



**Rayat Shikshan Sanstha's**

**Yashavantrao Chavan Institute of Science, Satara (Autonomous)**

**Under Choice Based Credit System (CBCS)**

**(July 2022-2023)**

**SYLLABUS**

**For**

**M. Sc. Food Processing and Packaging**

**(Semester Pattern)**

**M. Sc. II Sem. III to IV**

**Academic flexibility with credit system to be implemented**

**From**

**July, 2022 onwards**

**Rayat Shikshan Sanstha's**  
**Yashavantrao Chavan Institute of Science, Satara**  
**Syllabus for Master of Science Part II**

1. Title: M.Sc. Food Processing and Packaging (Entire)
2. Year of Implementation: 2022-23
3. Preamble:

M. Sc. Food Processing and Packaging course under autonomy has been prepared keeping in view the unique requirements of M. Sc. Food Processing and Packaging students. The emphasis of the contents is to provide students the latest information along with due weightage to the concepts of classical trends in Processing and Packaging in food so that they are able to understand the recent and modernize technologies in the study of Snack Food and Extrusion Technology, Quality Evaluation of Processed Food, Technology of Meat, Fish and Milk. Recent Trends in Packaging like Advanced Food Packaging, Concepts and application of Computer in Packaging Design and applied subjects like Cold Storage and Refrigeration, Climate Change and Food Security, Marketing Management in Food Sector and Entrepreneurship in Food Processing. Also includes important topic like Waste Management and Renewable Energy in Food Processing.

The course content also lists new practical exercises so the students get hands on experience of the latest techniques that are currently used in Food industries. Project curriculum spanning over the one year of the course is designed in a way to give the students first hand research experience as it consists of writing of synopsis, literature review along with actual table work. Along with students are also provided with an opportunity to peruse internship in industry or research centers. The course will also inspire students to pursue higher studies and research in Food Processing and Packaging, for becoming an entrepreneur and enable students to get employed in Food, Nutraceutical and Agriculture Industries.

4. General Objectives:
  - Construction and designing of the courses to suite industrial needs.
  - More emphasis on applied aspects of Food Processing and Packaging.
  - To develop aptitude of students in the field of research.
  - Enrichment of basic knowledge in areas of Food Processing and Packaging.
5. Duration: One Year
6. Pattern: Semester wise

7. Medium of Instruction: English

8. Structure of Course:

a. Semester III:

Theory: 04 Papers

Practical's: 02 Papers

b. Semester IV:

Theory: 04 Papers

Practical's: 02 Paper

**YASHAVANTRAO CHAVAN INSTITUTE OF SCIENCE, SATARA**

**COURSE STRUCTURE UNDER CHOICE BASED CREDIT SYSTEM (CBCS)**

**M. Sc. Food Processing and Packaging (ENTIRE)**

**M. Sc. II SEMESTER– III (Duration – 6 Months)**

Sr. No.	SUBJECT CODE	PAPER NO AND TITLE	TEACHING SCHEME						
			Theory			Practical			
			No. of lectures	Hours	Credits	Subject	No. of lectures	Hours	Credits
1	MFPT 301	Snack Food and Extrusion Technology	4	4	4	MFPP 305 : Snack Food, Extrusion Technology and Technology of Meat, Fish and Milk	8	8	4
2	MFPT 302	Technology of Meat, Fish and Milk	4	4	4				
3	MFPT 303	Advanced Food Packaging	4	4	4	MFPP 306 : Research Project	8	8	4
4	MFPT 304 A	Cold Storage and Refrigeration	4	4	4				
5	MFPT 304 B	Climate Change and FoodSecurity	4	4	4				
<b>Total of SEM III</b>			<b>16</b>	<b>16</b>	<b>16</b>		<b>16</b>	<b>16</b>	<b>08</b>

**YASHAVANTRAO CHAVAN INSTITUTE OF SCIENCE ,SATARA**

**COURSE STRUCTURE UNDER CHOICE BASED CREDIT SYSTEM (CBCS)**

**M. Sc. Food Processing and Packaging (ENTIRE)**

**M. Sc. II SEMESTER– IV (Duration – 6 Months)**

Sr. No.	SUBJECTCODE	PAPER NO AND TITEL	TEACHING SCHEME						
			Theory			Practical			
			No. of lectures	Hours	Credits	Subject	No. of lectures	Hours	Credits
1	MFPT 401	Quality Evaluation of Processed Food	4	4	4	MFPP 405: Status Paper cum Seminar	8	8	4
2	MFPT 402	Waste Management and Renewable energy in Food Processing	4	4	4				
3	MFPT 403	Concepts and Application of Computer in Packaging Design	4	4	4	MFPP 406 : Internship	8	8	4
4	MFPT 404 A	Marketing Management in Food Sector	4	4	4				
5	MFPT 404 B	Entrepreneurship in Food Processing	4	4	4				
<b>Total of SEM IV</b>			<b>16</b>	<b>16</b>	<b>16</b>		<b>16</b>	<b>16</b>	<b>8</b>

Other Feature:

A) Library:

Reference and Textbooks, Journals and Periodicals

B) Specific Equipment's:

Computer, LCD Projector.

C) Laboratory Equipment's:

<b>Sr.No.</b>	<b>Name of the Equipment's</b>
1.	Tray Dryer
2.	Vacuum Packaging Machine
3.	Tearing Strength Tester
4.	Bursting Strength Tester
5.	Cooling Centrifuge
6.	Weighing Balance
7.	Hot Plate Round
8.	Muffle Furnace
9.	P <sup>H</sup> Meter
10.	Crown Corking Machine
11.	Refractometer
12.	Incubator
13.	Hot Air Oven
14.	Deep Freeze

15.	Chimney
16.	Centrifuge
17.	Food Processor
18.	Gas Stove
19.	Aluminum Foil Sealing Machine
20.	Water Bath
21.	Heating Mantle
22.	Colorimeter
23.	Compound Microscope
24.	Refrigerator
25.	Viscometer
26.	Lactometer
27.	Turbidometer

### Semester III

<b>SUBJECTCODE</b>	<b>PAPER NO AND TITLE</b>
MFPT 301	Snack Food and Extrusion Technology
MFPT 302	Technology of Meat, Fish and Milk
MFPT 303	Advanced Food Packaging
MFPT 304 A	Cold Storage and Refrigeration
MFPT 304 B	Climate Smart and Food Security



## SEMESTER III

### MFPT-301 Snack Food and Extrusion Technology

**Course Objective: Students will able to-**

1. remember the importance and scope of snack food
2. evaluate and formulate the ingredients and current practices for preparation of snacks
3. analyze extrusion & processing of snacks through extruders
4. understand packaging material required for snack foods & their quality control

