D. Y. Patil College of Engineering and Technology

Kasaba Bawada, Kolhapur

(An Autonomous Institute)

Accredited by NAAC with 'A' Grade

Department of Chemical Engineering

Program Structure

Food & Nutrition Technology (Minor)

(To be implemented from academic year **2022-23)**

D.Y.PATIL COLLEGE of ENGINEERING & TECHNOLOGY
Department of Chemical Engineering

Minor Degree details

With a view to enhance the employability skills and impart knowledge in emerging areas which are usually not being covered in Undergraduate Degree credit framework, AICTE has come up with the concept of 'Minor Degree' in emerging areas.

Minor specialization in EMERGING AREAS in Under Graduate Degree Courses is allowed where a student of another Department shall take the minimum additional Credits in the range of 18-20 and get a degree with minors in specialized area. These credits are in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline. Knowledge of these emerging areas will help students in capturing the plethora of employment opportunities available in these domains. With the help of industry-academia experts, the institute has framed the curriculum of Minor Degrees. Following are the minor degrees offered by the various departments:

Sr. No.	Department	Minor Degree Offered
1	Architecture	Sustainable Energy Practices
2	Chemical Engineering	Food and Nutrition Technology
3	Civil Engineering	Environmental Sustainability
4	Mechanical Engineering	Robotics and Industry 4.0
5	Electronics & Tele communication Engineering	Internet of Things (IoT)
6	Computer Science & Engineering	Web Development

Interested students studying in semester III can choose only one minor degree track offered by other department (excluding minors offered by their core undergraduate course). The final list of allocation will be displayed, following the eligibility criteria mentioned in the academic rules and regulations, before beginning of semester IV.

- The minor degree will be run only when the minimum students count is 30 for respective track.
- Students once enrolled for any minor degree are not permitted to change the track. However, a student can withdraw at any semester.
- The fee for minor degree is to be paid in addition to the college fees. There will not be any fee concession/relaxation for any category student. The fee will not be refunded when withdrawn from the minor degree.
- Minor degree courses will begin from semester IV onwards as per the structure of the respective tracks.

B. Tech. Chemical Engineering Minor Degree Structure													
Sr.No	**Course Code**	**Course Type**	**Name of the Course**	**Sem**	**Teaching Scheme Per Week**			**Credits**	**Total Marks**	**Evaluation scheme**			
1	201CHMIL 221	PCC	Principles of Food Preservation	IV	3	-	-	3	100	ISE MSE ESE	20 30 50	20 20	40
2	201CHMIP 222	PCC-LC	Principles of Food Preservation Laboratory	IV	-	-	2	1	25	ISE	25	10	10
3	201CHMIL 312	PCC	Human Nutrition	V	3	-	-	3	100	ISE MSE ESE	20 30 50	20 20	40
4	201CHMIP 313	PCC-LC	Human Nutrition Laboratory	V	-	-	2	1	25	ISE	25	10	10
5	201CHMIL 324	PCC	Food Process Engineering	VI	3	-	-	3	100	ISE MSE ESE	20 30 50	20 20	40
6	201CHMIL 325	PCC	Food Packaging	VI	3	-	-	3	100	ISE MSE ESE	20 30 50	20 20	40
7	201CHMIP 326	PCC-LC	Food Process Engineering Laboratory	VI	-	-	2	1	50	ISE ESE (PEO)	25 25	10 10	10 10
8	201CHMIL 413	PCC	Food Quality & Safety Management	VII	3	-	-	3	100	ISE MSE ESE	20 30 50	20 20	40
				Total	**15**	**-**	**06**	**18**	**600**	**Total Credits:18**			
					21					**Total Contact Hrs.:05/Week**			

Course Code	Definition
BSC	Basic Science Course
ESC	Engineering Science Course
HSMC	Humanity and Social Science including Management Course
PCC	Professional Core Course
PEC	Professional Elective Course
OEC	Open Elective Course
LC	Laboratory Course
MC	MandatoryCourse
PROJ	Project

Abbreviations:

ISE: In Semester Evaluation,
MSE: Mid semester Examination,
ESE: End Semester Examination

Note:
ESE will be conducted for 100 marks and converted to 50 marks

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Course Title : **Principles of Food Preservation** (Lecture work)	
Course Code :201CHMIL221	**Semester : IV**
Teaching Scheme : L-T-P : 3-0-0	Credits : 3
Evaluation Scheme : ISE + MSE : 20+30=50 Marks	ESE Marks : 50 Marks

Course Objectives (COs):

1. Applying basic food science knowledge and understanding of biochemical changes that occur during various processing and conservation techniques.
2. Introduce students to different food processing techniques.
3. Educate students on the technical mechanism for preserving food.
4. Introduce students to food preservation methods to avoid waste.
5. Introduce students to different non thermal ways of food processing.
6. Introduce students to different modern ways of processing and conserving food.

