PERIYAR UNIVERSITY
PERIYAR PALKALAI NAGAR
SALEM – 636 011

DEGREE OF MASTER OF SCIENCE

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR M.SC. FOOD PROCESSING

FOR THE STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2012 – 2013 ONWARDS

M.Sc FOOD PROCESSING
COURSE STRUCTURE
(Candidates admitted from 2012-2015 onwards)

S.No.	SUBJECT	SUBJECT CODE	TITLE OF THE PAPER	L (Lecture)	P (Practical)	T (Tutorial)	C (Credit)
I	CORE PAPER	12PFP11	Core Paper I: Food Microbiology	6	-	-	5
		12PFP12	Core Paper II: Food Product Development & Marketing Strategy	6	-	-	5
		12PFP13	Core Paper III: Food Process Technology-I	6	-	-	5
		12PFPP11	Core Practical I: Food Microbiology Practical	-	3	-	2
		12PFPP12	Core Practical II : Food Preservation Practical	-	4	-	2
		12PFP24	Core Paper IV: Food Chemistry	4	-	-	5
		12PFP25	Core Paper V: Chemical Changes in Processing & Preservation	4	-	-	5
		12PFP26	Core Paper VI: Food Process Technology-II	5	-	-	5
		12PFP27	Core Paper VII: Research Methodology & Statistics	5	-	-	5
		12PFPP23	Core Practical III: Food Analysis Practical	-	6	-	4
		12PFP38	Core Paper VIII: Food Regulations & Quality Control	6	-	-	5
		12PFP39	Core Paper IX: Instrumentation	6	-	-	5
		12PFPP34	Core Practical IV: Quality Control & Adulteration Practical	-	6	-	4
		12PFPIT1	Internship Training in Food Industry (one month)	-	-	-	4
		12PFP410	Core Paper X: Food Packaging Technology	6	-	-	5
II	ELEC	12PFPE	Elective Paper I: Food Production & Agriculture	5	-	-	4

	TIVE PAPER	**11** **12PFPE32** **12PFPE33** **12PFPE44**	**Elective Paper II: Computer Application** **Elective Paper III: Animal Nutrition** **Elective Paper IV: Food Biotechnology** **Dissertation**	**6** **6** **6** 18	**-** **-** **-** -	**-** **-** **-** **-**	**4** **4** **4** **4**
III	**EXTRA DISCEPLINARY PAPER (ED)**			**4**	**-**	**-**	**4**
IV	**HUMAN RIGHTS (VE)**			**2**	**-**	**-**	**-**

M.Sc FOOD PROCESSING
SCHEME OF EXAMINATION
(For the Candidates admitted from the year 2012 onwards)

Semester	Code	Course	Hrs	Credit	Marks			Exam (hrs)
					IA*	EA**	Total	
I	**12PFP11**	**Core Paper I : Food Microbiology**	**6**	**5**	**25**	**75**	**100**	**03**
	12PFP12	**Core Paper II :Food Product Development & Marketing Strategy**	**6**	**5**	**25**	**75**	**100**	**03**
	12PFP13	**Core Paper III: Food Process Technology-I**	**6**	**5**	**25**	**75**	**100**	**03**
	12PFPP11	**Core Practical I : Food Microbiology Practical**	**3**	**2**	**40**	**60**	**100**	**03**
	12PFPP12	**Core Practical II: Food Preservation Practical**	**4**	**2**	**40**	**60**	**100**	**03**
	12PFPE11	**Elective Paper I: Food Production & Agriculture**	**5**	**4**	**25**	**75**	**100**	**03**
II	**12PFP24**	**Core Paper IV: Food Chemistry**	**5**	**5**	**25**	**75**	**100**	**03**
	12PFP25	**Core Paper V: Chemical Changes in Processing & Preservation**	**5**	**5**	**25**	**75**	**100**	**03**
	12PFP26	**Core Paper VI: Food Process Technology-II**	**5**	**5**	**25**	**75**	**100**	**03**
	12PFP27	**Core Paper VII: Research Methodology & Statistics**	**5**	**5**	**25**	**75**	**100**	**03**
	12PFPP23	**Core Practical II : Food Analysis Practical**	**6**	**4**	**40**	**60**	**100**	**06**
		Extra Disciplinary Paper (ED)	**4**	**4**	**25**	**75**	**100**	**03**
		Human Rights (VE)	**2**	**-**	**25**	**75**	**100**	**03**

III	**12PFP38**	**Core Paper VIII: Food Regulations & Quality Control**	**6**	**5**	**25**	**75**	**100**	**03**
	12PFP39	**Core Paper IX: Instrumentation**	**6**	**5**	**25**	**75**	**100**	**03**
	12PFPP34	**Core Practical III: Quality Control & Adulteration Practical**	**6**	**4**	**40**	**60**	**100**	**06**
	12PFPE32	**Elective Paper II: Computer Application**	**6**	**4**	**25**	**75**	**100**	**03**
	12PFPE33	**Elective Paper III: Animal Nutrition**	**6**	**4**	**25**	**75**	**100**	**03**
	12PFPIT1	**Internship Training in Food Industry(one month)**		**4**	**40**	**60**	**100**	**-**
IV	**12PFP410**	**Core Paper X: Food Packaging Technology**	**6**	**5**	**25**	**75**	**100**	**03**
	12PFPE44	**Elective Paper IV: Food Biotechnology**	**6**	**4**	**25**	**75**	**100**	**03**
		Dissertation	**18**	**4**	**40**	**60**	**100**	**-**
		Total		**90**		**2200**		

PG PROGRAMME- FOOD PROCESSING

Question Pattern: M.Sc Food Processing Theory (External Exam)

Time: 3 hrs **Max: 75 Marks**

Part- A (5x5=25) Marks
I. Answer ALL Questions (Internal Choice)

Part- B (5X10=50)
II. Answer ALL Questions (Internal Choice**)**

Internal Assessment
Mark Distribution

Test	= 10
Assignment	= 5
Seminar	= 5
Attendance	= 5
	25

Theory

Passing Minimum (IA) = 50% = 12 Marks
Passing Minimum (EA) = 50% = 38 Marks

50 Marks

Practical

Passing Minimum (IA) = 50% = 20 Marks
Passing Minimum (EA) = 50% = 30 Marks

50 Marks

Dissertation: Evaluation Pattern

Dissertation marks 80 : 2 Review- 20/20 – 80 marks

Viva voice - 20 marks

100 marks

Practical Mark Distribution

External	:	60 marks
Internal	:	40 marks
		100 marks

***IA = Internal Assessment**
****** **EA = External Assessment**

SEMESTER –I

CORE PAPER-I: FOOD MICROBIOLOGY

(Theory – 6hrs, Credit-5)

PAPER CODE:12PFP11

THEORY

UNIT-I

Introduction to Food Microbiology, Classification of micro- organism, importance of micro-organisms in food- primary sources of micro-organisms in food- intrinsic and extrinsic parameters of food affecting microbial growth.

UNIT-II

Spoilage of foods - principles and types of spoilage. Microbial spoilage of cereal and cereal products and its prevention. Microbiology of milk and milk products - kinds of microorganism, sources of contamination and prevention.

UNIT-III

Contamination, spoilage and preventive measures of sugar and sugar products, fruits and vegetables - kinds, sources, prevention.

UNIT-IV

Microbiology, spoilage and preventive measures of meat, poultry, fish, egg.

UNIT-V

Food in relation to diseases- Food poisoning and intoxication- Bacterial- Bacillus, Clostridium botulinum, clostridium perfringens, E.coli, Salmonella, Shigelle, Staphylococcus aureus, Non bacterial- protozoa, fungi, virus, algae – characteristics and preventive measures.

CORE PRACTICAL I : FOOD MICROBIOLOGY PRACTICAL

(PRACTICAL-3Hrs, CREDIT -2)

PAPER CODE: 12PFPP11

PRACTICALS

1. Isolation and identification of specific microorganisms of normal and spoiled.
    a. Fruits
    b. Vegetables
    c. Canned foods
    d. Bottled drinks
2. Fleshy foods
3. Fermented foods
4. Methylene Blue Reductase test for milk microbiological survey.

REFERENCES

1. Frazier, W.C and Westoff, 1995.Food Microbiology, Tata McGraw Hill Publishing Co.Ltd, New Delhi.
2. Gould, G.G.1996.New methods of Food Preservation, Blackie Academic & Professional, Chennai.
3. Jay, J.M.1996. Modern Food Microbiology.CBS Publishers & Distributors, New Delhi.
4. King.R.D and P.S.J.Cheetham 1986.Food Biotechnology, Elsvier Applied Science, New York.
5. George J.Banwart, 1998. Basic Food Microbiology, 2nd edition, CBS Publishers, New Delhi.