<b>Credits = 4</b>	<b>SEMESTER III MFPT-301 Snack Food and Extrusion Technology</b>	<b>No. of hours per unit / credits</b>
<b>UNIT I</b>	<b>Introduction &amp; Snack Food Ingredients</b>	<b>15</b>
	a) Introduction to snacks, Domestic and Global status of Snack food Industry, Ingredients & additives commonly used in snack food, their attributes and functions.  b) Starches for snack foods, Technology for grain-based snacks: whole grains – roasted, toasted, puffed, popped and flakes, coated grains-salted,spiced and sweetened; flour based – batter and dough based products papads.	
<b>UNIT II</b>	<b>Products and Processing</b>	<b>15</b>
	a) Potato Chips, Meat based snacks, Snacks based on popcorn, baked snacks, Nut based snacks (salted, spiced and sweetened), Savory and Farsans,  b) Processing of Papad, Chips and Wafers, Corn Chips and Simulated Potato Chips, Application of seasonings, Indian Savory Sweets	
<b>UNIT III</b>	<b>Extrusion &amp; Extrusion Methods of Snack Foods</b>	<b>15</b>
	Extrusion: definition, introduction to extruders,	

	principles and types, Extruded products, Extruding Equipment, Uses of extruders in the snack food industry; Specialized Equipment for Popcorn Processing; Snack foods from formers & high shear extruders, Potato chip processing, Equipment for Frying, Baking, and Drying, Snack foods from cooking extruders	
<b>UNIT IV</b>	<b>Packaging &amp; Quality Control of Snack Foods</b>	<b>15</b>
	<p>a) Product protection &amp; packaging materials; Quality properties of snack foods, properties of snack food packaging materials, Packaging Materials &amp; Packaging equipment's required for snack foods.</p> <p>b) Quality assurance and Quality control of snack foods; evaluation methods- process control and product attributes and safety, Oil Content and Shelf Stability.</p>	

### **Course Outcomes**

#### **Unit-I: After completion of the unit, Students are able to**

1. remember the ingredients used for snacks & their global status
2. know about the technology for grain-based snacks

#### **Unit-II: After completion of the unit, Students are able to**

1. recall the types of products and their processing
2. analyze application of seasonings and Indian savory snacks

#### **Unit-III: After completion of the unit, Students are able to**

1. remember the types of extruders, specific use in snack food industry
2. handle specialized equipments for potato chips, popcorn etc

#### **Unit-IV: After completion of the unit, Students are able to**

1. understand the type of packaging material required for snack foods
2. standardize quality control & quality assessment for snack foods & shelf life study

## Recommended readings

1. Matza S ,Extruded foods. Springer, 2000 -UNIT I
2. N.D. Frame,Technology of Extrusion Cooking Springer, (Springer New York, NY 2012) 1-51 - UNIT I
3. Riaz M.N.,Extruders in Food Application CRC Press, 2000 -UNIT II
4. Samuel A. Matz, Snack food technology 3rd edition AVI Publ.1993 -UNIT II
5. Gordon BR,Snack Foods,AVI Publ. 1997 -UNIT III
6. Maskan and Altan Advances in Food Extrusion Technology CRC Press, 2000 -UNIT III
7. Edmund W.Lusas & Lloyd W.Rooney, Snack Foods Processing CRC Press 2000 -UNIT IV

## MFPT 302 – Technology of Meat, Fish and Milk

### Course Objective: student will able to

1. learn and remember the techniques used in meat and poultry processing.
2. impart knowledge of fish processing technology.
3. analyze and learn milk processing technology.
4. characterize the various milk products and technology in milk products.

<b>Credits = 4</b>	<b>SEMESTER III</b> <b>MFPT 302 – Technology of Meat, Fish and Milk</b>	<b>No. of hours per unit / credits</b>
<b>UNIT I</b>	<b>Meat And Poultry Technology</b>	<b>15</b>
	Sources and development of meat and poultry industries in India, muscle structure and physio – chemical properties of meat muscle. Pre – slaughter transport and care, slaughtering of animals and poultry, post – mortem inspection and grading of meat, Egg structure: composition, quality characteristics, processing and preservation of egg, processing and preservation of meat and poultry: freezing, pickling, curing, cooking and smoking.	

<b>UNIT II</b>	<b>Fish Technology</b>	<b>15</b>
	Classification of fish (fresh water and marine), composition of fish, characteristics of fresh fish, Fish products: fish protein concentrate (FPC), fish protein extract (FPE), fish protein hydrolysate (FPH)	
<b>UNIT III</b>	<b>Technology In Milk</b>	<b>15</b>
	<p>a) Introduction – Status and scope of dairy industry in India, Definition of milk, composition, Physical and chemical properties of milk, factors affecting composition of milk, Physio – chemical properties of milk: Color, flavor, viscosity, acidity and PH.</p> <p>b) Quality control tests: Platform tests like – smell, appearance, temperature, lactometer reading. Chemical/ Laboratory test: Fat, SNF and Acidity. Fluid milk processing: Pasteurization: LTLT, HTST, UHT methods.</p>	
<b>UNIT IV</b>	<b>Milk Products And Technology In Milk Products</b>	<b>15</b>
	Coagulated milk products: Channa, paneer, classification and manufacturing process of cheese, Butter/ Ghee: Manufacture and storage of butter and ghee, Condensed milk: factors affecting the quality of condensed milk, storage of condensed milk, Dry milk products: methods of drying milk (Drum and Spray drying), factors affecting the quality of dry milk, Frozen products: Manufacturing of ice – cream factors affecting the quality of frozen products, Cleaning and sanitation of dairy plant and equipment	

**Course Outcomes:**

**Unit I: After completion of the unit, Student are able to**

1. known about meat processing.
2. recall the poultry technology.

**Unit II: After completion of the unit, Student are able to**

1. remember the fish processing.
2. understand techniques used in fish processing.

**Unit III: After completion of the unit, Student are able to**

1. understand technology used in milk processing.
2. standardize various quality control measures in milk processing.

**Unit IV: After completion of the unit, Student are able to**

1. characterize various milk products
2. understand the technology used for preparation on various milk products.

**Recommended Readings:**

1. Aberle, Elton David. Principles of meat science. Kendall Hunt, 2001. -UNIT I
2. Singh, V. P., and Neelam Sachan. Principles of meat technology. New India Publishing, 2011. -UNIT I
3. Hui, Yiu H., ed. Handbook of meat and meat processing. CRC press, 2012. -UNIT I
4. Sastry, N. S. R., C. K. Thomas, and R. A. Singh. Farm animal management and poultry production. Vikas Publishing House, 1982. -UNIT II
5. Hall, George M., ed. Fish processing technology. Springer Science & Business Media, 1997. -UNIT II
6. Nollet, Leo ML, Terri Boylston, Feng Chen, Patti Coggins, Grethe Hydlig, L. H. McKee, and Chris Kerth, eds. Handbook of meat, poultry and seafood quality. John Wiley & Sons, 2012. -UNIT III
7. Eckles, Clarence Henry, Willes Barnes Combs, and Harold Macy. "Milk and milk products." Milk and milk products. 4th edition (1951). -UNIT III
8. De, Sukumar. "Outlines of dairy technology." (1980). -UNIT III
9. Tamime, Adnan Y., ed. Milk processing and quality management. John Wiley & Sons, 2009. -UNIT IV
10. Class, X. I. I. "CBSE Study Material for Student." PhD diss., Department of Commerce & Business Administration, Saurashtra University, Rajkot. -UNIT IV
11. Rai, Bhole Shankar, Sangeeta Shukla, Kaushal Kishor, Himanshu Singh, and Swarnima Dey. "Sensory acceptability of value added multigrain biscuit with different levels of wheat flour,

maize flour and sesame seed." The Pharma Innovation 6, no. 7, Part H (2017): 1015. -UNIT IV

## MFPT 303 Advances in Food Packaging

### Course Objectives: Students will able to-

1. recall the various designing & labeling parameters for food packaging.
2. evaluate the packaging operations cost.
3. understand the new trends in food Packaging.
4. formulate the recent technologies in food Packaging.