Course Outcomes (COs): At the end of the course the student will be able to

C221.1	**Understand** the need for food processing
C221.2	**Grasp** the various food processing techniques
C221.3	**Understand** the different preservation technique
C221.4	**Understand** the principles of food spoilage and the ways to prevent.
C221.5	**Describe** the principles involved in non-thermal food processing.
C221.6	**Describe** the principles involved in the various modern ways of food processing.

Prerequisite	Basic sciences

Contents	Hours
Principles of Food preservation Scope and Importance of food processing, National and International perspectives, Objectives and techniques of food preservation.	06
Food preservation by low temperature Cold Preservation: Freezing and Refrigeration- Air freezing, Indirect contact freezing, Immersion freezing, Dehydro-freezing, Cryo-freezing, Changes in foods during refrigeration and frozen storage	06
Food preservation by heating	06

Blanching, pasteurization, sterilization, UHT processing, extrusion cooking of food, Moist and Dry heat methods, Dehydration, Concentration, Canning	
Preservation by drying Processing and preservation by drying, concentration and evaporation-types of dryers and their suitability for different food products;	06
Food preservation by Non-thermal method Chemical preservation, fermentation methods for food preservation, irradiation, membrane technology.	06
Recent methods for food preservation Pulsed electric field processing, high pressure processing, processing by using ultrasound, dielectric, ohmic and infrared heating etc.	06

Text Books:

1. "Food processing technology: principles and practice", Fellows, P. and Ellis H. (1990). Wood Head Publishing Ltd.
2. "Food preservation and processing", Manoranjan Kalia and SangitaSood. (2019). Kalyani Publishers. New Delhi.
3. "Chemical changes in food during processing". Richardson, T. and Finley, J.W. (2003).Macmillon Publishers, Canada.

Reference Books:

1. Jelen, P. (1985). Introduction to Food Processing. Prentice Hall, Reston Virginia, USA.
2. Heldman, D.R. and Singh R. P. (2016). Introduction to Food Engineering.5th Edition. Elsevier India
3. William C. Frazier and Dennis C. Westoff (2017)., Food Microbiology 5th Edition, McGraw Hill Education.
4. Singh, Anju. (2017). Handbook of Food Preservation. Agrotech Press

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Course Title : **Principles of Food Preservation Laboratory** (Practical work)	
Course Code : 201CHMIP222	**Semester : IV**
Teaching Scheme : L-T-P : 0-0-2	Credits : 1
Evaluation Scheme : ISE Marks: 25 Marks	

Course Objectives (COs):

1. To imparts knowledge and expertise on preservation and food processing methods.
2. To familiarize themselves with good manufacturing practices and standard operating procedures used in laboratory activities.
3. To preserve food through drying, through freezing with the help of sugar, salt and acids.
4. To assist with the quality assessment of conservation products.

Course Outcomes (COs): At the end of the course the student will be able to

C222.1	**Apply** knowledge and expertise on preservation and food processing methods
C222.2	**Explain** themselves with good manufacturing practices and standard operating procedures used in laboratory activities.
C222.3	**Describe** preservation of food through drying, through freezing with the help of sugar, salt and acids.
C222.4	**Assist** with the quality assessment of conservation products.

Prerequisite	Basic sciences

List of Experiments

Expt. No.	Name of Experiment	Type	Hours
1.	Introduction to food processing equipment's	S	02
2.	To study effect of blanching on quality of foods	S	02
3.	To check the adequacy of Blanching treatment	O	02
4.	Preservation of food by the process of freezing	O	02
5.	Drying of food using Tray dryer/other dryer	O	02
6.	Preparation of product by using sugar as preservative	O	02
7.	Preparation of product by using salt as preservative	O	02
8.	Preservation of product by using chemical preservatives	O	02
9.	Preservation of food by canning	O	02

10.	Extrusion cooking of food	O	02
11.	Food Fermentation	O	02
12.	Market Survey	S	02

- S-STUDY, O-OPERATIONAL
- Minimum 10 Experiments should be conducted

Text Books/ Reference Books:

1. "Food processing technology: principles and practice" Fellows, P. J. (2009). Elsevier.
2. "Introduction to food engineering" Singh, R. P., and Heldman, D. R. (2001). Gulf Professional Publishing.
3. "The technology of food preservation" Desrosier, N. W., and James N. Desrosier. (1977). 4th Ed. AVI Publishing Company, Inc.