SEMESTER-I

CORE PAPER-II: FOOD PRODUCT DEVELOPMENT AND MARKETING STRATEGY

(THEORY-6HRS, CREDIT-5)
PAPER CODE: 12PFP12

UNIT-I:

Basic principles and concept of food product development, cultural approach to development of dietary pattern of various groups-language, linguistic, regional, religious (ethnic), Factors involved in food habit alteration, availability, importance and role of different research and development departments in food production industry.

UNIT-II:

Steps in product development-material resources based on market demand, Standardization methods involved in product development. Portion size and portion control; Calculation of nutritive value and cost of production, Shelf life and Storage stability evaluation procedure of developed food products.

UNIT-III:

Formulation of new food products for infants, preschool children, adolescents, pregnant and nursing mothers, old age, sports persons, armed sources personnel and therapeutic uses. Selection and training of judges, Development of Score Card and analysis of data, Role of advertisement and Technologies in promotion of new products.

UNIT-IV:

Concept of market and marketing- Approaches of study marketing and marketing functions, market structure, marketing efficiency and market integration, Role of government in promoting agricultural marketing. Market promotion and positioning of food products.

UNIT-V:

Conditions for sale, license and identification and quality processing, conditions for distribution, storage and sanitation, Studying the global market status, Role of export promoting agencies, Economic feasibility of new products.

REFERENCES:

1.Sivarama prasad.A, 1985,Agricultural Marketing in India-Mittal Publications,New Delhi.

2. Acharya.S.S,and N.L.Agarwal,1992,Agricultural Marketing in India- Oxford and IBH Publishing Pvt., Ltd., New Delhi.

3. Developing New Food Products For a Changing Market Place, 2nd Edition, 2005,Aaron, L.Brody,John B.Lord.

4. New Food Product Development, 2004,Gordon W.Fuller.

SEMESTER-I

CORE PAPER-III: FOOD PROCESS TECHNOLOGY-I

(THEORY- 06 Hrs, CREDIT- 5)
PAPER CODE: 12PFP13

UNIT-I:

Unit operations in food processing- Food Engineering operations- raw material preparation, cleaning, sorting, grading and peeling. Food conversion operations- size reduction and screening, mixing, emulsification, filtration, membrane separation, centrifugation, extraction and crystallization.

UNIT-II:

Pulsed Electric Field processing, High-Pressure Processing, Processing using Pulsed Light and Processing using ultrasound. Heat processing by Dielectric, Ohmic and Infra-red heating.

UNIT-III:

Processing by application of heat-Heat processing using steam or water- Blanching, Pasteurization, Heat Sterilization, Evaporation, Distillation, Extrusion and Canning.

UNIT-IV:

Heat processing using hot air – Dehydration, Intermediate Moisture Foods, Baking and Roasting, Heat processing using hot oils- Frying. Processing by chemical methods- by sugar, salt, curing, smoking, acid and chemicals.

UNIT-V:

Processing by removal of heat- Chilling, Freezing, Freeze-drying and Freeze concentration; Irradiation of foods.

REFERENCE:

1.P.J.Fellows, Food Processing Technology. Principles and Practices, Second Edition, Woodland Publishing Ltd,Cambridge,England,2002.

2. Avantina Sharma, Text Book of Food Science and Technology, International Book Distributing Co, Lucknow, UP, 2006.

3. Sivasankar, Food Processing and Preservation, Prentice hall of India Pvt Ltd, NewDelhi.IIIrd Printing, 2005.

4. Peter Zeuthen and Leif Bogh-Sorenson, Food Preservation Techniques, Woodland Publishing Ltd, Cambridge, England, 2005.

SEMESTER- I

CORE PRACTICAL-II: FOOD PRESERVATION PRACTICAL

(Practical -4hrs, CREDIT-2)

PAPER CODE: 12PFPP12

1. Preservation of foods by sugar-Jam, Jelly, Marmalade, Cordial, Squash, Fruit bars, Fruit Preserves-Tuity Fruity (Papaya), Petha (White Pumpkin) Ginger Murabha (Ginger), Glazed fruits.
2. Preservation of foods by salt and acid-Vathal, Vadagam, Tomato ketchup and Squash, Pickles-Lemon, Mango, Mixed vegetable, Garlic.
3. Preservation by fermentation- Wine, Vinegar.

SEMESTER- I

ELECTIVE PAPER-I FOOD PRODUCTION AND AGRICULTURE

(THEORY-5 HRS, CREDIT-4)

PAPER CODE:12PFPE11

UNIT-I

Agriculture- scope in India and Tamil Nadu, Branches of Agriculture, Agronomic classification of crops and their economic importance, Major crops of India and Tamil Nadu-Adaptation and distribution. Agro-climatic norms of major field crops, Development of scientific agriculture in world and India.

UNIT-II

Crop production- production trends in world, India and Tamil Nadu. Factors affecting crop production.

Systems of farming-wet, irrigated, dry and rain fed farming. Factors governing the choice and varieties, Cropping patterns and systems in India and Tamil Nadu, crop rotation - advantages of crop rotation followed in India and Tamil Nadu.

UNIT-III

General procedure for cultivation of wetland crops and garden land crops-field preparation, sowing/ planting, maintenance/ field sanitation, cost of cultivation and economics.

Irrigation management – methods of irrigation suitability, advantages and limitations, irrigation systems of India and Tamil Nadu.

Weeds classification and its characteristics, principles and methods of weeds control (outline only).

UNIT-IV

Manures and fertilizers- Types and its role in crop production, factors affecting quantity of manures and fertilizers for different crops.

Nutrient potential of different organic manure Agricultural, Industrial and Urban wastes-preparation enriched Farm Yard Manure (FYM) –Zinc enriched organics, compost making-coirpith, sugar cane trash, farm waste, farm weds and vermin composting.

UNIT- V

Storage of food grains - Types and characteristics of storage structures, grain storage and distribution system in India and Tamil Nadu. General aspects of food security in India. Agricultural research schemes in India and Tamil Nadu.

References:

Dharma, A.K.1996. Organic Farming for sustainable Agriculture. Agri Botanical Publishers (India), Bikaner.

Gopal Chandra De .1997. Fundamentals of Agronomy. Oxford and IBH publishing Co.Pvt Ltd, New Delhi.

Icar. 1996.Handbook of Agriculture.Indain Council of Agricultural Research, New Delhi.

Morachan, Y.b.1980.Crop production and Management. Oxford and IBH Publishing Co.Pvt LTD., New Delhi.

Gupts, O.P.1998. Modern weed management. Mrs. Saraswathi for agro botanical, New Delhi.

T.N.A.U. 1999. Crop production guide. T.N.A.U. and Directorate of Agriculture, Chennai.

SEMESTER- II

CORE PAPER IV: FOOD CHEMISTRY

(Theory- 4 hrs, Credit-5)

PAPER CODE: 12PFP24

THEORY

UNIT- I

Introduction to food chemistry. Water- Structure, Water content in foods, physical properties, Hydrogen bonding, Types of water in foods, Water activity- Water activity and food spoilage and water activity and packaging. Interaction of water with food components, moisture determination.

UNIT-II

Carbohydrate- Structure, classification, physical and chemical reactions of monosaccharides and polysaccharides.Cyclic and non cyclic photophosphyralation, Calvin cycle and synthesis of carbohydrate source and starch. Carbohydrate metabolism- glycolysis and TCA cycle, Pentose phosphate pathway. Bio energetics of glucose.

UNIT-III

Proteins- classifications, structure, physical and chemical properties of proteins, protein metabolism, transamination, deamination and decarboxylation, ammonia assimilating enzymes, metabolic interrelationship. Amino acids- classification and structure, properties of aminoacids, Hydrogen bond and hydrophobic interaction. Essential aminoacid and protein quality. Nature of protein in meat, milk, egg and cereals.

UNIT- IV

Lipids- Classification, physical and chemical properties, Fatty acid structure and distribution, Essential Fatty acids, waxes, phospholipids and sterols- basic structure and their importance. Oils- physical and chemical constants, Rancidity and hydrogenation, polar lipids and its characteristics. Lipid metabolism. Fatty acid oxidation and bio energetic, Biosynthesis of Fatty acids and triacyl glycerol.

Unit -IV

Vitamins- structure and properties of Thiamine, Riboflavin, Pyridoxine, Niacin, Cobalamine, Folic acid, Biotin, Pantothenic acids, Ascorbic acid, retinal, Cholecalciferol, Vitamin –E and Vitamin- K in foods.

Minerals- Nature and properties of bulk minerals and trace minerals- Iron, Copper, Zinc, Selenium and Iodine.

References:

1. Coultatte,.T.O., “Food – The Chemistry of Components”, Rsc, Royal Society of Chemistry.
2. Iqbal.s.a., Mido.Y,” Food Chemistry” Discovered Publishing Houses, New Delhi, 2005.
3. Lilian hoagland Meyer,” Food Chemistry”, CBS Publishers and Distributors, 4596/1-A, 11 Darya Ganj, New Delhi- 110 002 (India).
4. Alais, Lindan,”Food Biochemistry”, Ellishorunros LTD., New York.