<b>Credits = 4</b>	<b>SEMESTER III</b> <b>MFPT 303 Advances in Food Packaging</b>	<b>No. of hours per unit / credits</b>
<b>UNIT I</b>	<b>Package Labelling and Designing</b>	<b>15</b>
	Label, types of label, Importance of nutritional labelling package design consideration, cushioning materials and their properties, Testing and Identification of packaging materials.	
<b>UNIT II</b>	<b>Packaging Economics</b>	<b>15</b>
	a) Evaluation of packaging economics, Packaging operations cost consideration and disposability.  b) Hazards in distribution & design of packages for various foods.	
<b>UNIT III</b>	<b>Novel Techniques in Packaging I</b>	<b>15</b>
	a) Smart Packaging, Active Packaging- Oxygen absorbers, Carbon dioxide absorbers, Ethylene absorbers, Humidity absorbers, Lactose remover, UV light absorbers and Cholesterol remover.  b) Antimicrobial Food Packaging- Benzoic acids, Paraben, Benzoic & sorbic acids, Acetic, propionic	

	acid, Lysozyme, nisin, EDTA, Allyl isothiocyanate. Edible packaging- Edible coating and Edible films.	
<b>UNIT IV</b>	<b>Novel Techniques in Packaging II</b>	<b>15</b>
	<p>a) Active packaging systems- Self-heating cans and Self-cooling cans, Green Plastics for Food Packaging- Polylactic acid (PLA), Native starch, Thermoplastic starch, Chitin and chitosan, Cellulose and Shellac resins.</p> <p>b) Intelligent Packaging- Thermochromic inks, Microwave Doneness Indicators (MDIs), Radio Frequency Identification (RFID). Bioactive packing- Non-Migratory Bioactive Polymers (NMBP) In Food Packaging, Inherently bioactive synthetic polymers: Types and Applications- Chitosan, UV irradiated nylon.</p> <p>c) Nanotechnology in food packaging- Nano composite, Innovative packaging technologies- Functional barrier and High chemical barrier material innovations.</p>	

### Course outcomes

#### Unit I: After completion of the unit, Students are able to

1. understand the Concept of nutritional labelling package.
2. perform the test of packaging material.

#### Unit II: After completion of the unit, Students are able to

1. evaluate the packaging operations cost.
2. understand the distribution & design of packages.

#### Unit III: After completion of the unit, Student are able to

1. characterize the various scavenging technology.
2. remember the modern packaging technologies.

#### Unit IV: After completion of the unit, Students are able to

1. understand the various novel methods of packaging.
2. formulate the recent packaging technologies.

### Recommended Readings:-

1. Paine, Frank A., and Heather Y. Paine. *A handbook of food packaging*. Springer Science & BusinessMedia, 2012. -UNIT I
2. Coles, Richard, Derek McDowell, and Mark J. Kirwan, eds. *Food packaging technology*. Vol. 5. CRCpress, 2003. -UNIT I
3. Sacharow, Stanley, and Roger C. Griffin. *Principles of food packaging*. AVI Pub. Co., 1980. -UNIT II
4. Kadoya, Takashi, ed. *Food packaging*. Academic Press, 2012. -UNIT II
5. Mahadeviah, M., and R. V. Gowramma. *Food packaging materials*. Tata McGraw-Hill, 1996. -UNIT III
6. Palling, S. J. *Developments in food packaging*. No. 664.09 P3. 1980. -UNIT III
7. Majid, Ishrat, Gulzar Ahmad Nayik, Shuaib Mohammad Dar, and Vikas Nanda. "Novel food packaging technologies: Innovations and future prospective." *Journal of the Saudi Society of Agricultural Sciences* 17, no. 4 (2018): 454-462. -UNIT III
8. Majid, Ishrat, Gulzar Ahmad Nayik, Shuaib Mohammad Dar, and Vikas Nanda. "Novel food packaging technologies: Innovations and future prospective." *Journal of the Saudi Society of Agricultural Sciences* 17, no. 4 (2018): 454-462. -UNIT IV
9. Altaf, Uzma, Varsha Kanojia, and A. Rouf. "Novel packaging technology for food industry." *Journal of Pharmacognosy and Phytochemistry* 7, no. 1 (2018): 1618-1625. -UNIT IV

## MFPT 304 A Cold Storage Technology and Refrigeration

### Course Objective: Students will able to-

1. recall and learn the refrigeration and refrigeration system.
2. Impart knowledge about best practices in cold Storage and freeze Storages.
3. evaluate and learn controlled atmosphere and modified atmosphere storages.
4. handle and understand chilling equipment and techniques for different food products.

<b>Credits = 4</b>	<b>SEMESTER III</b> <b>MFPT 304 A Cold Storage Technology and Refrigeration</b>	<b>No. of hours per unit / credits</b>
<b>UNIT I</b>	<b>Principles of Refrigeration</b>	<b>15</b>



	Principles of Refrigeration, Refrigeration cycles, Vapour compression and vapour absorption cycles, refrigerants, characteristics of different refrigeration's, ozone-depletion potentials, green house potential refrigerants, use of non-polluting refrigerants, net refrigerating effect, ton of refrigeration - Components of a Refrigeration system: compressor, condenser, Evaporator, Expansion valves piping and different controls. Atmospheric air and its properties, Psychometrics.	
<b>UNIT II</b>	<b>Cold Storage Design and Construction</b>	<b>15</b>
	<p>a) Cold Storage Design and Construction, Small and large commercial storages, Cold Room temperatures, Insulation, Properties of insulating materials, Air diffusion equipment, Doors and other openings.</p> <p>b) Cold load estimation; prefabricated systems, walk-in coolers and refrigerated container truck: Freezer Storages, Freezer room temperatures, insulation of freezer rooms: Pre-cooling and pre freezing.</p> <p>c) Cold storage practice, Stacking and handling of material in and around cold rooms, Optimum temperatures of storage for different food materials.</p>	
<b>UNIT III</b>	<b>Controlled atmosphere and modified atmosphere storages</b>	<b>15</b>
	Controlled atmosphere and modified atmosphere storages: Principles and basics of their construction, Operation and maintenance, cleanliness, defrosting practices, preventive maintenance and safety measures.	
<b>UNIT IV</b>	<b>Chilling of Foods</b>	<b>15</b>
	Chilling of Foods: Chilling equipment for liquid	

	foods. Secondary refrigerants and direct expansion techniques in chilling. Chilled foods transport and display cabinets – Basics of Chilled foods microbiology – Hygienic design considerations for chillers and chilled storages Cool storage and their applications. Evaporative cooling and its applications.	
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**Course outcomes.**

**Unit I: After completion of the unit, Student are able to**

1. understand the need of refrigeration.
2. remember the refrigeration system.