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Course Title : **Human Nutrition** (Lecture work)	
Course Code : 201CHMIL312	**Semester : V**
Teaching Scheme : L-T-P : 3-0-0	Credits : 3
Evaluation Scheme : ISE + MSE : 20+30=50 Marks	ESE Marks : 50 Marks

Course Objectives (COs):

1. To understand the physiological and metabolic functions of human digestive system.
2. To understand an overview of the major macro and micronutrients relevant to human health
3. To formulate dietary recommendations.
4. To understand proper diet planning, nutritional facts for balanced nutrition and healthy diets.
5. To understand the role of diet in causing and preventing various diseases
6. To get a basic foundation in human nutrition in preparation for any of the health professions.

Course Outcomes (COs): At the end of the course the student will be able to

C312.1	**Understand** the physiological and metabolic functions of nutrients.
C312.2	**Familiarize** nutritional assessment, RDA and Dietary Recommendations and guidelines.
C312.3	**Understand** the importance of energy and water balance
C312.4	**Understand** malnutrition, their causes and treatment
C312.5	**Understand** the principals involved in the diet, exchange lists, food labels and nutritional facts for balanced nutrition and healthy diets.
C312.6	**Describe**undesirable Constituents and toxic substances and their disorders.

Prerequisite	Basic sciences

Contents	Hours
Nutrition Scope, concepts and importance of nutrition, human digestive system	06
Nutritional aspects Nutritional aspects of carbohydrate, protein, lipids, water, vitamin and minerals, food, fad and faddism.	06
Energy and water balance Energy and water balance, Water intake and losses, energy requirement, and physiological energy value, bomb colorimeter	06

Malnutrition Types of malnutrition, multi-factorial causes, epidemiology of under nutrition and over nutrition, nutrition infection and immunity, nutrition education	06
Balance diet Balance diet, types of balance diet, diets for specific purposes.	06
Undesirable Constituents and toxic substances Undesirable Constituents and toxic substances and their disorders, hormones	06

Text Books:

1. "Nutrition and Dietetics" Joshi, Shubhangini A., (1992). Tata Mc Grow- Hill publishing Company Ltd., New Delhi.
2. "Fundamentals of Human Nutrition".Geissler.(2009). Elsevier Science.
3. "Advance Nutrition and Human Metabolism" Gropper, S. S. (2013). Cenage Learning.
4. "Advanced Text Book on Food and Nutrition"Swaminathan, M. (2006). (Volume I and II) The Bangalore Printing and Publishing Co. Ltd., Bangalore.

Reference Books:

1. Stewart Truswell. (2003) .ABC of Nutrition .4th edition. BMJ Publishing Group.
2. Carolyn D. Berdanier, Elaine B. Feldman and Johanna Dwyer. (2008). Handbook of Nutrition and Food. 2nd Ed. CRC Press, Boca Raton, FL, USA.
3. Swaminathan, N. (1987). Food Science and experimental foods. Ganesh Publications, Madras.5th Edition, vol 2, 2002.
4. Paul Singh R, and Dennis R.Heldman "Introduction to Food Engineering" 4th Edition. Academic Press – Elsevier India Private Ltd. New Delhi, 2008.

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Course Title : **Human Nutrition Laboratory** (Practical work)	
Course Code : 201CHMIP313	**Semester : V**
Teaching Scheme : L-T-P : 0-0-2	Credits : 1
Evaluation Scheme : ISE Marks: 25 Marks	

Course Objectives (COs):

1. To understand the physiological and metabolic functions of nutrients.
2. To determine the major macro and micronutrients relevant to human health
3. To understand methods of nutritional assessment, RDA and guidelines.
4. Explain how dietary recommendations are formulated.

Course Outcomes (COs): At the end of the course the student will be able to

C313.1	**Understand** the methods used for nutritional assessment.
C313.2	**Familiarize** nutritional assessment, RDA and Dietary Recommendations and guidelines.
C313.3	**Describe** the different nutritional assessment methods
C313.4	**Understand** the food composition and energy balance requires in diet planning.