SEMESTER- II

CORE PAPER V

CHEMICAL CHANGES IN PROCESSING AND PRESERVATION

(Theory-4hrs, Credit-5)

PAPER CODE: 12PFP25

THEORY

UNIT –I

Chemistry of cooking- biochemical changes in carbohydrates, protein and lipids during cooking, Chemical changes in vitamins and minerals during processing.Par boiling of rice, Browning reaction- enzymatic and non- enzymatic reaction. Loss of nutrients during cooking and preservation.

UNIT-II

Chemical changes during storage of food grains, fruits and vegetables. Environmental effects on chemical changes in foods- Environmental effects on rates of chemical reaction. Chemistry of microbial spoilage of food- chemistry and mode of action of microbial toxins.

UNIT- III

Chemical changes during processing and preservation of foods - drying, pickling, baking, malting, canning, cold storage and freezing, chemical changes in natural pigments and flavors during processing.

UNIT –IV

Isolation and purification of starch; starch in food industry, pectins, gums and stabilizers in food industry. Modifications of starch, Sweeteners and sugars in foods- structure activity relationship.

UNIT-V

Isolation of protein from soyabean, milk, egg, protein hydrolysates; modification of protein; storage of proteins and stability of proteins. Enzymatic action of post harvest and post mortem foods. Oxygen dependent enzymatic reaction in post harvest foods.

PRACTICAL EXPERIENCE:

Isolation of starch from tubers. Isolation of protein from milk and egg. Hydrolysis of starch and proteins Chromatography.

Aflatoxins - Analysis of effluents from food industry. Rancidity of oils. Isolation and assay of industrial enzymes.

References:

1. Belitz.W.Grosch.1986. Food chemistry. Springer Verley Berlin Heidelberg. New York.
2. David S. Robinson. 1987. Food Biochemistry and Nutritive value. Longman Group, UK.
3. Leslie Hart, F and Harry Johnstone Fisher. 1971, Modern Food Analysis, Springer-Verlag, New York.
4. Dauthy, M.E. 1995. Fruit and Vegetable processing, FAO Agricultural Services Bulletin, 119,Rome.
5. Sadasivam, S and Manickam, 1996. Biochemical methods for Agricultural sciences, New Age International Publishers.
6. Poter. H.N: Food Science, The Av Publishing Co., Inc West Poet, Connectcut 1973.
7. Desrosier.N.W. The technology of food preservation. The Av Publishing Co., Inc West Poet, Connectcut 1973.
8. Meyer L.H: Food Chemistry, Von Nostrand
9. Chemical Changes in food during processing. T. Richandson.

SEMESTER – II

CORE PAPER VI : FOOD PROCESS TECHNOLOGY- II

(Theory- 5 hrs, Credit-5)

PAPER CODE: 12PFP26

THEORY:

UNIT- I

Cereal Technology- Rice- Parboiling and milling methods, by products of rice milling and their utilization. Wheat- Milling, By- products of milling. Conventional and non-conventional foods- Breakfast, Extruded products.

UNIT- II

Millets Technology- major and minor millets- Processing Pulse Technology- Types, processing and methods to remove toxic factors.

UNIT- III

Fruits and vegetables-Processing – Drying and dehydration techniques, canning and freezing.

Sugarcane and sago technology- processing and by products utilization.

UNIT- IV

Dairy Technology- Milk processing- separation, standardization, pasteurization, homogenization, sterilization- Ultra High Temperature (UHT), Sterile milk and milk products, butter, cream and ghee.

Fleshy Foods Technology- Meat, Poultry, Fish and Egg Processing and its products.

UNIT-V

Oil seed Technology- Extraction of oils, meal concentrates and isolates.

Spice technology- Processing, Extraction of essential oils and colours.

Confectionary technology- types of confectionaries and its method of preparation.

References:

1. NIIR Board of Food and Technologist, Modern Technology of Food Processing and Agro based industries, National Institute of Industrial Research, Delhi, 2005.
2. Peter zeuthena nd Leif Bogh- Sorensen, Food Preservation Techniques, Wood Head Publishing Ltd., Cambridge, England, 2005
3. Suman Bhatti, Uma Varma, Fruit and vegetable processing organizations and institutions, CBS Publishing, New Delhi, 1st Ediion- 1995.
4. Mirdula Mirajkar, Sreelatha Menon, Food Science and Processing Technology vol-2, Commercial processing and packaging, Kanishka publishers, New Delhi-2002.
5. NIIR Board, the complete Technology book on processing, dehydration, canning, preservation of fruits and vegetables, National Institute of Industrial Research, Delhi- 2005.

SEMESTER- II

CORE PAPER VII: RESEARCH METHODOLOGY AND STATISTICS

(Theory- 5hrs, Credit-5)

PAPER CODE:12PFP27

THEORY

UNIT- I

Meaning of Research, Role of Statistics and research in Home Science Discipline, objectives of research, Types of research and their application, selection and formulation of research problem, Hypothesis, Designing a research – different types, census and sample method, Theoretical basis of sampling, Sampling methods- Random sampling methods, size of sample, sampling and Non- sampling errors.

UNIT-II

Methods of collecting primary data- Questionnaire, preparation of schedules, interview method, case- study method, Experimentation method, sources of secondary data, precautions while using secondary data. Editing and coding the data, Organization of data, classification- meaning and objectives, types of classification, formation of discrete and continuous frequency distribution, Tabulation – role, parts of a table, general rules of tabulation, types of tables.

UNIT- III

Representation of data- Diagrammatic and graphical representation- significance of diagrams and graphs, general rules for constructing diagrams, Types of diagrams, graphs of time series, graphs of frequency distribution.

Interpretation and report writing- meaning of interpretation technique, precautions, format of research report, types, steps and stages, mechanism and style, essential of good report, footnotes and bibliographical citations. Scale of measurements.

UNIT- IV

Measures of central tendency- mean, median, mode, their relative advantages and disadvantages, measures of dispersion- mean deviation, standard deviation, quartile deviation, co-efficient of variation, percentile and percentile ranks. Association of attributes, contingency tables, correlation, coefficient of correlation and its interpretation, rank correlation, regression equations and predictions.

UNIT-V

Probability- Rules of probability and its applications. Distribution- Normal, binomial, their properties, importance of these distributions in statistical studies. Tests of significance, large and small samples, "t" and F test, tests for independence using chi-square test. Analysis of variance – One- way and two-way classification.

References:

1. Kothari,C.R.(2002), Research Methodology
2. Gupta,S.P.(2002), Statistical Methods, Sultana Chand and sons, 31st revised edition
3. Devadas, R.P.(1989), A Handbook on Mehodology of Research, Sri Ramakrishna Vidhyalaya, Coimbatore.
4. Ramakrishnan,P.(2001), Biostatistics, Saras publication.
5. Donald, H.M.C.Burney (2002), Research Methods, Fifth edition, Thomson and Wadsworth Publications
6. Shanthi,P., Sophia and Bharathi (2000), Computer oriented statistical methods/ probability and statistics, charulatha publications, second edition.
7. Pillai, R.S.N and Bagavathi,V(2001), Statistics, Chand and company limited.

Practical /Related Experiences:

1. Identifying the research problems under each type
2. Formulation of Questionnaires and schedules.
3. Consolidating data and forming tables.
4. Drawing graphs and diagrams appropriately.
5. To understand and select a suitable saying methods for a given situation.
6. Working out numerical sums for all statistical analysis and interpret.
7. Demonstration of SPSS.

SEMESTER – II

CORE PRACTICAL III: FOOD ANALYSIS PRACTICALS

(Practical- 6 hrs, Credit-4)

PAPER CODE: 12PFPP23

Analysis of food for:

a) Calories (Demo)
b) Crude fiber
c) Moisture
d) Nitrogen (Demo)
e) Ash
f) Calcium
g) Phosphorus
h) Iron
i) Vitamin A
j) Vitamin C
k) Fat (Demo)
l) Saponification value
m) Iodine number
n) Acid number
o) Lipid content in egg yolk
p) Carbohydrate by anthrone method
q) Estimation of total sugar in honey by phenol sulphuric acid
r) Protein by Lowry's method
s) Thiamine (Demo)
t) Riboflavine (Demo)

References :

1. Raghuramulu,N.Nair,K.A.And Kalyanasundraram, A.(1983) A manual of Laboratory Techniques, National, Institure of Nutrition, Silver Prints, Hyderabad.
2. Oser, B.L.,(1954) Hawke's Physiological Chemistry, XIV Edition, Tata MC Graw Hill Publishing Company Ltd, Mumbai.
3. Jayaram.J.(1996), Laboratory Manual In Biochemistry, New Age International Ltd, Publishers, New Delhi, Fifth Reprint.
4. Sadasivam, S And Manickam, A(1991) Biochemical Methods, New age International Pvt. Publishers, New Delhi, 2nd Edition.