**Unit II: After completion of the unit, Student are able to**

1. evaluate the Cold Storage and its construction.
2. know the Freeze storage and its management.

**Unit III: After completion of the unit, Student are able to**

1. understand and share information about recent trends in Controlled atmosphere.
2. recall the modified atmosphere storages for food products.

**Unit IV: After completion of the unit, Student are able to**

1. characterize the technologies of Chilling
2. formulate the chilling techniques for different food product

**Recommended Readings:**

1. Raymond R. Gunther: Refrigeration, Air Conditioning and Cold Storage Chiltan Company, Philadelphia, USA 1957 -UNIT I
2. Clive D.J. Dellino: Cold and Chilled Storage Technology Publisher: Kluwer Academic Publisher (1997) -UNIT I
3. S. Domkundwar and Subhash Arora: A Course in Refrigeration and Air Conditioning: DhanpatRai and Sons, Publishers, New Delhi (1994) -UNIT II
4. Andrew D Althouse and others: Refrigeration and Air Conditioning Goodheart – Willcox CompanyInc. 1982 -UNIT II
5. E.R. Hollowell: Cold Storage and Freezer Storage Manual AVI Publishing Co. (1980) - UNIT III

6. Ed. C.P. Mallet: Frozen Food Technology Balckie Academic and Professional, (1993) -UNIT II

7. Aurel Gobaneu and Gabriela Lasessa and others (1976) Cooling Technology in the Food Industry: Abacus Press, Tunbridge Wells, U.K -UNIT IV

Additional Learning Source

1. <https://nptel.ac.in/courses/103107088/module11/lecture2/lecture2.pdf>
2. <https://swayam.gov.in/course/3687-refrigeration-and-air-conditioning>

### **MFPT-304 B Climate Change and Food Security**

**Course Objectives: Students will able to-**

1. remember the climate and agriculture.
2. analyze the Mitigation and Adaptations.
3. study about the food security and nutrition security.
4. formulate the methods used to measure level of food security.

<b>Credits = 4</b>	<b>SEMESTER III</b> <b>MFPT-304 B Climate Change and Food Security</b>	<b>No. of hours per unit / credits</b>
<b>UNIT I</b>	<b>Climate Change and Agriculture</b>	<b>15</b>
	Climate change and agriculture, impact of temperature and changed climate on crop productivity, climate change and food availability, climate change and stability of food production, climate change and access to food, climate change and food utilization, government of India policies and programs for food Security	
<b>UNIT II</b>	<b>Mitigation and Adaptations.</b>	<b>15</b>
	Sustainable integrated agricultural systems, Climate-Smart agriculture, Conservation agriculture, Sustainable intensification, Urban agriculture, Food	

	supply management, Demand changes - diet changes, food waste	
<b>UNIT III</b>	<b>Food security and Nutrition security.</b>	<b>15</b>
	Definition, introduction, concept and principles of food security, climate change and food insecurity: response measures, accessibility, utilization, stability of food supply, challenges and current situation in food security, basic principles of nutrition security, community nutrition, nutritional ecology, nutrition programs and policies.	
<b>UNIT IV</b>	<b>Methods Used to Measure the Level of Food and Nutrition Security</b>	<b>15</b>
	The food and agricultural organization (FAO) method, household expenditure survey method (HESM), dietary intake assessment (DIA), integrated child development services, rapid rural appraisal, anthropometry	

**Course outcomes.**

**Unit I: After completion of the unit, students are able to:**

1. analyze the impact of climate change on food.
2. known about the policies and programs for food Security

**Unit II: After completion of the unit, students are able to**

1. understand about Climate-Smart agriculture.
2. remember the changes of demand.

**Unit III: After completion of the unit, students are able to**

1. characterize the need of food and nutrition security
2. recall the current situation in food security and nutrition programs and policies

**Unit IV: After completion of the unit, students are able to**

1. formulate the methods of measure level of food and nutrition security.
2. understand the information about FAO, DIA, HESM methods for food security

### Recommended Readings-

2. Zhou, Zhang-Yue. Global Food Security: What Matters?. Routledge, 2019. -UNIT I
3. Swaminathan, Monkombu Sambasivan. Combating hunger and achieving food security. Cambridge University Press, 2016. -UNIT I
4. Assessment, Millennium Ecosystem. "Climate Change: Observed Impacts on PlanetEarth." CHEMISTRY International (2009). -UNIT II
5. Chinnala, Bala Ramulu. Marginalized Communities and Decentralized Institutions in India: An Exclusion and Inclusion Perspective. Routledge India, 2020. -UNIT II
6. Ramesh, Mridula. The Climate Solution: India's Climate-Change Crisis and What We Can Do about It. Hachette UK, 2018. -UNIT III
7. Weingärtner, Lioba. "The concept of food and nutrition security." Achieving food and nutrition security 3 (2009). -UNIT IV

## MFPP 305 : Snack Food, Extrusion Technology and Technology of Meat, Fish and Milk

### Course Objective: Students will able to-

1. perform the practical's on snack food, extrusion technology and technology of meat, fish and milk
2. analyze the shelf life studies and quality evaluation for each snack
3. formulate various quality parameters in meat and poultry products
4. characterize methods used to prepare milk products and learn quality parameters.

