Course Name: **Bachelor of Vocational**
Discipline: **Food Safety & Quality Management**
(FOR THOSE WHO JOININ 2022 AND AFTER)
Duration of the Course: **Three Years**

COURSE SCHEME :

Semester	Part	Subject	Hours/ Week	Credits			Int + Ext =Total	Subject Code	Focus on Employability/ Entrepreneurship/ Skill Development	Revised / New/ No change/ Interchanged & Percentage of revision
				Theory	Skill	Total				
III	Part 1	Soft Skill Development	6	2	2	4	25+75=100	B19FSC31/ **B22FSC31**	Skill Development	No change
	Core 5	Principles of Food Safety and Quality Management (PFSQM)	6	4	2	6	25+75=100	**B22FSC32**	Skill Development	**Revised – 10%**
	Core 6 Training	Training at any Food Industry for PFSQM	6	-	5	5	100 (Internal)	B19FSC33/ **B22FSC33**	Employability	No change
	Allied 5	Food Chemistry-I	6	4	2	6	25+75=100	B19FSA31/ **B22FSA31**	Skill Development	No change
	Allied 6 **Lab**	Food Chemistry-I Practical	4	-	4	4	40+60=100	B19FSAP31 / **B22FSAP31**	Skill Development	No change
	SBE 3	1. Food Processing in Cereals	2	1	1	2	25+75=100	**B22FSE31**	Skill Development	**Revised – 40%**
		2. **Food Processing in Pulses and Oil seeds**						B19FSE32/ **B22FSE32**		No change
		3. Food Processing in Fruits and Vegetables						**B22FSE33**		**Revised – 20%**
		Industrial Trip Report (Minimum 2 trips)			2	2	50(Internal)	B19FSIV3/ **B22FSIV31**	Entrepreneurship	No change
		Total	**30**	**12**	**18**	**29**	**650**			

Semester	Part	Subject	Hours/ Week	Credits			Int + Ext =Total	Subject Code	Focus on Employability/ Entrepreneurship/ Skill Development	Revised / New/ No change/ Interchanged & Percentage of revision
				Theory	Skill	Total				
IV	Core 7	Marketing, business administration and International trade	6	3	2	5	25+75=100	**B22FSC41**	Skill Development	**Inter changed – 10%**
	Core 8	Food Commodities and Food Preservation Technology (FCFP)	6	4	2	6	25+75=100	**B22FSC42**	Skill Development	**Revised – 20%**
	Core 9 Training	Training at any Food Industry for FCFP	6	-	4	4	100 (Internal)	B19FSC43/ **B22FSC43**	Entrepreneurship	No change
	Allied 7	Food Chemistry-II	6	4	2	6	25+75=100	B19FSA41/ **B22FSA41**	Skill Development	No change
	Allied 8 Lab	Food Chemistry– II Practical	4	-	4	4	40+60=100	B19FSAP41/ **B22FSAP41**	Employability	No change
	SBE 4	**1. Food Processing in Poultry and its Products**	2	1	1	2	25+75=100	**B22FSE41**	Skill Development	**Revised – 20%**
		2. Food Processing in Fish and its Products						**B22FSE42**		**Revised – 30%**
		3.Processing in Water Quality Analysis						**B22FSE43**		**Revised – 20%**
		Minor Project at any industry		-	3	3	50 (Internal)	B19FS4PR/ **B22FS4PR**	Entrepreneurship	No change
		Total	**30**	**12**	**18**	**30**	**650**			

Year	Part	Subject	Credit	Int = Total	Code
I & II	Part V	NSS / NCC / Physical Education/ YRC / RRC	3	100 = 100	**U22NS4 / U22NC4 / U22PS4 / U22YR4** / U22RR4

SEMESTER – III

SOFT SKILL DEVELOPMENT - Part III

Contact hours per week: **6** **Subject code:** B19FSC31/ **B22FSC31**

Contact hours per semester: **60** (30Theory + 30Skill) **Credits: 4**(**2**Theory + **2** Skill)

Course outcomes:

Students, after successful completion of the course, will be able to

CO1 : Describe and analyze the principles of food processing design and production techniques.