SEMESTER- II

EXTRA DISCIPLINARY

FOOD PROCESSING

THEORY

UNIT –I

Functions of Food- Food Groups- Food Science, objectives of cooking- Preliminary preparation- cooking methods.

UNIT- II

Processing of pulses, composition and nutritive value, processing methods, toxic constituents.

UNIT- III

Processing of cereals- structure, composition and nutritive value, Processing methods- fermented and unfermented products.

UNIT- IV

Processing of milk, composition, physical properties, nutritive value and effect of salt, enzymes, acid and heat, Fermented and Non -fermented milk products.

UNIT-V

Processing of meat and poultry- processing, composition, nutritive value, preservation and storage.

References:

1. Belitz.W.Grosch.1986. Food chemistry. Springer Verley Berlin Heidelberg. New York.
2. David S. Robinson. 1987. Food Biochemistry and Nutritive value. Longman Group, UK.
3. Leslie Hart, F and Harry Johnstone Fisher. 1971, Modern Food Analysis, Springer-Verlag, New York.
4. Dauthy, M.E. 1995. Fruit and Vegetable processing, FAO Agricultural Services Bulletin, 119,Rome.

5. Sadasivam, S and Manickam, 1996. Biochemical methods for Agricultural sciences, New Age International Publishers.
6. Poter. H.N: Food Science, The Av Publishing Co., Inc West Poet, Connectcut 1973.
7. Desrosier.N.W. The technology of food preservation. The Av Publishing Co., Inc West Poet, Connectcut 1973.
8. Meyer L.H: Food Chemistry, Von Nostrand
9. Chemical Changes in food during processing. T. Richandson.

SEMESTER – III

CORE PAPER VIII: FOOD REGULATIONS AND QUALITY CONTROL

(Theory – 6 hrs, Credit-5)

PAPER CODE:12PFP38

THEORY :

UNIT – I :

General principles of quality control – quality attributes size, shape, colour, consistency, viscosity, texture, taste and flavor.

UNIT – II :

Methods of evaluation of food quality – sensory, objective technique, microbiological methods of quality evaluation, shelf life assessment .

UNIT – III :

Common adulterants, tests to detect adulterants contaminants, naturally occurring toxins in food metallic pesticide and preservative contaminants. Non nutritive food components and their potential health effects, phoyphenols, tannins, phyto oestrogens, cyanogenic compounds, lecithin, saponins.

UNIT – IV :

Government and trade standards for quality – food laws and regulations – PFA , FPO and Food Safety Act 2006. BIS standards, Agmark standards, International Standards for export, APEDA and MPEDA.

UNIT – V:

Rules and regulations for setting up of a processing unit. Criteria for ingredients and finished products. Aspects of microbiological safety in food preservation technologies, Establishment and implementation of HACCP, Continuous Assessment System, Total quality management and quality audits in food industries.

PRACTICAL EXPERIENCE:

Examination of food products in relation to different standards PFA. Agmark, Visit to BIS centre, AGMARK Centre. District level quality control laboratory and food processing industries, market survey of foods for quality.

REFERENCE BOOKS :

1. BIS Standards
2. Giridarillal Sidappa G.S., and Tandon, G.L. (1979) Preservation of fruits and vegetables, ICAR, New Delhi.
3. FPO (1955) Quality control.
4. Horace D.Graham. 1980 The safety of foods, 2nd End. AVI Publishing Co. Inc. Westport.
5. Julie Miller Jones. 1992 Food Safety, Enagan Press, USA.
6. Lewis M.J. 1987 Physical Properties of Food and processing system. Ellis Horwood Ltd., England.
7. Picgott, J.R.1984. Sensory analysis of Foods Elsevier . Applied Science Publisher, New York.
8. Principles and practices for the safe processing foods, David Ashapton.

SEMESTER – III

CORE PAPER –IX: INSTRUMENTATION

(Theory – 6 hrs, Credit-5)

PAPER CODE: 12PFP39

THEORY :

UNIT – I

Unit operations – classification – conservations of mass and energy- Dimensions and units – Dimensional and unit consistency – dimensionless ratios – Evaporators- Single and multiple effect evaporator- Vacuum evaporator- Evaporation evaporators- Forced circulation evaporators.

UNIT – II

Mechanical separations- Filtration- Filter cake compressibility- Filtration equipment- Sedimentation, Gravitational sedimentation of particles in fluid and gas. Setting under combined forces- Centrifugal and liquid – Liquid separatoin – Centrifuge – Size reduction.

UNIT – III

Principles of combination – Characteristics- Particle size distribution – Energy and power requirements – Crushing efficiency- Mixing of solids, pastes, dry powders- Criteria of mixer effectiveness- Mixing index.

UNIT – IV

Refrigerators – Types of refrigeration system- Mechanical vapour compression – Vapour absorption system – Components of mechanical refrigeration- Refrigerants- Properties- Comparison of Freon and ammonia systems- cold storages- Design of cold storages- Defrosting- Humidifiers and dehumidifiers- cooling load calculator.

UNIT –V

Principles and uses of Gas chromatography, Gas liquid chromatography, Electrophorosis, High performance liquid chromatography and Atomic Absorption Spectrophotometry.

Solar equipments – Heaters, driers, cookers, distillators for food products.

PRACTICALS :

Separation efficiency of centrifugal of separation energy requirement in size reduction using burr mill, bar mill, hammer mill, muller mill, economy and thermal efficiency of rotary flash evaporator for concentration of juice, collection efficiency of cyclone separator, liquid – solid separation by filtration, mixing index in a feed mixer, particle size determination of rice bran by sieve analysis-visit to solvent extraction, sugar, tapioca starch and industries.

Use of psychrometric chats-Experiments on refrigeration tutor and humidifiers to determine. COP and efficiency – domestic refrigerator – cooling efficiency. Air conditioner – heating load – solving problems. Installation and maintenance plant. Design of cold storages.

REFERENCE BOOKS :

1. Coulson, J.M. and J.F.Richaradson, 1977. chemical Engineering. Volume I to V the pergamon press New Yor.
2. Earle, R.L.1985 unit operations in Food Processing Pergamon Press. Oxford. U.K.
3. Henderson, S.M. and R.L. Perry 1955. Agricultural process Engineering, John Wiley and sons, New York.
4. Mc Cabe, W.L. and J.C.Smith 1976 unit operations of chemical Engineering. Mc Graw – Hill Inc. Kosaido printing Ltd. Tokyo, Japan.

5. Pande, P.H. 1994 Principles of Agricultural Processing –A Text Book, Kalyan Publishers, Ludhiana.
6. Sahay, K.M. and K.K. Singh, 1994. Unit operation of Agricultural Processing, Vikas Publishing House Pvt., Ltd., New Delhi.

SEMESTER- III

CORE PRACTICAL IV

QUALITY CONTROL AND ADULTERATION PRACTICAL

(Practical 6 hrs, Credit-4)
PAPER CODE: 12PFPP34

1. Establishing Sensory Panels- Designing Sensory Testing Facilities- Analytical Test- Conduct a Sensory Evaluation Test- Designing Score card, objective evaluation, Instruments used for texture evaluation
2. Adulteration test- for adulterants in milk. Fat and oil, spices and Condiments.
3. Quality test for milk and ghee.
4. Quantitative test:
    a. Titrable acidity
    b. Gluten content (wet & dry)
    c. Total Soluble Solids
    d. Bulk Density
    e. Water absorption capacity

f. Oil absorption capacity
g. Foaming stability.

SEMESTER-III

ELECTIVE PAPER II: COMPUTER APPLICATIONS

(Theory-6hrs : , Credit-4, Pratical-3hrs)

PAPER CODE: 12PFPE32

THEORY :

UNIT-I

Introduction to computer-Types-Digital –Analog-Hybrid-business-scientific computer – evolution of computer-Dark age-Modern age-Generation of computer. Computer organization –peripherals-Input/Output devices-Central processing unit-Memory devices – Processors-keyboard-functions of the keyboard-printers-types of printers.

Hardware-Software –rules and procedures-Data processing –Electronic data processing-Information Technology-qualities and good information.

UNIT-II

Number system-Types-binary-decimal-octal number. Problems on number system conversion-Arithmetical operations using binary numbers.

MS-DOS-dir, copy, rename, delete files-make and remove directory. MS-WINDOWS 98-Explorer-File-New folder-Edit-Cut-Copy-Paste-View by name, by type.