<b>Credits = 4</b>	<b>SEMESTER III</b> <b>MFPP 305 : Snack Food, Extrusion Technology and Technology of Meat, Fish and Milk</b>	<b>No. of hours per unit / credits</b>
	<b>Section A</b>	<b>8</b>
	1. Preparation of Chips and its quality evaluation 2. Preparation of extruded snack food and its quality evaluation 3. Preparation of Wafers and its quality evaluation 4. Preparation of Flaked cereals (Poha) and its quality	

	<p>evaluation</p> <p>5. Preparation of Puffed cereals (Churmura) and its quality evaluation</p> <p>6. Preparation of Expanded snack and its quality evaluation</p> <p>7. Preparation of noodles/ vermicelli and its quality evaluation</p> <p>8. Preparation of Coated grains or nuts and its quality evaluation</p> <p>9. Preparation of instant food premixes and its quality evaluation</p> <p>10. Determination of Shelf-Life and Quality Characteristics of Snack Foods</p> <p>11. Preparation of savory snack product and its quality evaluation.</p> <p>12. Preparation of popcorn and its quality evaluation.</p>	
	<b>Section B</b>	<b>8</b>
	<p>1. Slaughtering and dressing of poultry bird</p> <p>2. Determination of meat PH</p> <p>3. Preparation of meat products</p> <p>4. Composition and structure of egg</p> <p>5. Determination of egg quality</p> <p>6. Determination of moisture content in milk powder</p> <p>7. Determination of fat content in milk powder</p> <p>8. Preparation of ice cream</p> <p>9. Determination of titrable acidity of milk</p> <p>10. Determination of fat in milk</p> <p>11. Preparation of paneer</p>	

## Course Outcomes-

### After completion of the Lab course, Students are able to:

- remember a knowledge about the preparation methods of different snacks like potato chips, flaked cereals, popcon, expanded snacks, coated grains.
- formulate the shelf life studies and quality evaluation for each snack.

3. characterize different methods used for the preparation of milk products.
4. impart knowledge about various quality control measures in meat, fish and poultry products

### Recommended readings

1. Riaz M.N., Extruders in Food Application CRC Press, 2000 -UNIT I
2. Samuel A. Matz, Snack food technology 3rd edition AVI Publ.1993 -UNIT I
3. Gordon BR, Snack Foods, AVI Publ. 1997 -UNIT II
4. Maskan and Altan Advances in Food Extrusion Technology CRC Press, 2000 -UNIT II
5. Edmund W. Lusas & Lloyd W. Rooney, Snack Foods Processing CRC Press 2000 -UNIT III
6. Hui, Yiu H., ed. Handbook of meat and meat processing. CRC press, 2012. -UNIT III
7. Sastry, N. S. R., C. K. Thomas, and R. A. Singh. Farm animal management and poultry production. Vikas Publishing House, 1982. -UNIT IV
8. Hall, George M., ed. Fish processing technology. Springer Science & Business Media, 1997. -UNIT IV

### MFPP 306: Research Project

**Credit 04**

#### Course Objectives : Students will able to-

- To provide the practical knowledge of experiment designing
- To provide the knowledge of literature review
- To make students capable of writing research proposal and projects

Credits = 4	SEMESTER III MFPP 306: Research Project	No. of hours per unit / credits
	<ol style="list-style-type: none"> <li>1. Self-study and reference work of relevant topics and concepts by the student.</li> <li>2. The Project Work must involve practical work(wet lab.) related to selected discipline</li> <li>3. Students are expected to work on “Project Work” for about 10 periods per week.</li> </ol>	<b>8</b>

	<ol style="list-style-type: none"><li>4. The project work must be allotted individually.</li><li>5. The student invests his energy, time and resources in a project. The project therefore should, if possible, have important bearing on some practical aspect. This will help student to justify his efforts on project.</li><li>6. It is the joint responsibility of student and project supervisor to maintain daily register book of his/her project work and has to be produced at the time of examination if asked.</li><li>7. Submission Process: Student should prepare 2 copies of the Project Report. At the beginning, the respective Project Supervisor must approve both copies positively before final examination. Then respective Head or Coordinator approves both copies of the Project Report.</li><li>8. The student has to submit one of these approved copies of project report, duly signed by the project Supervisor and Principal, before practical examination.</li></ol>	
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**SEMESTER IV**

<b>SUBJECTCODE</b>	<b>PAPER NO AND TITEL</b>
MFPT 401	Quality Evaluation of Processed Food
MFPT 402	Waste Management and Renewable energy in Food Processing
MFPT 403	Concepts and application of Computer in Packaging Design
MFPT 404 A	Marketing Management in Food Sector
MFPT 404 B	Entrepreneurship in Food Processing

## MFPT-401 Quality Evaluation of Processed Food

**Course Objective: Students will able to-**

1. understand and learn the Quality Evaluation in Dairy Industries
2. recall knowledge about Quality Evaluation in Bakery and Confectionary Industries
3. formulate and learn Quality Evaluation in Meat, Poultry and Sea Food Industries
4. characterize Sensory Analysis of Food and its Methods

<b>Credits = 4</b>	<b>SEMESTER IV</b> <b>MFPT-401 Quality Evaluation of Processed Food</b>	<b>No. of hours per unit / credits</b>
<b>UNIT I</b>	<b>Quality Evaluation in Dairy Industries</b>	<b>15</b>
	Milk Composition, Major and minor milk constituents, Nutritional Importance - Milk reception operations - Unloading-Conveying - Examiner of raw milk-weighing sampling of Milk - Quality control lists for milk and their significance. Introduction - Preservatives – Neutralizer - Adulterants - Detection methods - Standard specification of Milk and Milk products - Dairy product certification and licensing.	
<b>UNIT II</b>	<b>Quality Evaluation in Bakery and Confectionary Industries</b>	<b>15</b>
	<p>a) Quality of raw materials, quality checks on flours, building inspection and routine cleaning programs, process control- microbial and fungal contaminants.</p> <p>b) Ingredients, equipments, bakery quality assurance, ingredient inspection, process control, assessing products for quality.</p>	
<b>UNIT III</b>	<b>Quality Evaluation in Meat, Poultry and Sea Food Industries</b>	<b>15</b>
	<p>a) Poultry processing ,Nutritive value of egg, Microorganisms associated with egg, Measurement of egg shell, albumin and yolk quality - Determination of interior quality ,defects-grading of egg-quality assurance-Test methods. Egg powder and products. MPL of contaminants for egg products.</p>	

	b) Sea foods - nutritional composition- microbial, non - microbial and metal contaminants in sea foods- transportation of fish - grading - sea food products and processing - preservation methods - freezing – IQF - canning - salting - surumi process. Maximum Permissible Limit for sea foods.	
<b>UNIT IV</b>	<b>Sensory Analysis of Food and its Methods</b>	<b>15</b>
	Definition of Sensory Analysis , Sensory characteristic of food, Requirements of conducting Sensory Analysis Sensory panel-Types, Training of sensory panel, Reason for testing food Quality, Methods of Sensory Evaluation and sensory card.	