CO2 : Demonstrate the capacity to research, assimilate and apply advances in food processing technology.

CO3 : Understand the principles of quality management systems.

CO4 : Use and apply quality management systems to food processing.

Section –A Theory

Unit 1 **(6Hours)**

Meaning of soft skills – Soft skills versus hard skills – The importance of soft skills inthe competitive job market today – Selling your soft skills – Attributes regarded as soft skills –Identifying your soft skills – Enhancement of your soft skills through training.

Unit 2 **(6Hours)**

What is resuming? – The importance of a resume in an interview – Details to be included in a resume – Do's for resume preparation – Don't' for resume preparation – Resume preparation for fresher – Resume preparation for candidates with experience.

Unit 3 **(6Hours)**

Meaning of career goal – The importance of "Know Thyself" or self-assessment –What is SWOT analysis – Long term goal and short term goal – Career opportunities today –Source of career information – Importance of career guidance.

Unit 4 **(6Hours)**

What is GD? – Necessity of GD in an interview – Characters tested in a GD – Skills required in a GD – Types of GD – Body language in a GD – Movements and gestures to be avoided in GD – Topics for GD – GD etiquette.

Unit 5 **(6Hours)**

Why an interview – Types of interview – Anticipated interview questions – Body language in an interview dress code in an interview – Do's in interview – Don'ts in an interview – Post interview etiquette – Salary negotiation in an interview.

Reference Books:

1. Kasser, B. 1998.*Using the internet.* Fourth edition, EE Edition, New Delhi,.

Section –B Skill Component

Contact hours per semester: **30** **Credits: 2**

- Study of individual soft skills, its importance and develops through proper training.
- Learning the resume preparation methods and enhance the fresher's to attend interview.
- Determination of career goal of individuals and learn present opportunities in the field.
- Developing the individuals for group discussion and know its importance to get a job.
- Study of the types of interviews and learn the parameters should be followed in it.

Core5 – PRINCIPLES OF FOOD SAFETY AND QUALITY MANAGEMENT (PFSQM)

Contact hours per week: 6 **Subject code: B22FSC32**
Contact hours per semester: 90 (60Theory+30Skill) **Credits:** 6 (4 Theory + 2Skills)
Course outcomes:
Students, after successful completion of the course, will be able to

CO1: Analyze and communicate issues relevant to food processing technology and food quality management systems.
CO2: Perform experiments assessing the effect of processing conditions on quality parameters.
CO3: Communicate the science and technology involved in food processing and quality assurance through IT implemented reports and presentations.
CO4: Review and report upon the latest scientific literature pertaining to the areas of Food Processing and Quality Assurance.

Section-A:Theory

Unit1 **(12Hours)**

Principles of quality control - Raw material process control and Product inspection. Food adulteration and hygiene- Definition, common adulterants in different foods and methods of detecting adulterated foods.

Unit2 **(12Hours)**

Food additives - Definitions, types, action. Leavening agents: Definition and classifications. Sweetening agents: Flavors, stabilizers, color–uses and optimum level Color of foods – Natural colors, certifiedartificialcolors,non-certifiedcolors,usesandoptimumlevels.

Unit3 **(12Hours)**

Food processing: Introduction, enzymes -Amylases, Proteases, lipases, oxidoreductases, hydrolases. Standards for foods-Milk and milk products, Fruits and Vegetables, Beverages and Fleshy foods

Unit4 **(12Hours)**

Consumerism-Definition, Consumer protection act, Consumer Education, Legal modes of protection act and Machinery for redressal of consumer grievances.

Unit5 **(12Hours)**

Evaluation of quality of foods: Sensory Evaluation of foods - Requirement for conducting sensory tests, Types of test, limitation of sensory evaluation.