UNIT-III

MS-WORD- Menu bar-file-new-open-close-save print-print view-page set up margin settings, EDIT-cut, copy, paste, select all-FIND-find and replace, Go to page. VIEW-tool bar, standard formatting –drawing-tables and borders. INSERT-Page number-Date & Time –Picture –text box-object. FORMAT-font-paragraph –bullets and numbering –borders and shading – tabs.

TABLE-Insert table-cells and rows delete –merge-spilt-sort-formula-sum above, window left and right.

MS EXCEL –Graphical Applications-Pie-bar-curve-line-trend chart-title chart-preparation of leaflet and pamphlets for agricultural extension application using computer. MS POWER POINT-Slides-format-transition background-slide show.

UNIT-IV

Visual basic-Introduction to development environment, forms and common intrinsic controls, properties, events and methods, input box and message box, data types, variables, constants, operators, arrays, procedures, programs and functions, flow control with conditional statement and looping concept. Creating a data base in visual basic, MDI forms, using data control.

UNIT-V

Internet and e-mail-Introduction, browsers, www, internet explorer, search engine, web server-online and off line browsing-Individual account creation, Browsing important internet sites, creating mail ID, sending and receiving mails, sending attachments, HTTP use of statistical packages.

References :

1. Karthigeyan, P.C.(2002), Software for office automation (MS Office) for pvt circulation, GOBI Arts and Science College, Gobichettipalayam, Erode.

2. Sanjay Saxena (2000), MS Office to everyone, Vikas publishing house pvt ltd. Alexis Leon and Mathews Leon (2000), Introduction to computers with MS Office 2000, Tata Mc Craw Hill publishing company Ltd, New Delhi.

3. Steve Brown (1998), visual basic 6 in record time, BPB publications.

4. Brain siler and Jeff sports (1998), Using visual Basic, BPB publications.

5. MC Bride, P.K.(1998), Programming in Visual Basic, BPB publications.

6. Harley Halm (1997), Internet-complete reference, Tata Mc Graw Hill.

Practical /Related Experience :

Creating a word document using all menus (file menu, edit menu, find, view, insert, format menu, insert table and creating mail merge), Creating excel documents using graphical applications (Pie-bar-curve-line-trend chart-title chart-preparation of leaflet and pamphlets for agricultural extension application using computer) –Creating powerpoint presentation slides and creating a database.

SEMESTER III

ELECTIVE PAPER II: ANIMAL NUTRITION
(Theory:6 hrs, Crdit-4)
PAPER CODE: 12PFPE33

UNIT I
Nutrient requirements of cattle and buffalow, growth pattern in India domestic buffalows, Intestine meat production from buffalows

UNIT II
Nutrient requirement for growth, milk production, feeding of goats, natural common feeds and Fodders of goats

UNIT III
Nutrient requirements- reproduction, feeding of sheep and weaning pigs, feeding schedule, growers rations.

UNIT IV
Nutrient requirements of poultry, formulation of poultry rations, feed requirement for production, feeding schedule

UNIT V

Tree leaves and shrub straws and crop residues- agro- industrial by-products, rations for feeding during scarcity, preparation of feed.

References:

1. Hutton,J.B, 1962: Proc. New Zealand Sc. Anim. Prod.
2. Ranjhan.S.K. 1991. Chemical composition of Indian feeds and feeding of farm animals, ICAR, New Delhi.
3. Razdan,M.N., Bhosreker,M.R and Ray,SN., 1965. Ind. J.Dairy Scie. 18,96.
4. Ranjhan,.S.K.2001.Animal Nutrition in the tropic, 5th revised edition, P; 288-490.

SEMESTER-IV

CORE PAPER X: FOOD PACKAGING TECHNOLOGY

(Theory -6hrs, Credit-5)

PAPER CODE: 12PFP410

THEORY :

UNIT-I.

Packaging-Concepts, definition, significance, classification, Flexible packaging materials and packaging forms-paper, regenerated cellulose, film, aluminum foils, and lamination, wrappers, bags, pouches and collapsible tubes.

UNIT-II

Spiral packaging methods-vacuum packaging, gas packaging and shrink packaging. Packaging of milk and milk products –milk, condensed milk, evaporated milk, milk powder, cream, butter & cheese.

Semi rigid packaging materials & forms –Aluminum Containers, setup paper cartons, folding paperboard cartons, moulded pulp containers and plastic containers.

UNIT-III

Rigid packaging materials-glass containers and Compostie Containers. Rigid packaging materials and package forms-Aerosol containers, Solid & Corrugated fiber board Containers, wooden boxes & crates. Cylindrical shipping containers and problems in packaging dehydrated foods.

Packaging requirements & materials for chocolate and Confectionaries-chocolate, candy, confectionary peanut butter, chewing gum, jams & jellies. Packaging requirements and materials for beverages, vegetables and fruits juices, carbonated soft drinks.

UNIT-IV

Packaging requirements and materials for fish- fresh, frozen, salted, smoked fish meal. Packaging of egg products.

Packaging equipment, principles of weighing filling, sealing, wrapping, cartooning, capping, labeling, coding, marking including bar coding and strapping.

UNIT-V

Packaging –Laws and regulations. Aseptic and retort packaging. Testing and evaluation of packaging media-retail packs and transport packages. Produce package Compatibility, toxicity, tainting and corrosion. Packaging and environment.

REFERENCE :

1. Stainley Sacharous, Roger.C.Griffin, Principles of food packaging 2nd edition, AVI. Publishing.Co., Westport.
2. Paine, F.A. & Paine, H.Y.A.hand book jof food packaging Leonard Hill.Blackie Son's Ltd, London.
3. Sacharow, S.Hand Book of packaging materials, A VI Publishing company, West Port.
4. Croshy, N.T.Food packaging materials, Applied Science publication limited, London.
5. Paine, F.A.The packaging media, Blackie and Son's Ltd, London.

6. Sacharow and Grilin, Food Packaging, AVI Publications Hotchikess, Food and Packaging interactin-American Chemical Society.

7. Robertson, G.L.Food packaging Technology, News Port, Marcell Dekkar, Inc.

8. Food Packaging Principles And practice, 1998, Gordon L.Robertson.

9. Novel Food Packaging Techniques, 2003, Raija Ahvenainen.

10. Active Packaging For Food Applications, Aaron, L.Brode, Eugene R.Strupinsky, 2001.

Practical / Related Experiences :

A visit to packaging unit.

SEMESTER-IV

ELECTIVE PAPER IV: FOOD BIOTECHNOLOGY

(Theory-6hrs, Credit-4)

PAPER CODE:12PFPE44

THEORY :

UNIT – I

Important Industrial micro organism. Media for industrial fermentations, criteria used in media formulation, medium composition – energy, carbon, nitrogen and other growth factors – buffering and antifoam agents. Production of culture, maintenance and preparation, bacterial culture, yeast culture and mold culture.

UNIT – II :

Food Fermentation –Batch and continuous process, Fermentor design – solid substrate fermentation, downstream processing, instrumentation and control. Alcoholic beverages: Beer, wine: Non alcoholic beverages: tea, coffee, cocoa; Dairy products; fermented vegetables- sauerkraut, soya based foods – tofu, temphe, yogurt; meat fermentation- sausage; Vinegar. Development of novel sweeteners, production of fats- Lard, amino acids- L-aspartate.

UNIT – III

Enzyme technology in food industry: industrial enzymes and its applications(with respect to food processing industry). Micro encapsulation, List of industrial enzymes and their applications in food industry, Production of food industrial enzymes, Immobilization of enzymes- method of immobilization, advantage and disadvantages of immobilization. Uses of immobilized enzymes- High fructose corn syrup preparation.

UNIT – IV

Recombinant DNA Technology: Gene cloning Tools and Techniques – Plasmids and other cloning Vehicles – handlings's of DNA, RNA, C.RNA, Restriction enzymes, production of proteins from cloned genes, Application of gene cloning, production of pharmaceutical compounds, artificial insulin gene, recombinant and diagnostic reagents.

UNIT-V:

Tissue culture-Plant & animal tissue culture, principles and procedure, culture media applications. Xenobiotics-Definition, components, biodynamic of xenobiotics. overall metabolic fate of xenobiotics in the body.

Reference :

1. Owen pward (1989), Fermentation Biotechnology Principles, Processes And Products, Prentice H New Jersey.
2. Solomons, G.L.(1983), Single Cell Proteins-Critical Reviews of Biotechnology, Moo Young Compressive Biotechnology Scientists Foundations, Engineering Consideration.
3. Prescot (1987), Industrial Food Preservation, John Willey And Sons.
4. Frazier And West Hoff (1995), Food Microbiology, Tata Mcgraw Hill Publishing Company Ltd, New Delhi.
5. Dubey, R.C.(2001) Text Book Biotechnology S.Chand And Co Ltd, New Delhi.
6. Gupta, P.K.(1996), Elements of Biotechnology, Rostogi And Co, Meerut.
7. Paul, P.C. and Palmer (1972) Food Theory And application John Wiley Sons, New Youk
8. Gary Walsh And Denis R.Headen, Protein Biotechnology, S.Chand And Co,Ltd, New Delhi.
9. Dubey, R.C. And Maheswari, D.K.A. Text Book of Microbiology, S.Chand And Co, Ltd, New Delhi.
10. Food Science And Food Biotechnology,2003, Gustara F.Gutierrez-Lopez.