**Course outcomes-**

**Unit I: After completion of the unit, Student are able to**

1. evaluate the quality of Dairy products
2. remember the quality evaluation of raw milk

**Unit II: After completion of the unit, Student are able to**

1. know the quality evaluation of Bakery products
2. characterize the quality evaluation of Confectionary products

**Unit III: After completion of the unit, Student are able to**

1. characterize the quality evaluation of Poultry products
2. characterize the quality evaluation of meat and fish products

**Unit IV: After completion of the unit, Student are able to**

1. formulate the Supply Chain Management in dairy and Poultry
2. known the Threats and Opportunities in poultry management

**Recommended Readings:**

1. Pearson, A. M., and T. R. Dutson. "Quality Attributes and Their Measurement in Meat, Poultry and Fish Products (Advances in Meat Research) Springer." (1995). -UNIT I
2. Barbut, Shai. *Poultry products processing: an industry guide*. CRC press, 2016. -UNIT I
3. Joint, F. A. O. *Codex alimentarius commission procedural manual*. Food and Agricultural

- Organisation of the United Nations, World Health Organisation, 1981. -UNIT I
4. Djekic, Ilija, Dragan Zivanovic, Sladjana Dragojlovic, and Radoslava Dragovic. "Lean manufacturing effects in a Serbian confectionery company–Case Study. *Organizacija* (2014). -UNIT II
  5. Jenness, Robert, and Stuart Patton. "Principles of dairy chemistry." *Principles of dairy chemistry*. (1959). -UNIT II
  6. Vijayakumar, K. R., Asha Martin, Lalitha R. Gowda, and V. Prakash. "Detection of genetically modified soya and maize: Impact of heat processing." *Food Chemistry* 117, no. 3 (2009): 514-521. -UNIT III
  7. VIHAR, JYOTI. "M. Sc. in Food Science & Nutrition." -UNIT III
  8. Khanna, Sri Ram, and Madhu Saxena, eds. *Food Standards and Safety in a Globalised World: The Impact of WTO and Codex*. New Century Publications, 2003. -UNIT IV

## **MFPT 402 Waste Management and Renewable Energy in Food Processing**

### **Course Objective: Students will able to-**

1. remember various sources of energy and pretreatment of wastes.
2. formulate utilization of wastes produced by various food industries
3. characterize renewable energy and application of solar energy in food processing.
4. evaluate the biofuel production and utilization modern applications of biomass.

<b>Credits = 4</b>	<b>SEMESTER IV</b> <b>MFPT 402 Waste Management and Renewable Energy in Food Processing</b>	<b>No. of hours per unit / credits</b>
<b>UNIT I</b>	<b>Sources and Pretreatment of Wastes</b>	<b>15</b>
	Sources of waste and pollutants, Classification, and characterization of Solid, Liquid and Gaseous wastes from food industry. (Dairy industry, agro processing industry, meat industry, bakery industry), Pretreatment of waste, Secondary treatments, and Tertiary treatments, Measurement of levels of pollution.	
<b>UNIT II</b>	<b>Utilization of Waste and Effluent Treatment</b>	<b>15</b>

	Utilization of waste from: Fruit and Vegetable processing, Fish, Meat and Poultry industry, oil milling, and pulses milling, and utilization of by-products of dairy industry, microbiology of effluent and treated water. Identification of insecticide, pesticides, and fungicides in effluent water.	
<b>UNIT III</b>	<b>Solar Energy and its Applications</b>	<b>15</b>
	<p>a) Solar Energy - Biomass Energy - Wind Energy and other Renewable Sources of Energy - Economics of Waste - Heat Recovery and Cogeneration - Energy Conservation Economics.</p> <p>b) Solar Thermal Energy: Solar radiation, flat plate collectors and their materials, Solar furnaces, Solar operated refrigeration systems, Solar Thermal Energy Storage, Solar still; Solar cooker: Solar pond.</p>	
<b>UNIT IV</b>	<b>Biofuels and Biomass Applications</b>	<b>15</b>
	Bio ethanol – production from conventional as well as unconventional sources. - Bio diesel – Technology for production of bio diesel. Rural applications of biomass –Combustion - Chulas - improved Chulas- Biomass – Physical - Chemical composition – properties of biomass, Recovery from the in industrial waste water – Case Studies in sugar, distillery, dairy, pulp and paper mill, etc.	

**Course outcomes.**

**Unit I: After completion of the unit, Student are able to-**

1. understand various sources of waste generated.
2. remember the pretreatment of wastes, secondary and tertiary treatments.

**Unit II: After completion of the unit, Student are able to -**

1. know utilization of waste products produced by food industries.

2. recall the microbiology and treatment of effluents.

**Unit III: After completion of the unit, Student are able to -**

1. understand solar energy and conservation economics.
2. remember the applications of solar energy in food processing.

**Unit IV: After completion of the unit, Student are able to -**

1. evaluate the production of various biofuels..
2. recall applications of biomass applications and case studies.

**Recommended Readings:**

1.Garg, H. P. *Solar energy: fundamentals and applications*. Tata mcgraw-Hill Education, 2000. -

UNIT I

2.Energy, M. Tech–Renewable. "Course Duration." -UNIT I

3.Elective-iii, list of departmental. "dr. Apj abdul kalam technical university, uttar pradesh, lucknow study and evaluation scheme of electrical & electronics engineering." -UNIT I

4.Partain, Larry D., and Lewis M. Fraas. *Solar cells and their applications*. John Wiley & Sons, 2010. -UNIT II

5.Datta, Manoj. "Waste disposal in engineered landfills." *Narosa, New Delhi* (1997). -UNIT II

6.Chauhan, D. S. *Non-Conventional Energy Resources*. New Age International, 2006. -UNIT II

7.Parker, Colin, and Tim Roberts. "Energy from waste: an evaluation of conversion technologies." (1985). -UNIT III

8.Shah, Kanti L. *Basics of solid and hazardous waste management technology*. No. 628.44 S5. 2000. -UNIT III

9.Datta, Manoj. "Waste disposal in engineered landfills." *Narosa, New Delhi* (1997). -UNIT IV

10. Waste disposal. "em9012 waste management and energy conversion It pc technologies 3 0 0 3 unit i solid waste 8." *affiliated institutions anna university, chennai*: 18. -UNIT IV

11. Sudhir, Varadarajan, G. Srinivasan, and V. R. Muraleedharan. "Planning for sustainable solid waste management in urban India." *System Dynamics Review: The Journal of the System Dynamics Society* 13, no. 3 (1997): 223-246. -UNIT IV

**MFPT-403 Concepts and application of Computer in Packaging Design**

**Course Objective: Student will able to-**

1. formulate the Design of Molds for Packaging.

2. remember the Introduction to Packaging Design Concepts.
3. recall the Application of Computers in Packaging Design.
4. characterize the Package Printing Technology

<b>Credits = 4</b>	<b>SEMESTER IV</b> <b>MFPT-403 Concepts and application of Computer in Packaging Design</b>	<b>No. of hours per unit / credits</b>
<b>UNIT I</b>	<b>Design of packaging molds for packaging</b>	<b>15</b>
	Injection Molds, Blow Molds and its principle of working, Extrusion Dies, Product Design, Designing for Packaging Application, Equipment's for canning, paper / board carton, Flexible packaging, Application of various molds	
<b>UNIT II</b>	<b>Packaging Design Concepts</b>	<b>15</b>
	Introduction to design, 2D & 3D Design principle and applications, Study of Visual Elements, Principles of Typography, Introduction to visual ergonomics, Understanding the relationship between consumer & communication Design.	
<b>UNIT III</b>	<b>Application of Computers in Packaging Design</b>	<b>15</b>
	Setting drawing requirement, Commands and systems variables, To co-ordinate a system, Creating objects, Introduction to Editing methods, Layers and object properties and components, Creating 3D objects	
<b>UNIT IV</b>	<b>Package Printing Technology</b>	<b>15</b>
	Process of Communication, Printing Processes and Methods, Layout & Paste-up, Composition for Printing, Theory of Full Color Graphic Arts, Photography, Printing Image, Carriers, Printing Presses, Paper and other Printing Stocks, Printing Inks.	

