. 1987. *Food Chemistry*. CBS publishers and Distributors, New Delhi.
- Potter, N.N. and Hotchikiss, J.H. (2006), Food Sciences, Fifth edition, CBS publishers and Distributors, New Delhi.

- Desrosier NW & James N. (2007). Technology of food preservation. AVI. Publishers
- Fellows, P.J. (2005). Food processing technology: Principle and Practice. 2nd Ed. CRC Publishers
- Jelen, P. (2005). Introduction to Food Processing. Prentice Hall
- Lyon, D.H.; Francombe, M.A.; Hasdell, T.A.; Lawson, K. (eds) (2002): Guidelines for Sensory Analysis in Food Products Development and Quality Control. Chepman and Hall, London.
- Lawless, H.T. and Klein, B.P. (2001): Sensory Science Theory and Applications in Foods. Marcel Dekker Inc. New York.
- Piggott, J.R. (ed) (2008): Sensory Analysis of Foods. Elservier Applied Science London.
- Ranganna S. 2006. HandBook of Analysis and Quality Control for Fruits and Vegetables Products 2nd Ed. Tata McGraw- Hill Publishing company Limited. New

ENTREPRENEURIAL VENTURES IN FOOD INDUSTRY
(THEORY)

Maximum Marks: 50
Paper: 45
Credit Hours: 2/week **Internal Assessment: 05**

Duration of Exam: 3 hours

Instructions to the paper setter:

Question paper will have four sections/units. Paper setter will set a total of nine questions comprising of two questions from each unit and one compulsory question of short answer type covering the whole syllabus. Student will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

Objectives:
To enable the students to-

1. To motivate the students to undertake entrepreneurial ventures in food industry
2. To enable them to translate entrepreneurial knowledge into income generation and self employment
3. To disseminate knowledge about setting up of startups and small enterprises in relation to food industry.

UNIT - I

1. Entrepreneurship as a Process

- Concept, importance and features of entrepreneurship and entrepreneur
- Overview of differences among entrepreneur, manager, and business owner.
- Problems in the growth of entrepreneurship

2. Formation of Business Plan

- Business ideas: Definition and characteristics of good business idea
- Sources of long term and short term finance
- Government incentives, subsidies and grants for setting up of food enterprises in India

UNIT - II

3. Startups and Small Business Development in Food Industry

- Types, Features and importance of startups and small business
- Growth of Micro, Small and Medium enterprises (MSME) in food industry
- Problems faced by (MSME) in food industry

4. Food technology Startups in India and Developed countries

- Concept, features and development of technology startups
- Case study; Any two food technology startups with reference to challenges, concerns and sustainability issues

.UNIT -III

5. Electronic-Commerce and Food Enterprise Development in India

- Meaning and evolution
- Growth of e-commerce industry in India
- E- commerce suitability for small enterprises and prospective areas in relation to food industry.

6. SWOC analysis

Conducting a SWOC (Strength, Weakness, Opportunities and Challenges)

Analysis of business and competitors

UNIT- IV

7. Growth Strategies in Small business

- Objectives and stages of growth in small business
- Types of growth strategies
- Expansion and diversification

8. Business Development and Marketing Strategies in relation to food industry

- Sales promotion: Objectives and tools
- Overview of advertising, packaging and branding as marketing tools

RECOMMENDED READINGS

- Gupta , C.B and Srinivisan, N.P (2001). Entrepreneurship Development. Sultan Chand and Sons
- Khanka ,S.S. (1998). Entrepreneurship Development. Sultan Chand and Sons,
- Patel, V. G. (1995). The Seven Business Crises and How to Beat Them. Tata-McGraw, New Delhi
- Small Industries Development Board of India (IDBI) Report on Small Scale Industrial Sector (Latest Editions)
- Taneja, S and Gupta, S.L. (2000). Entrepreneurship Development-New Venture
- Creation. Galgotia Publishing

ENTREPRENEURIAL VENTURES IN FOOD INDUSTRY

(PRACTICAL)

Maximum Marks: 50
Paper: 40

Credit Hours: 2/week **Internal Assessment: 10**
Duration of Exam: 3 hours

1. Standardization, Preparation and Sale of selected quality recipes
2. Project Report and presentation of case studies on any two food technology startups with reference to challenges, concerns and sustainability issues
3. Practical training in establishment of a start up initiative