Prerequisite	Basic sciences

List of Experiments			
Expt. No.	**Name of Experiment**	**Type**	**Hours**
1.	Calculation of BMR and body surface area	S	02
2.	Calculation of energy value of food	S	02
3.	Preparation of balance diet	O	02
4.	Anthropometric measurements	O	02
5.	Biochemical analysis of blood	O	02
6.	Biochemical analysis of urine	O	02
7.	Computation of energy requirement on the basis of physical activity ACU units	O	02
8.	Role of various national and international agencies in field of human nutrition	O	02
9.	Nutritional labelling of food products	O	02

10.	Nutritional survey	S	02
11.	Determination of energy value of food by bomb calorimeter	S	02
12.	Diet for specific health condition	S	02

- S-STUDY, O-OPERATIONAL
- Minimum 10 Experiments should be conducted

Text Books/ Reference Books:

1. "Advanced Text Book on Food and Nutrition" Swaminathan, M. (2006). (Volume I and II). The Bangalore Printing and Publishing Co. Ltd, Bangalore.
2. "ABC of Nutrition" Stewart, Truswell. (2003) (4th edition). BMJ Publishing Group. ISBN 0727916645.
3. "Handbook of Nutrition and Food" Carolyn D. Berdanier, Elaine B. Feldman and Johanna Dwyer. (2008). 2nd Ed. CRC Press, Boca Raton, FL, USA.

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Course Title : **Food Process Engineering** (Lecture work)	
Course Code : 201CHMIL324	**Semester : VI**
Teaching Scheme : L-T-P : 3-0-0	Credits : 3
Evaluation Scheme : ISE + MSE: 20+30=50 Marks	ESE Marks : 50 Marks

Course Objectives (COs):

1. Define the course and indicate the importance of the same to the students.
2. Introduce students to different machines/equipment used in food processing
3. Make the student to become acquainted with the principles of handling and processing food and agricultural products.
4. Emphasis on to the principles of operation of equipment used in the processing industry and the response of biological materials to these operations.
5. Apply engineering principle and concepts to handle store and process of various food products.
6. Design food processing and operating equipment for production of various food products.

Course Outcomes (COs): At the end of the course the student will be able to

C324.1	**Explain** the machines/equipment used for the different unit operations in food processing carry out some of the basic unit operations in food processing
C324.2	**Understand** of specific processing technologies used for various food products
C324.3	**Develop** an ability to identify, formulate, and solve engineering problems
C324.4	A comprehensive **understanding** of the aspects required to be controlled during food processing.
C324.5	Problem **evaluation** and problem solving skills regarding food processing operations that can affect the quality of foods
C324.6	**Developed** self-learning and practical proficiency and team work in food processing techniques to specific commodities and industrial plant unit operations.

Prerequisite	Principles of Food Preservation, Food Chemistry

Contents	Hours
Filtration and Centrifugation Filtration : Theory of filtration, industrial filters, applications to food industries Centrifugation: Theory of centrifugation, equipment, applications to food industries	05
Evaporation	

Principles of evaporation, types and selection of evaporators, mass and energy balance. Design of single and multiple effect evaporators, applications in food industries.	05
Drying & psychometric chart The psychometric chart: construction and use of psychometric chart for food unit operations. Drying: Principles of drying, drying rate kinetics, Dehydration systems, and dehydration system design by mass and energy balance, drying time prediction.	07
Refrigeration and Freezing Refrigeration: Refrigeration system and its components. Selection of a refrigerant. Cold– storage plants Freezing: Food Freezing systems, Frozen food properties, Calculation of freezing time by Plank's equation and other modified methods	07
Extrusion processes of Food Basics principle of extrusion, Extrusion systems : cold and hot extrusion; single screw and twin screw extruder design, extrusion cooking, application of extrusion	06
Crystallization Theory and principles of Crystallization, nucleation, crystal growth, crystallization equipment, applications of crystallization in food processing.	06

Text Books:

1. "Food Process Engineering and Technology" Berk, Zeki Academic Press, 2009.
2. "Introduction to Food Process Engineering". Smith, P.G. Springer, 2004.
3. "Fundamentals of Food Process Engineering".Toledo, Romeo T. 3rd Edition, Springer, 2007.