Text Books:

1. AdamsM.R.andMossM.O.2018. *FoodMicrobiology*,NewAgeInternationalPrivateLtd.Publications,London.
2. Frazier, W.C., Westhoff, D.C. and Vanitha, N.M. 2014. *Food Microbiology*, Fifth Edition, McGraw Hill Publications, New York.
3. Sri Lakhsmi, B. 2018. *Food Science*. Seventh Edition, New Age International Publishers, Chennai.

Reference Books:

1. Peppler, H.J. 1979. *Microbial Technology*, Volumes I and II – Academic press, New York.

Section – B Skill Component

Contact hours per semester: **30** **Credits: 2**

- Study the impact of food adulteration and adulterated foods.
- Analyze the safety of food materials and food processing techniques.
- Study the violations in the food additives and adulterations.
- Study the food laws governing the food products.
- Analyze the evaluation tests to check the quality of foods.

Core–6 TRAINING AT ANY FOOD INDUSTRY FOR PFSQM

Contact hours per week: 6 **Subject code:** B19FSC33/ **B22FSC33**
Contact hours per semester: 90 **Credits:** 5 (5Skill)

Course outcomes:

Students, after successful completion of the course, will be able to

CO1: Narrate and compile the information and data that is used to construct and assess about the company safety and risk management programs.

CO2: Introduction review on instrumentation, labors and processing. And predict the company future developments.

List of Industrial Visits Areas:

Masala food products,
Milk and milk products,
Frozen food products,
Heat and control food products,
Animal nutrition food products,
Agro foods products,
Foods and Beverages products,
Sea food products,
Poultry and egg products,
Vegetables sauce manufacture,
Sugar and sugar recipe and
Jam and pickles products

Allied-5 FOOD CHEMISTRY - I

Contact hours per week: 6 **Subject code:** B19FSA31/ **B22FSA31**
Contact hours per semester: 90 (60 Theory+30Skill) **Credits:** 6 (4Theory + 2Skill)

Course Outcomes:

Students, after successful completion of the course, will be able to

CO1: Learn the food materials and its origin

CO2: Know the various nature of food materials and its importance

CO3: Analyze the various food materials based on its physical and chemical Properties.

CO4 : Learn the processes of preservation and storage without contamination and learn waste management system

Section - A: Theory

Unit1 **(12 Hours)**

Introduction to food chemistry – Physio-chemical properties of foods – Colloids – Foams and emulsions –Role of water in food products–Bound water in food products

Unit2 **(12Hours)**

Chemical composition, nutritive value and basic nutrients: Carbohydrates proteins and lipids - Essential nutritive factors: Vitamins (Fat soluble and water soluble) and minerals (Ca, K, Fe, I and P)

Unit3 **(12Hours)**

Anti-nutritive Factors: Natural toxic Compounds, food contaminants: Physical, ChemicalandBiological(exogenicandendogenic)-hygienictoxicologicalqualityoffood-othercomponentsinfluencingfood quality.

Unit4 **(12Hours)**

Food analysis – Sampling techniques of food products –Physical and Chemical analysis of foods, Instrumentation in food analysis: pH meter, Colorimeter and Bomb calorimeter.

Unit5 **(12Hours)**

Food preservation – Irradiation High temperature and low temperature – Preservatives: Natural and artificial.

Text Books:

1. Sri Lakhsmi, B. 2018. *Food Science*. Seventh Edition, New Age International Publishers, Chennai.
2. Silley, P. and Forsythe, S. 1996. Impedance Microbiology –A rapid change for Microbiologists – A review. *Journal of Applied Bacteriology*, 80:223-243
3. Dziezak, J.D. 1987. Rapid methods for analysis of foods. *Food Technology*, 41(7): 56-73.
4. Johnson Green, Perry, 2002. Diagnostic systems. **In**: Introduction to Food Biotechnology, CRC Press, Florida.
5. Vennila, Principles on Preservation of Fruits and Vegetables

Reference Books:

1. Jellifie, D.B. 1966. The Assessment of the nutritional status of the Community; World Health Organization, Geneva.

Section – B Skill Component

Contact hours per semester: **30** **Credits:2**

1. Study of various origins and sources of foods.
2. Determination of food contents like water, sugars and proteins.
3. Determination of food contents like lipids, vitamins and food additives.
4. Study of food samples analyzing techniques for physical and chemical properties.
5. Study of food processing, packaging and preservation in industry.