SEMESTER IV

PROJECT

Each student shall be required to prepare a training report on the basis of a training undergone by the candidate in Food Industrial Organisation, suggesting a possible solution for a problems of current interest in the area of processing. The Report should demonstrate the capability of the student for some creative potential and original approach to solve the practical problems in today's Business or Industry. The report should include industrial research, experiments, interpretations, planning and design of an improved and integrated processing, management systems, presented in a comprehensive manner with recommendations for solutions based on scientifically worked out date. It contains less than 200 pages.

M.Sc DEGREE EXAMINATION

FOOD PROCESSING

PAPER – I FOOD PROCESS TECHNOLOGY – I

Time : Three hours **Maximum : 75 Marks**

PART A (5X5 = 25)

Answer All Questions

All questions carry equal marks

1. (a). Write about the size reduction of solid and liquid foods?

(Or)

(b). What are the procedures of preparing raw materials for processing?

2. (a). What does the term “high pressure processing” means?

(or)

(b). Explain about processing of food products using pulsed light and ultrasound?

3. (a). Which is the effective method of heat processing? Explain.

(or)

(b). Write a short note on Intermediate Moisture Foods.

4. (a). Give the low temperature processing methods?

(or)

(b). How will you modify the environment of a food product to extend its shelf life?

5. (a). Write about blanching – the high temperature heat processing method?

(or)

(b). Bring details on pasteurization.

PART B (5X10=50)

Answer All Questions

All questions carry equal marks

1. (a). Explain the principles of food processing and preservation.

(Or)

(b). Write details on the following operations of food processing

(i). Mixing and forming

(ii). Centrifugation

(iii). Filtration.

2. (a). Write about heat processing by means of chemical methods.

(Or)

(b). Outline the processing method using pulsed light, ultrasound and Pulsed electronic field processing.

3. (a). Elaborate heat processing using hot oils.

(Or)

(b). Distinguish the heat processing method by dielectric, ohmic and infrared heating.

4. (a). Explain in detail about low temperature methods of heat processing with example.

(Or)

(b). Give an account on freeze drying and freeze concentration.

5. (a). Compare high temperature heat processing methods with low temperature heat processing methods.

(Or)

(b). Explain the following :

(i). Effect of nutrients during blanching.

(ii). Draw a flowchart on canning process with example and explain.

M.Sc DEGREE EXAMINATION

FOOD PROCESSING

FOOD PRODUCTION AND AGRICULTURE

Time : Three hours **Maximum : 75 Marks**

PART A (5X5 = 25)

Answer All Questions

All questions carry equal marks

1. (a). Write about the scope of agriculture in India and explain its branches.

   (Or)

   (b). Give an short account on adaptation and distribution of major crops in India and Tamilnadu.

2. (a). What are the factors affecting crop production?

   (Or)

   (b). Write shortly about the systems of farming.

3. (a). Show the methods of irrigation, its advantages and limitations

   (Or)

   (b). Explain the methods of controlling weeds.

4. (a). Highlight the factors affecting manure quantity.

   (Or)

   (b). Write about vermicomposting.

5. (a). Bring down the characteristics of storage structure.

   (Or)

   (b). Show the general aspect of food security systems in India.

PART B (5X10=50)

Answer All Questions

All questions carry equal marks

6. (a). Discuss the principles behind the classification of agronomic crops and their economic importance.

(Or)

(b). Explain about the introduction of scientific methods in agriculture and its development in India.

7. (a). Describe briefly about the new trends in the crop production in India and explain farming techniques.

(Or)

(b). Define crop rotation. Outline the methods involved in it with advantages.

8. (a). Write down the procedure for the production of wetland crops and gardened crops.

(Or)

(b). Discuss the following terms.

(i). Field sanitation

(ii). Field economics

9. (a). Enumerate the types of manures and fertilizers and their role in crop production with example.

(Or)

(b). Give an detailed account on the nutritive potential of different organic manures.

10. (a). Write an essay on grain storage and distribution system in India and Tamil Nadu.

(Or)

(b). Elaborate the agricultural research schemes in India and Tamil Nadu.

M.Sc DEGREE EXAMINATION

FOOD PROCESSING

FOOD CHEMISTRY

Time : Three hours **Max. Marks : 75**

PART-A (5X5 = 25)

Answer All Questions

All questions carry equal marks

1. (a). Give an brief account about the physical properties of water in foods?

(Or)

(b). Explain the interaction of water with food components.

2. (a). Discuss the following :

(i). Structure and classification

(ii). Physical and chemical reactions of monosaccharide

(Or)

(b). Write about the cyclic and non-cyclic photophosphorylation.

3. (a). Describe the metabolic inter relationship between nutrients.

(Or)

(b). Explain the nature of proteins in fleshy foods.

4. (a). List out the importance of waxes, phospholipids and sterols.

(Or)

(b). Outline the biosynthesis of fatty acids.

5. (a). Explain the structure and properties of

c. Thiamine

d. Pyridoxine

(Or)

(b). Write the nutritional importance of iron and iodine in foods.

PART B (5X 10=50)

Answer All Questions

All questions carry equal marks

1. (a). What are the types of water in foods and explain them in detail.

(Or)

(b). Define water activity. Explain the relationship of water activity with food spoilage and packaging?

2. a). Explain the following carbohydrate metabolism.

(i). Glycolysis

(ii). TCA Cycle

(Or)

(b). Give an detailed account on electron transport chain?

3. a). Discuss protein under following headings.

(iii). Classification

(iv). Transamination

(v). Deamination

(Or)

(b). How to determine protein quality in meat and egg.

4. a). List out the physical and chemical properties of lipids and oils and

explain in detail.

(Or)

(b). Explain the role of lipases and phospholipases.

5. a). High light the nutritional significance of rational, cholecalciferol and Vitamin c.

(Or)

(b). Write about the nature and properties of any three-bulk mineral

M.Sc., DEGRE EXAMINAITON

FOOD PROCESSING

FOOD PRODUCT DEVELOPMENT AND MARKETING STRATEGY

Time : Three hours **Maximum : 75 marks**

PART A (5x5=25)

Answer All Questions

All questions carry equal marks

1. (a) What are the factors that are involved in food habit alteration?

(or)

(b) Write a note on cultural approach to development of dietary pattern of various groups?

2. (a) Give a short note on the role of food additives and preservatives in product development.

(or)

(b) what are the steps involved in product development.

3. (a) What are the procedures involved in selection and training of judges.

(or)

(b) How will you formulate new food products for armed sources personnel?

4. (a) Define market and marketing. Explain its types and functions.

(or)

(b) Discuss the classification of market structure.

5. (a) Explain the role of export promoting agencies in food processing industries.

(or)

(b) Write a note on the conditions that are considered for distribution, storage and sanitation of food products.

PART – B (5x10=50)

Answer ALL Questions

All questions carry equal marks

1. (a) Discuss about the basic principle and concept of food product development?

(or)

(b) Explain the factors to the considered in the food product development.

2. (a) How will you calculate the nutritive value, cost of production of food products?

(or)

(b) Give an detailed account on

(i) Storage stability and

(ii) Evaluation procedure of developed food products.

3. (a) What are the procedures involved in selection and training of judges? How will you develop a score card and analysis of data for a food product ?

(or)

(b) Explain the role of advertisement and technologies in promotion of new products?

4. (a) Discuss the following :

(b) Marketing channel

(c) Marketing cost

(d) Margin – price spread.

(or)

(b) Write an essay on the types of marketing institutions

5. (a) List out the export potential for selected Indian food products ?

(or)

(b) What are the conditions for sale, licensed and identification and quality processing of a developed products?

M.Sc. DEGREE EXAMINATION

FOOD PROCESSING

FOOD PRESERVATION PRACTICAL

Time : 3 hours **Maximum : 60 marks**

I. Process and present one available fruit by addition of sugar and pickling of vegetable by using oiling method		50
II. Viva voce		10
	Total	**60**

M.Sc. DEGREE EXAMINATION

FOOD PROCESSING

FOOD MICROBIOLOGY

Time : Three hours **Maximum : 75 marks**

PART A (5x5=25)

Answer all Questions

All questions carry equal marks

1. (a) Discuss how microorganisms are important in food processing.

(or)

(b) Explain the primary sources of microorganisms in food.

2. (a) Describe the spoilage of cereals.