Reference Books:

1. Ibarz A. & Barbosa-Canovas G. V., "Unit operation in food engineering". CRC PRESS, 2013.
2. Bark Z. "Food Process engineering and technology". Academic Press. 1st Edition, 2009.
3. Smith P.G., "Introduction to food processing engineering". Springer, 2nd education, 2011.
4. Fellows P.J. "Food processing Technology-Principles and Practices". Wood head Publishing Limited,

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Course Title : **Food Packaging** (Lecture work)	
Course Code : 201CHMIL325	**Semester : VI**
Teaching Scheme : L-T-P : 3-0-0	Credits : 3
Evaluation Scheme : ISE + MSE : 20+30=50 Marks	ESE Marks : 50 Marks

Course Objectives (COs):

1. To impart comprehensive overview of the scientific and technical aspects of food packaging.
2. To instill knowledge on packaging machinery, systems, testing and regulations of packaging.
3. To gain knowledge on the different types of materials and media used for packaging foods
4. To gain knowledge on hazards and toxicity associated with packaging materials and laws, regulations and the monitoring agencies involved food safety, labeling of foods.
5. To gain knowledge on methods of packaging, shelf life and food factors affecting packaging.
6. To select the correct food packaging materials for different food products.

Course Outcomes (COs): At the end of the course the student will be able to

C325.1	**Understand** the various properties of food packaging materials.
C325.2	**Confirm** packaging laws and regulations meeting standards.
C325.3	**Describe** the properties of food packages, conversion technologies, processing and packaging technologies and user requirements including safety, convenience and environmental issues
C325.4	**Select** suitable packaging material for specific foods.
C325.5	**Describe** the technology involved in the production, shaping and printing of various packaging materials and package
C325.6	**Utilize** the correct packaging materials use for different food products manufacture in Food Industry.

Prerequisite	The students should have knowledge of Food Preservation, Food Engineering-I &II, Food Chemistry and Food Microbiology

Contents	Hours
Introduction to Food Packaging Package requirements, package functions, Hazards acting on package during transportation, Storage and atmospheric package, labeling laws Mechanical and functional tests on Package :Various mechanical and functional	06

testes perform in laboratories on package boxes and package materials	
Package Materials Classification packages, paper as package material its manufacture, types, advantages corrugated and paper board boxes etc. Glass as package material, Manufacture, Advantages, disadvantages. Metal as package material-manufacture, Advantages, disadvantages, Aluminum as package material, Its advantages and disadvantages, plastic as package material classification of polymers, properties of each plastics, uses of each plastics, chemistry of each plastic such as polyethylene, Polypropylene, polystyrene, polycarbonate, PVC, PVDC, Cellulose acetate, Nylon etc.	08
Lamination and Coating on paper and films Lamination, need of lamination, types, properties, advantages and disadvantages of each type. Types of coatings. Need of coating, methods of coatings.	06
Aseptic packaging Need, Advantaged, process, comparison of conventional and aseptic packaging, system of aseptic packaging and materials used in aseptic packaging, Machineries used in Packing foods	06
Packaging of Specific Foods Packaging of specific foods with its properties like bread, biscuits, coffee, milk powder, egg powder, carbonated beverages, Snack foods etc.	05
Novel Food Packaging Packaging of Space food, Retort able pouches, Controlled and Modified atmosphere Packaging, Active packaging, Edible Packages etc.	05

Text Books:

1. "Food Packaging Technology", 2003, Coles. Richard et al, Blackwell Publishing, Oxford Department of Technology, B.Tech (Food Technology) Program- Syllabus w.e.f. 2018 – 19
2. "Food Packaging Principles and Practice" Second Edn., 2005, G.L. Robertson
3. "Food Packaging Science and Technology", Dong Sun Lee, 2008

Reference Books:

1. Saroka, W 2002, Fundamentals of Packaging Technology, 3rd edition, Institute of Packaging Professionals, Herndon, Virginia.
2. Twede, D 2005, Cartons, Crates and Corrugated Board: Handbook of Pap*er and Wood Packaging Technology*, DEStech Publications.

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Course Title : **Food Process Engineering Laboratory** (Practical work)	
Course Code : 221CHMIP326	**Semester : VI**
Teaching Scheme : L-T-P : 0-0-2	Credits : 1
Evaluation Scheme : ISE Marks: 25 Marks	ESE (POE) : 25 Marks

Course Objectives (COs):

1. To food unit operation applied in food process industries
2. To different machines/equipment used in food processing
3. To become acquainted with the principles of handling and processing food and agricultural products.
4. To inculcate the practical proficiency in a food process engineering laboratory.

Course Outcomes (COs):

At the end of the course the student will be able to:

C326.1	Better **understanding** of food unit operation applied in food process industries
C326.2	**Explain and apply** the machines/equipment used for the different unit operations in food processing
C326.3	**Explain** practical proficiency in a food processing units
C326.4	**Identify, formulates,** and solves engineering problems.