Allied - 6 FOOD CHEMISTRY – I PRACTICAL

Contact Hours per week: 4 **Subject Code:** B19FSAP31/ **B22FSAP31**
Contact Hours per semester: 60 (40 Practical + 20Skill) **Credits:** 4 (4 Skills)

Section–A

Course outcomes

Students, after successful completion of the course, will be able to

CO1: Learn moisture present in the food materials
CO2: Learn ingredient level of protein, fat, vitamins and pH values of the various Food products
CO3: Estimate chemical components present in the food products
CO4: Learn the presence of pigments and microchemicals

List of Experiments:

1. Calibration of Glassware
2. Moisture in Food Products by Hot-air oven – drying Method
3. Moisture in Food Products by Dean and Stark Method
4. Moisture in Food Products using Karl Fischer Titration Method
5. Determination of total, non-reducing and reducing sugars.
6. Determination of Protein in food sample by Lowry's method.
7. Protein Content in Food Products by Kjeldahl Method
8. Determination of Crude Fat in food sample by Soxhlet method.
9. Total fat in foods by Rose Gottleib Method
10. Starch in Cereal Grains by Acid Hydrolysis Method

Reference Books:

1. Cappucino, J.G. and Sherman, N., 2014, *Microbiology: A laboratory manual,* 11/e, Pearson Publica ons United States.

SBE: I
FOOD PROCESSING IN CEREALS

Contact Hours per week: 2 **Subject Code: B22FSE31**
Contact Hours per semester: **30 (20 Theory + 10 Skill)** **Credits:** 2(1 Theory + 1Skill)

Course outcomes:

Students, after successful completion of the course, will be able to

CO1. Understand the working of equipment related to Wheat & Rice Milling along with equipment related to Wheat based & Rice based Food Products.
CO2. Understand technology for Milling of Corn & Corn based other Food Products along with equipments and know how to operate it.

Unit1 **(4 Hours)**

Cereals and Millets: Origin, morphology, chemical composition and nutritive values, physico-chemical properties.

Unit2 **(4 Hours)**

Paddy processing and rice milling: Conventional milling, modern milling Milling operations, milling machines, milling efficiency; Quality characteristics influencing final milled products. Parboiling, Rice bran stabilization and its methods, aging of rice; Enrichment of rice – Methods of enrichment; Rice fortification.

Unit3 **(4 Hours)**

Corn milling: Dry and wet milling of corn, starch and gluten separation, milling fractions and modified starches. Barley: Malting and milling Oat/Rye: Processing, milling Sorghum: Milling, malting, pearling Millets (Pearl millets, finger millets)

Unit4 **(4 Hours)**

Secondary and tertiary product processing of cereals and millets, By-products of cerealsand millets processing - Processing of millets for food uses.

Unit5 **(4 Hours)**

Cereals and millets: Processing of infant foods; Breakfast foods: Flaked, puffed, expanded, extruded and shredded; by- products. Present status and future prospects of cereals and millets.

Text Books:

1. Chakraverty, A. and Singh, R.P. 2014. *Post Harvest Technology and Food Process Engineering*. CRC Press, Boca Raton, FL, USA.
2. Khan, K. and Shewry, P.R. 2009. *Wheat: Chemistry and Technology*, 4th Ed., AACC International, Inc., St. Paul, MN, USA.
3. Wrigley, C.W., Corke, H. and Walker, C. 2004. *Encyclopedia of Grain Science*. Elsevier Academic Press, London, UK.
4. Champagne, E.T. 2004. *Rice: Chemistry and Technology*, 3rd Ed., AACC International, Inc., St. Paul, MN, USA.
5. Chakraverty, A., Mujumdar, A.S., Vijaya Raghavan G.S. and Ramaswamy, H.S. 2003. *Hand book of Post Harvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices*. Marcel Dekker, Inc., NY, USA.
6. White, P. J. and Johnson. L. Lawrence A. 2003. *Corn: Chemistry and Technology*, 2nd Ed., AACC International, Inc., St. Paul, MN, USA.