(or)

(b) Discuss the microbiology of milk and milk products.

3. (a) Explain the spoilage of meat and fish.

(or)

(b) Discuss the microbial spoilage of fruits.

4. (a) Explain the sewage contamination in food.

(or)

(b) Discuss the soil contamination in food.

5. (a) List out the preventive measures of food borne infections.

(or)

(b) Explain the necossicities to investigate the outbreak of food borne diseases.

PART B (5X10=50)

Answer All Questions

All questions carry equal marks

1. (a) Classify the microorganisms associated with food.

(or)

(b) Give an account on the factors affecting microbial growth.

2. (a) Write an essay on principles and types of spoilage in food.

(or)

(b) Give an account on spoilage and preventive measures of sugar and sugar products.

3. (a) Discuss in elaborate on Microbiology of egg.

(or)

(b) Explain in detail about sources and preventive measures of vegetable spoilage.

4. (a) Write in detail about the water contamination in food.

(or)

(b) Describe the air contamination during food poisoning.

5. (a) Give an account on Non-bacterial food borne infection.

(or)

(b) Explain the followings :

(i) Staphylococcal food intoxication

(ii) Staphylococcal food intoxication

(iii) Salmonellosis

(iv) Botulism

M.Sc., DEGREE EXAMINATION

FOOD PROCESSING

FOOD MICROBIOLOGY PRACTICAL

Time : 3 hours **Maximum : 60marks**

I. Enumerate and identify the micro organism which is present in surface swab Meat. 50

II. Viva Voce 10

M.Sc., DEGREE EXAMINATION

FOOD PROCESSING

FOOD PROCESS TECHNOLOGY – II

Time : Three hours **Maximum : 75 marks**

PART A (5X5=25)

Answer All Questions

All questions carry equal marks

1. (a) List out the advantages of parboiling.

   (or)

   (b) Differentiate between conventional ad non conventional foods.

2. (a) Give an outline of the processing of nay one major millets.

(or)

(b) Discuss the various methods to remove toxic factors from pulses.

3. (a) Write about the factors influencing drying of vegetables.

(or)

(b) Bring out the utilization of various by – products from sugarcane.

4. (a) Give an brief account about pasteurizations and homogenization ?

(or)

(b) Explain the methods of preservation of fish.

5. (a) Write the steps involved in the extraction of oils from oil seeds.

(or)

(b) Explain the method of preparation of confectionaries.

PART B (5x10=50)

Answer All Questions

All questions carry equal marks

1. (a) Describe the traditional and modern methods of rice milling ?

(or)

(b) Explain the different types and processing of breakfast cereals.

2. (a) Write a note on the processing of any three minor pulses ?

(or)

(b) Explain in detail the Traditional methods of pulse milling.

3. (a) Define freezing and canning. Explain its types and effects on fruits.

(or)

(b) How the sage is processed and mention the by products out of this.

4. (a) Explain the manufacturing steps involved in cream.

(or)

(b) Outline the processing steps of meat and explain the post mortem changes in meat.

5. (a) List out the importance of essential oils in foods and how it is extracted?

(or)

(b) Give an detail account on the method of preparation of the following:

(i) Chocolate

(ii) Candies

(iii) Marsh melons

M.Sc. DEGREE EXAMINATIOIN

FOOD PROCESSING

CHEMICAL CHANGES IN PROCESSING

AND PRESERVATION

Time : Three hours **Maximum :75 marks**

PART A (5x5=25)

Answer All Questions

All questions carry equal marks

1. (a) Define 'medium'. What are the prerequisites for the preparation of a medium.

   (b) How will you maintain a culture medium ?

2. (a) Write about the properties and types of Restriction enzymes.

(or)

   (b) Enumerate the production of Artificial Insulin Gene.

3. (a) Distinguish about solid substrate fermentation.

(or)

   (b) What do you mean by the tem 'Downstream processing' ?- Explain.

4. (a) Outline the methods of immobilizing enzymes.

(or)

   (b) What are the applications of lactic acid bacteria in food industry ?

5. (a) What does the term 'Xenobiotics' means ?

   Explain the microbiological degradation of Xenobiotics.

(or)

   (b) Write down the application of culture medium.

PART B (5X10=50)

Answer All Questions

All questions carry equal marks

1. (a) Explain briefly about industrial organisms .

(or)

   (b) Enumerate the production of culture medium for food fermentation.

2. (a) Explain the tools and techniques used for Gene cloning.

(or)

(b) Write an brief account on single cell proteins.

3. (a) Write an essay on the production of alcoholic and non-alcoholic beverages.

   (b) Write a note on the following:

   (iii) Batch and continuous fermentation processes.

   (iv) Fermentation of meat and bread making.

4. (a) Narrate about novel sweetness.

   (or)

   (b) Write down the recent development in cheese flavor technology.

5. (a) What are the principles an procedure involved in the production of plant and animal tissue culture ? – Explain.

(or)

(b) Enumerate the overall metabolic fate of Xenobiotics in the body.

M.Sc., DEGREE EXAMINATION

FOOD PROCESSING

RESEARCH METHODOLOGY AND STATISTICS

Time : Three hours **Maximum : 75 marks**

PART A (5x5=25)

Answer All Questions

All questions carry equal marks

1. (a) Explain the meaning and significance of a research design.

   (or)

   (b) What do you mean by research ? Explain the role of statistics in research.

2. (a) Write a brief not on case study method.

(or)

   (b) Draw a specimen table and explain the parts of a table.

3. (a) Mention the rules for constructing a diagram.

(or)

   (b) Write a short note on 'Bibliography and its importance in context of research report'.

4. (a) From the following data, compute the Arithmetic mean.

   (or)

Fruits	:	0-10	10-20	20-30	30-40	40-50	50-60
number of plants	:	5	10	25	30	20	10

   (or)

   (b) The ranking of 10 students in two subjects A and B are as follows.

   Calculate the rank correlation

A	:	6	5	3	10	2	4	9	7	8	1
B	:	3	8	4	9	1	6	10	7	5	2

5. (a) Define Binomial distribution. State the Assumptions of Binomial distribution.

   (or)

   (b) What are the applications of 'Z' distribution.

PART B (5x10=50)

Answer All Questions

All questions carry equal marks

1. (a) What do you mean by sampling ? Discuss the various types of probability sampling ?

   (or)

   (b) How will you select problem for research ?

2. (a) Write on the points to be borne in mind while constructing a questionnaire.

   (or)

   (b) Define primary data ? Explain the different methods of collecting primary data with suitable examples.

3. (a) Describe in brief the layout of a research report covering all relevant points.

   (or)

   (b) Define Diagrams ? Explain the types of diagrams with illustrations.

4. (a) Calculate the standard deviation and coefficient of variation for the following.

Variable :	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency :	4	6	20	40	45	31	20	9	5

(or)

   (b) Calculate the two regression equations X on Y and Y on X from the following data and estimate X when Y = 15

Length X (in m) :	5	7	3	1	9	12	8	3
Weight Y (in gm) :	8	9	5	4	9	13	7	9

5. (a) In an Orchard of 60 trees, a record was taken of the number of shaded and un shaded trees, and in each of these classes, the frequency of high and low yielding trees was noted below :

Yield type	Shaded	Un shaded
Low yielding	12	26
High yielding	16	6

   Calculate X2 and test whether shading on the trees has any effect on its yielding capacity [5% value of X2 for 1 degree of freedom = 3.84].

(or)

(b) The following table represents the yield of wheat in bushels per acre for trail plots of land treated with four different levels of fertilizer. Each level was applied to five plots randomly chosen over a field.

Plot number	Treatment			
	1	2	3	4
1	21	24	34	40
2	25	33	26	47
3	31	34	38	39
4	17	39	32	41
5	26	35	33	33

M.Sc., DEGREE EXAMINATION

FOOD PROCESSING

FOOD ANALYSIS PRACTICALS

Time : 6 hours **Maximum : 100 marks**

I. Explain the effect of processing methods on the nutritive value of meat. & Estimate the amount of phosphorus content in the given sample. 50

II. Viva voce 10

M.Sc., DEGREE EXAMINATION

FOOD PROCESSING

INSTRUMENTATION

Time : Three hours **Maximum : 75 marks**

PART A (5X5=25)

Answer All Questions

All questions carry equal marks

6. (a) Define :

   (b) Units and Dimension. Give an example.

   (c) Dimensional ratio

   (d) Law of conservation of mass and energy.

   (or)

   (b) Give units and dimension of the following :

   (i) Power (iv) Pressure

   (ii) Specific gravity (v) Momentum

   (iii) Surface tension (vi) Viscosity

   (vii) Reynolds number

7. (a) Give the unit operations involved in Food Processing of milk and manufacture of fruit juice.

(or)

   (b) Explain the principle of size reduction and its equipment with neat diagram.