Prerequisite	Principles of Food Preservation, Food Chemistry, Food Process Engineering I

List of Experiments

Expt. No.	Name of Experiment	Type	Hours
1.	Experiment on Filtration	O	02
2.	Experiment on Centrifugation	O	02
3.	Study of evaporator	S	02
4.	Determination of air properties using psychometric chart	S	02
5.	Study of dryers	S	02
6.	Osmotic Dehydration of Foods.	O	02
7.	Study of Freezing of foods by different methods	S	02
8.	Study of refrigeration of foods	S	02
9.	Determination of freezing time of a food material,	S	02
10.	Study of Extrusion process in food	S	02

11.	Study of crystalliser	S	02

- ❖ S-STUDY, O-OPERATIONAL
- ❖ Minimum 10 Experiments should be conducted

Text Books/ Reference Books:

1. "Introduction to food processing engineering". Smith P.G., Springer, 2nd education, 2011.
2. "Food processing Technology-Principles and Practices". Fellows P.J. Woodhead Publishing Limited, 2ND Edition, 2000.
3. "Chemical Engineering". Coulson J.M & Richardsons J.F., Butterworth Heinemann, 5th Edition, vol 2, 2002.

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Course Title : **Food Quality and Safety Management** (Lecture work)	
Course Code : 201CHMIL413	**Semester : VII**
Teaching Scheme : L-T-P : 3-0-0	Credits : 3
Evaluation Scheme : ISE + MSE:20+30=50 Marks	ESE Marks : 50 Marks

Course Objectives (COs):

1. The basic knowledge of food quality and Safety aspects
2. To quality assessment of different food products
3. To various regulatory aspects for food business operators
4. The sensory assessment for different food products
5. Understand various standards in food products and industries.
6. To apply the knowledge of sensory assessment methods in food industries.

Course Outcomes (COs): At the end of the course the student will be able to

C413.1	**Understand** the food quality aspects and need of food safety.
C413.2	**Apply and analyses** the quality assessment for perishable food products.
C413.3	**Apply and analyses** the quality assessment for nonperishable food products.
C413.4	**Understand** the various regulatory aspects for food business operators
C413.5	**Understand** the various voluntary standards for food processing industries.
C413.6	**Understand, apply and analyses** the sensory assessment for different food products.

Prerequisite	The students should have the knowledge of Food Quality & Safety Management

Contents	Hours
Introduction to food quality & Food safety management Food quality, its role in industry, Factors affecting quality control, Quality Attributes-Classification: Quality attributes, dominant attributes, hidden attributes	06
Methods of quality assessment of Perishable food material Sampling and specification of raw materials and finished products, Methods of quality assessment of food materials fruits, vegetables, dairy products, meat, poultry, egg and processed food products etc.	06
Methods of quality assessment of Non Perishable food material Methods of quality assessment of food materials Cereals, Bakery and confectionery,	06

Spices and plantation of Crop	
Regulatory system in food processing Food laws and standards: FSSAI, Concept of Codex Alimentations/ /USFDA Food Safety Modernization Act (FSMA)/, BIS standards, BRC standards , International Food Standard (IFS)	06
Voluntary standards Food Safety management system: ISO 22000, HACCP, PRP and OPRP: GMP, GLP. GAP, GHP, GDP, Global Food Safety Initiative (GFSI) and Global-Gap.	06
Sensory Evaluation Introduction -Panel Screening, Selection of Panel members, Requirements for conducting Sensory Evaluation and serving, Procedures, Methods of Sensory Evaluation, Instrumental analysis in quality control	06

Text Books:

1. Amerine, M.A. Pangborn, R.M., and Rosseler, E.B. 1965.
2. “Principles of Sensory Evaluation of Food”. Academic Press, New York. 2. Birk, G.G., Herman, J.G. and Parker, K.J. Ed. -1977.
3. “Sensory Properties of Foods”. Applied Science, London. 3. Charalambous, G. and Inglett, G. 1981.

Reference Books:

1. “The Quality of Foods and Beverages”. (2 vol.set). Academic Press, New York. 4. Furia, T.E. Ed. 1980.
2. “Regulatory Status of Direct Food Additives”. CRC Press, Florida. 5. Krammer, A. and Twigg, B.A. 1970. “
3. Quality Control for the Food Industry”. 3rd Edition. AVI, Westport. 6. Pattee, H.E. Ed. 1985.
4. “Evaluation of Quality of Fruits and Vegetables”. AVI, Westport.