**Course outcomes:**

**Unit I: After completion of the unit, Student are able to**

1. formulate the Design of molds for packaging
2. remember the Design for packaging.

**Unit II: After completion of the unit, Student are able to**

1. recall the Introduction to Packaging Design Concepts.
2. understand the Introduction to visual ergonomics

**Unit III: After completion of the unit, Student are able to**

1. understand the Application of Computers in Packaging Design.
2. characterize the Layers and object properties.

**Unit IV: After completion of the unit, Student are able to**

1. remember the Package Printing Technology.
2. understand the Theory of Full Color Graphic Arts.

**Recommended readings :**

1. Athavale, Shrikant P. *Hand Book of Printing, Packaging and Lamination: Packaging Technology*. Notion Press, 2018. -UNIT I
2. Agazzi, Alban, Vincent Sobotka, Ronan LeGoff, and Yvon Jarny. "Optimal cooling design in injection moulding process—A new approach based on morphological surfaces." *Applied Thermal Engineering* 52, no. 1 (2013): 170-178. -UNIT I
3. Klimchuk, Marianne R., and Sandra A. Krasovec. *Packaging design: Successful product branding from concept to shelf*. John Wiley & Sons, 2013. -UNIT II
4. Pemble, Anne, ed. *Packaging technology: Fundamentals, materials and processes*. Elsevier, 2012. -UNIT II
5. Board, N. I. I. R. *Screen Printing Technology Hand Book*. Asia Pacific Business Press Inc., 2003. -UNIT II
6. Paine, Frank A., and Heather Y. Paine. *A handbook of food packaging*. Springer Science & Business Media, 2012. -UNIT III
7. Rees, Herbert. *Understanding injection mold design*. Hanser Verlag, 2001. -UNIT III
8. Mohebbi, Behzad. "The art of packaging: An investigation into the role of color in



packaging, marketing, and branding." *International Journal of Organizational Leadership* 3 (2014): 92-102. -UNIT IV

9. Ellicott, Candace, and Sarah Roncarelli. *Packaging essentials: 100 design principles for creating packages*. Rockport Publishers, 2010. -UNIT IV

10. Zhang, Yue Ping, M. Sun, Kai Meng Chua, L. L. Wai, and Duixian Liu. "Antenna-in-package design for wirebond interconnection to highly integrated 60-GHz radios." *IEEE Transactions on Antennas and Propagation* 57, no. 10 (2009): 2842-2852. -UNIT III -UNIT IV

## **MFPT 404 A: Marketing Management in Food Sector**

**Course Objective: Students will able to-**

1. understand the concepts of marketing management
2. formulate about marketing theories, principles, strategies and process of marketing planning
3. characterize about marketing process for different types of products and services
4. evaluate Branding and packaging, Benefits of advertising.

<b>Credits = 4</b>	<b>SEMESTER IV</b> <b>MFPT 404 A: Marketing Management in Food Sector</b>	<b>No. of hours per unit / credits</b>
<b>UNIT I</b>	<b>Concept of Marketing Management</b>	<b>15</b>
	Concept of Marketing Management; Marketing Environment; Marketing Mix, Strategic Marketing, Market Segmentation, Targeting, and Positioning; Buyer Behavior, Marketing Information System, Marketing Organization and Control	
<b>UNIT II</b>	<b>Marketing Strategy, Planning and Control</b>	<b>15</b>
	Introductory strategy, policy and planning, Strategic business units, The need for marketing planning, The process of marketing planning, Contents of the marketing plan, Monitoring, evaluating and controlling the marketing planning, Marketing controls, Marketing plan control, Efficiency control. Digital and Non- digital	

	marketing.	
<b>UNIT III</b>	<b>Marketing channel decisions</b>	<b>15</b>
	Retailing, wholesaling and distribution; Pricing decisions, Pricing objectives, The laws of supply and demand, Elasticity of demand, Cross-price elasticity of demand, Practical problems of price theory, Cost - revenue - supply relationships, The meaning of price to consumers, Price as an indicator of quality, Pricing strategies.	
<b>UNIT IV</b>	<b>Product Policy and Advertising</b>	<b>15</b>
	Product and product line, Product classification, product mix strategy, Product life cycle, New product development, Branding and packaging, Benefits of advertising, Developing and advertising program, Sales promotion, public relation, personal selling, Pricing, significance of pricing, Price adjustments, Effect of price change	

**Course outcomes.**

**Unit I: After completion of the unit, Student are able to**

1. study the Concept of Marketing Management
2. evaluate the Marketing Organization and Control

**Unit II: After completion of the unit, Student are able to**

1. understand the Marketing Strategy.
2. formulate the need for marketing planning.

**Unit III: After completion of the unit, Student are able to**

1. understand the Retailing, wholesaling and distribution of product
2. Evaluate/analyze the marketing strategy for an existing product and/or services. Know the basic marketing concepts and theories.

**Unit IV: After completion of the unit, Student are able to**

1. understand the Product Policy and Advertising
2. evaluate the Benefits of advertising.

**Recommended Readings:**

1. Brassington, Marketing Management. Pitman Publ. House, 1997 -UNIT I
2. Kotler P., Marketing Management – Analysis, Planning, Implementation and Control. PearsonEdu.,2002. -UNIT I
3. McCarthy., Marketing Management. Tata McGraw-Hill., 2003 -UNIT II
4. Saxena R. Marketing Management. Mc Graw Hill., 2002. -UNIT II
5. Stanton WJ, Etzel MJ & Walker BJ., Fundamentals of Marketing. McGraw-Hill. 1996. -UNIT III
6. Philip Kotler, Keller, Koshy and Jha, Marketing Management: A South Asian Perspective, 14thEd. Pearson Education.,2013. -UNIT II -UNIT III
7. William J. Stanton, Fundamentals of Marketing, Tata McGraw-Hill Publication, New Delhi.,1984. -UNIT IV
8. Kotler, Philip., Marketing Management, Millennium Edition. Intl ed. US: Prentice Hall, 2002. -UNIT IV
9. Kotler and Armstrong, Principles of Marketing, 12th edition., Pearson, 2008. -UNIT IV

**MFPT 404B - Entrepreneurship in Food Processing**

**Course Objective: student will able to**

1. learn and understand the entrepreneurial skills.
2. impart knowledge about food business management.
3. characterize the different governmental policies and get knowledge about export business.
4. evaluate environmental factor, and business policies in food business.