8. (a) Write down the properties of refrigerants.

(or)

   (b) Explain the mechanism of Vapour Absorption System.

9. (a) Solar energy is more economical. How?

(or)

   (b) Describe solar equipments.

10. (a) Explain the insulation material in details.

(or)

(b) Enumerate the principles of combination and its characteristics.

PART B (5x10=50)

Answer All Questions.

All questions carry equal marks.

11. (a) Explain single and multiple effect evaporator with neat diagram.

(or)

(b) Explain the mass and energy balance using law of conservation of mass and energy.

12. (a) Discuss in detail

(i) Principle involved in Sedimentation

(ii) Gravitation sedimentation of particles in gas and combined forces.

(or)

(b) Write about the filtrate flow through filter cake and its application.

13. (a) What is mixing index ? Explain mixing of solids, pastes and dry powders.

(or)

(b) Role of mixing in food industries – Explain.

14. (a) Explain air conditioning systems and their applications.

(or)

(b) How will you calculate a cooling load ? Describe cold storage system.

15. (a) Explain the parts of solar heater and its processing.

(or)

(b) Explain the applications and the use of solar energy in various fields.

M.Sc., DEGREE EXAMINATION

FOOD PROCESSING

FOOD REGULATION AND QUALITY CONTROL

Time : Three hours **Maximum : 75 marks**

PART – A (5x5=25)

Answer All Questions

1.(a) Write briefly on the importance of color and flavour of a food product.

(or)

(b) Discuss about the principles of quality control.

2. (a) Define subjective evolution of foods. What are the different types of subjective evolution methods ?

(or)

(b) With suitable illustration, explain the working of the spectrophotometer.

3. (a) Write briefly on the causes, signs symptoms and prevention of lathyrism.

(or)

(b) Write short notes on adulterants in spices.

4. (a) Write the importance of PFA in food industry.

(or)

(b) Write the importance of AGMARK in food industry.

5 . (a) Discuss the total quality management and quality assessment system in food industries ?

(or)

(b) What are the steps in evaluating the microbiological quality of food processing equipments ?

PART – B (5X10=50)

Answer All Questions

All question carry equal marks

6. (a) Write an essay on the importance of quality control in meat industry.

(or)

(b) Discuss food quality control under the following heads.

(i) Factors affecting

(ii) Principle

7. (a) Describe the objective methods of food quality evaluation.

(or)

(b) Differentiate the subjective and objective evaluation of food outlining the advantages of each.

8. (a) Give an detailed account on the following :

(i) Naturally occurring toxins in food

(ii) Metal and Pesticide contaminant.

(b) Write an essay on the home testing methods for testing adulterants in spices, oils and milk products.

9. (a) Write an essay on the international standards for food quality control.

(or)

(b) Discuss the importance of food laws and standards in the food industry.

10. (a) Write short notes on :

(i) HACCP in food industries

(ii) Sanitation of equipment in food industries.

(or)

(b) What are the precautions to be followed while setting up the food processing unit?

M.Sc., DEGREE EXAMINATION

FOOD PROCESSING

COMPUTER APPLICATIONS

Time : Three hours **Maximum : 75 marks**

PART – A (5x5=25)

Answer All Questions

All questions carry equal marks

1. (a) Write the classification of computers.

(or)

(b) Distinguish PROM and EPROM memories.

2. (a) With suitable examples, explain binary and octal number systems.

(or)

(b) How to creating shortcut method in windows 98.

3. (a) Explain about components of a document.

(or)

(b) What is meant by word Art ? How to insert word Art in document?

4. (a) Write short notes on Numeric Constants with an example.

(or)

(b) Explain conditional statements and looping concept, with example?

5. (a) Write short notes on E-mail.

(b) What are Meta search engines and how they are differ from normal Search engines ?

PART – B (5x10=50)

Answer All Questions

All questions carry equal marks

1.(a) With a neat sketch, explain the Block diagram of a digital computer system.

(or)

(b) What are input devices? Explain.

2. (a) i) What is Number System ? What are the coding systems used in computer?

(or)

ii) Convert the following:

a) 111_2 to decimal

b) 66_{10} to octal.

a.) i.)What is Windows? Evolution of the Windows Operating systems.

ii) How to working with Windows 98.

3. (a) Short Notes on

i) Creating Tables.

ii) Creating labels.

iii) Creating Envelops.

(or)

(b) What is spread sheet? Design a workbook for college. There are five departments.

4. (a) Create an application for student mark sheet, using MDI form ?

(or)

(b) Explain database with example?

5. (a) Discuss in detail about an Internet.

(or)

(b) Summaries Systems software package.

SEMESTER – III

PRACTICAL COMPUTER APPLICATONS

1. Prepare the business letter for more than one company using mail merge?

1. In a shop, there are 10 items to be sold. The information (Date, item, Quantity sold, price, total, amount

(i) Create a work book

(ii) Count the number of transactions

(iii) Find the total sales

(iv) Find the average sales

2. Create a Power Point Presentation giving animation and sound effects.

3. Create a staff db file with the following information (Name, Staff number, Post and Salary). Use all the commands.

M.Sc., DEGREE EXAMINATION

FOOD PROCESSING

FOOD BIOTECHNOLOGY

Time : Three hours **Maximum : 75 marks**

PART A (5x5=25)

Answer All Questions

All questions carry equal marks

1. (a) Explain the media used for cooking and the methods adopted?

(or)

(b) Give an brief account on the loss of nutrients during cooking.

2. (a) Write about the factors affecting quality of food during cold storage.

(or)

(b) Define microbial toxins and explain types and mode of action.

3. (a) Write down the chemical changes in natural pigments during processing.

(or)

(b) How do processing methods bring out changes during baking?

4. (a) How to isolate starch from the foods ?

(or)

(b) Discuss about the modified starches?

5. (a) Explain the storage and stability of proteins ?

(or)

(b) Write the application of protease in food processing.

PART B (5x10=50)

Answer All Questions

All questions carry equal marks

1. (a) Explain the biochemical changes of carbohydrates and proteins.

(or)

(b) Define browning reactions. Explain the reactions involved in enzymatic and non enzymatic browning.

2. (a) Give an detailed account on the biochemical storage of food grains.

(or)

(b) How do the foods affected by microbial spoilage.

3. a). Describe the effect of freezing on foods.

(Or)

(b). Explain the biochemical changes of vitamins and minerals during processing.

4. a). Discuss the pectin's and gums under the following headings.

(vi). Isolation and purification.

(vii). Its importance in food industry.

(Or)

(b). Describe the structure and activity relationship of sweetness in food.

5. a). Give an detailed account on SCP Production.

(Or)

(b). Explain in detail about the enzymatic action of

(i). Post harvest foods.

(ii). Post mortem foods.

M.Sc DEGREE EXAMINATION

FOOD PROCESSING

FOOD PACKAGING TECHNOLOGY

Time : Three hours **Maximum : 75 Marks**

PART-A (5X5 = 25)

Answer All Questions

All questions carry equal marks

1. (a). Define packaging and highlight its significance.

   (Or)

   (b). Classify packaging type with examples.

2. (a). Specify packaging material needed for milk and milk products..

   (Or)

   (b). Gas packaging – Explain with suitable examples.

3. (a). Write a short note on rigid packaging.

(Or)

(b). Give a brief note on packaging requirements for beverages.

4. (a). What is aseptic retort packaging?.

(Or)

(b). Write details on the laws and regulations of packaging.

5. (a). How will you choose a packaging material for eggs?.

(Or)

(b). Explain about labeling of food products after packaging.

PART B (5X10=50)

Answer All Questions

All questions carry equal marks

1. (a). Discuss the various types of packaging.

(Or)

(b). Enumerate the effect of packaging on food product.

2. (a). Discuss the following terms

(i). Vacuum packaging.

(ii). Gas packaging

(viii). Shrink Packaging

(Or)

(b). Define “Semi rigid packaging”. Show its forms in detail.

3. (a). Write an essay on problems in packaging dehydrated foods.

(Or)

(b). Give an detailed account on packaging requirements and materials needed for confectionaries.

4. (a). Explain the equipments needed for packaging.

(Or)

(b). Show details on principles of weighing.

5. (a). Elaborate the testing and evaluation of packaging media.

(Or)

(b). Discuss about environmental insanitation due to packaging materials.

EXTRA DISCIPLINARY

FOOD PRODUCT DEVELOPMENT

Unit- I

Definition and classification, Characterization and factors shaping new product development. Role of ingredients and processing in defining attributes.

Unit II

Shelf life requirements and factors affecting shelf life and product attributes.

Unit III

Process of flow sheet development, preparation of concept testing documentation .

Unit IV

Concept testing approaches sampling methods, role of sensory evaluation. Preparation of concept testing documentation.

Unit V

Research and new product development- patents- patent laws- International code for Intellectual Property Rights

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