RECOMMENDED READINGS

- Gupta , C.B and Srinivisan, N.P (2001). Entrepreneurship Development. Sultan Chand and Sons
- Khanka ,S.S. (1998). Entrepreneurship Development. Sultan Chand and Sons,
- Patel, V. G. (1995). The Seven Business Crises and How to Beat Them. Tata-McGraw, New Delhi
- Small Industries Development Board of India (IDBI) Report on Small Scale Industrial Sector (Latest Editions)
- Taneja, S and Gupta, S.L. (2000). Entrepreneurship Development-New Venture
- Creation. Galgotia Publishing

ALTERNATIVE MEDICINE AND NUTRITION

(THEORY)

Maximum Marks: 50
Paper: 45

Credit Hours: 2/week **Internal Assessment: 05**
Duration of Exam: 3 hours

Instructions to the paper setter:

Question paper will have four sections/units. Examiner will set a total of nine questions comprising of two questions from each section and one compulsory question of short answer type covering the whole syllabus. Student will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

Objectives:
This course should enable the students to –

1. To enable the students to understand the herbal medicine and its role in field of nutrition.
2. To understand the role and interaction of nutrition and other allied disciplines in health management.
3. To keep the students updated with recent advancement in field of modern medicine and use of herbal medicine.

UNIT – I

1. **Introduction to alternative system of medicines (Ayurveda, Homeopathy, Naturopathy, Yoga)**
   - Features of Alternative Medicine
   - Importance of Alternative Medicines

2. **Principles governing the alternative system of medicines**

UNIT –II

3. **Overview of role of traditional herbal medicines in healing**
   - Chinese medicine
   - Japanese medicine
   - Indian medicine

4. **Awareness, control and regulation on use of herbal medicine**
   - Definition and classification of herbal medicinal products
   - Good manufacturing practices and documentation of quality

UNIT –III

5. **Ayurvedic concept of**
   - Diet in ayurveda
   - Basic Tenets of Ayurveda**-** Food and its Components- *Akasha/ether,* (2) *Vayu/air* (3) *Teja/fire* (4) *Jala/water* (5) *Prithvi/earth and Gunas*/ Physical Properties and Their Attributes of ayurvedic foods

6. **Medicinal plants used in alternative/traditional medicines-***neem*, aloe vera, garlic, turmeric and *tulsi*

UNIT –IV

7. **Alternative medicine therapies – concept and principle of**
   - Mind body techniques – support groups, counseling, hypnosis, art therapy
   - Body based practices – massage therapy, reflexology, aromatherapy, osteopathy, acupuncture

8. **Importance and concept of diet in**
   - Yoga
   - Naturopathy- Raw, mono, eliminative, soothing and constructive

RECOMMENDED READINGS

- National Science Board *(2002).* Science and Technology: Public Attitudes and Public Understanding, Section: Belief in Alternative Medicine". Science and Engineering Indicators - 2002. Arlington, *Virginia: Division of Science Resources Statistics,* National Science Foundation*,* US Government.
- Rosch, Paul J (2013).Alternative Medicine: More Hype Than Hope?
- Mayo Clinic (2010). Book of Alternative Medicine, 2nd Edition
- Kenneth R. Pelletier and William L. Simon (2002).The Best Alternative Medicine.
- David Hoffmann FNIMH AHG (2003).Medical Herbalism: The Science and Practice of Herbal Medicine.

DISSERTATION (REPORT WRITING AND FINAL PRESENTATION)

Maximum Marks: 100

Course No: 4

Credit Hours: 4/ week

Objective

To understand an independent piece of research work in the relevant area of Foods and Nutrition.

Note:

1. The research work should contribute to the advancement of knowledge in the field. The students must be guided and supervised by a member of the teaching faculty of the department. Each student must submit a written dissertation at the end of the 4th semester of M.Sc.

   Dissertation should include introduction, methodology, results, discussion, summary, conclusion and references.

2. Marks will be awarded at the end of the 4th semester, after the submission and evaluation of the dissertation through a viva voce examination for assessment. The external and internal examiners will jointly evaluate the dissertation.

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