<b>Credits = 4</b>	<b>SEMESTER IV</b> <b>MFPT 404 B - Entrepreneurship in Food Processing</b>	<b>No. of hours per unit / credits</b>
<b>UNIT I</b>	<b>Entrepreneurial Development</b>	<b>15</b>
	Case studies of successful entrepreneurs, Exercises on ways of sensing opportunities – sources of idea, creating efforts, Entrepreneurial skill assessment test , Techniques of development of entrepreneurial skills,	

	positive self-image and locus of control, incubation and commercialization of business ideas Source of finance – Micro, Small, Medium entrepreneurship.	
<b>UNIT II</b>	<b>Food Business Management</b>	<b>15</b>
	Case studies of Food Processing Business and its aspects, Business opportunity Identification and Assessment techniques, Business Idea Generation and evaluation exercise, Market Assessment study Analysis of competitive situation, SWOT Analysis for business and for competitors, Preparation of business plan, Preparation of project report, Methods of Arrangement of inputs – finance and material	
<b>UNIT III</b>	<b>Government Policies and Export Business.</b>	<b>15</b>
	Government schemes and incentives for promotion of entrepreneurship, Government policy on small and medium enterprises (SMEs)/SSIs, Export and import policies relevant to food processing sector, Venture capital, Contract farming and joint ventures, public-private partnerships, Overview of food industry inputs, Characteristics of Indian food processing industries policy, programmes and agencies promoting entrepreneurship –KVIC, NABARD, NSIC, SIDBI, EDII, NIESBUD, DIC etc.	
<b>UNIT IV</b>	<b>Environment and Business Policies.</b>	<b>15</b>
	Environmental factors affecting success of a new business; reasons for the failure and problems for new business. Legal issues, environmental clearance, quality standards, government stores purchase schemes (e-tender process), exemption from income tax, industrial parks & food park.	

### **Course Outcomes:**

#### **Unit I: After completion of the unit, Student are able to**

1. study the entrepreneurial skills.
2. understand to develop positive self-image and understand the business idea commercialization.

#### **Unit II: After completion of the unit, Student are able to**

1. remember knowledge about food business management.
2. understand the market analysis, SWOT analysis, preparation of business report.

#### **Unit III: After completion of the unit, Student are able to**

1. recall the different governmental policies and get knowledge about export business.
2. understand about venture capital, government business policies.

#### **Unit IV: After completion of the unit, Student are able to**

1. evaluate environmental factor, and business policies in food business.
2. understand the concept of Industrial park, Food Park, legal issues.

### **Recommended Readings:**

1. Acharya S. S. and Agarwal N L Agricultural Marketing in India, Oxford & ISH Publishing Co., New Delhi. 1987 -UNIT I
2. Chandra, Prasanna Projects, Planning, Analysis, Selection, Implementation and Review, Tata McGraw-Hill Publishing Company Limited, New Delhi. 1996 -UNIT I
3. D. David and S Erickson Principles of Agri Business Management, McGraw Hill Book Co., New Delhi. 1987 -UNIT II
4. David H. Holt Entrepreneurship – Anew Venture Creation, Prentice Hall of India, New Delhi. 2002 -UNIT II -UNIT III
5. Phillip Kotler Marketing Management, Prentice Hall of India Private Limited, New Delhi. 1994 -UNIT III
6. Vasant Desai, The Dynamics of Entrepreneurial Development and Management, Himalya Publishing House Pvt. Ltd., Mumbai .2011 -UNIT III -UNIT IV
7. Vasant Desai, Fundamentals of Entrepreneurship and Small Business Management, Himalya Publishing House Pvt. Ltd., Mumbai. 2012.  
-UNIT IV

## **MFPP 405: Status Paper cum seminar**

**Credits: 04**

### **Course Objectives:**

- To provide the knowledge of literature review.
- Exposure to students for discussion of topic

1. Selection of the topic
2. Self-study and reference work of relevant topics and concepts by the student.
3. The Seminar work must be allotted individually.
4. The student invests his energy, time and resources in a Seminar.
5. Submission Process: Student should prepare 2 copies of the Seminar Synopsis.
6. The student has to present

### **Course outcomes:**

- Students will be able to review available literature on a particular topic.
- Students will be capable to discuss the selected topic.

## **MFPP 406: Internship**

**Credits :04**

### **Course Objectives:**

- Expose Technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
- Provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job.
- Exposure to the current technological developments relevant to the subject area of training.

### **Guidelines:**

Internships may be full-time or part-time; they are full-time in the summer vacation and part-time during the academic session. Curriculum is flexible to adjust internship duration. Therefore, opportunities must be provided for experiences that cannot be anticipated when planning the course. The institutes have the flexibility to schedule internship, Project work, Seminar etc. according to the availability of the opportunities. However, minimum requirement regarding Internship duration is three weeks.

During the vacation after 2<sup>nd</sup> and/or 3<sup>rd</sup> semester, students are ready for industrial experience. Therefore, they may choose to undergo Internship / Innovation / Entrepreneurship related activities. Students may choose either to work on innovation or entrepreneurial activities resulting in start-up or undergo internship with industry/ NGO's/ Government organizations/ Micro/ Small/ Medium enterprises to make themselves ready for the industry.

Every student is required to prepare a file containing documentary proofs of the activities done by him. The evaluation of these activities will be done by Programmed Head/Cell In-charge/ Project Head/ faculty mentor or Industry Supervisor as specified in evaluation scheme.

### **General Procedure:**

Step 1: Upon request of student, request Letter/ Email from the department should go to industry to allot various slots of 3-6 weeks during vacation as internship periods for the students. Students request letter/profile/ interest areas may be submitted to industries for their willingness for

providing the training.

Step 2: Industry will confirm the training slots and the number of seats allocated for internships via Confirmation Letter/ Email. In case the students arrange the training themselves the confirmation letter will be submitted by the students in the department. Based on the number of slots agreed to by the industry, department will allocate the students to the industry. In addition, the internship slots may be conveyed through Telephonic or Written Communication (by Fax, Email, etc.) by Faculty members who are particularly looking after the Internship of the students.

Step 3: Students on joining Training at the concerned Industry / Organization, submit the Joining Report/ Letters / Email.

Step 4: Students undergo industrial training at the concerned Industry / Organization. In between Faculty Member(s) evaluate(s) the performance of students once/twice by visiting/ coordination with the Industry/Organization and Evaluation Report of the students is submitted in department office.

Step 5: Students will submit training report after completion of internship.

Step 6: Training Certificate to be obtained from industry.

Step 7: Presentation along with brief report on training to be given at the time of examination for final evaluation.

**Course outcomes:**

- Students will get exposure to the industrial environment becoming competent professionals for the industry.
- Students will learn, understand and sharpen the real time technical / managerial skills required at the job.
- Student will be exposed to the current technological developments relevant to the subject area of training.