Reference Books:

1. Dendy, D.A.V. and Dobraszczyk, B.J. 2001. *Cereal and Cereal Products: Technology and Chemistry*. Springer-Verlag, US.
2. Kent, N.L. and Evers, A.D. 1994. *Kent's Technology of Cereals: An Introduction for Students of Food Science and Agriculture*. 4th Ed. Elsevier Science Ltd., Oxford, UK.
3. Samuel, A. Matz, 1991. *The Chemistry and Technology of Cereals as Food and Feed*, 2nd Ed. Springer Science + Business Media, NY, USA.
4. Araullo, E.V., DePadna, D.B. and Graham. 1976. *Rice Post Harvest Technology*. IDRC, Canada.

Section – BSkill Component

Contact hours per semester: **30** **Credits:1**

- Study the nutritional composition and physico chemical properties of cereals.
- Learning of processing techniques of cereals- dry and wet milling process.
- Study of gluten formation techniques and malting process.
- Study of importance of millets and its nutritional components.
- Learning the various processing methods of cereals and millets.

SBE: II

FOOD PROCESSING IN PULSES AND OIL SEEDS

Contact Hours per week: 2 **Subject Code:** B19FSE32/ **B22FSE32**
Contact Hours per semester: **30 (20 Theory + 10 Skill)** **Credits:**2 (1 Theory + 1 Skill)

Course Outcomes:

Students, after successful completion of the course, will be able to

CO1. Understand the technology for Wheat Milling & Wheat based Food Products.
CO2. Acquire the knowledge of the technology for Rice Milling & Rice based other Food Products.
CO3. Know the technology for Oil Extraction & Oil Seed Processing along with equipments.

Unit1 **(4 Hours)**

Wheat and wheat flour: Introduction – milling process, flour grade, flour treatments (bleaching, maturing), flour for various purposes, Products and By-products. Rice – Physicochemical properties, milling (mechanical & solvent extraction), parboiling, ageing of rice, utilization of byproducts.

Unit2 **(4 Hours)**

Corn – Milling (wet & dry), cornflakes, corn flour Barley- Milling (pearl barley, barley flakes & flour Oats – Milling (oatmeal, oat flour & oat flakes. Sorghum and millets – Traditional & commercial milling (dry & wet).Rye and triticale—milling (flour), uses.

Unit3 **(4 Hours)**

Milling of pulses, Drymilling, Wet milling, improved milling method

Unit4 **(4 Hours)**

Introduction, Extraction of oil and refining, Sources of protein (defatted flour, protein concentrates and isolates), properties and uses, protein texturization, fibre spinning

Unit5 **(4 Hours)**

Alcoholic beverages: Beer, Wine, Distilled Spirits and its commercial usage.

Text Books:

1. Chakrabarty, M.M. 2003. *Chemistry and Technology of Oils and Fats*. Prentice Hall.
2. Dendy, D.A.V. and Dobraszczyk, B.J. 2001. *Cereal and Cereal Products: Technology and Chemistry*. Springer-Verlag, US.
3. Hamilton, R.J. and Bhati, A. 1980. Fats and Oils-Chemistry and echnology. Applied Science Publisher, London.
4. Hoseney, R.S. 1994. Principles of Cereal Science andTechnology. 2nd Ed. AACC International, Inc., St. Paul, MN, USA.

Section – B Skill Component

Contact hours per semester: **30** **Credits: 1**

1. To develop proficiency skill in producing different processed pulses and oilseeds food products, operating & maintenance the modern equipment's & machineries
2. Make different processed food products with quality assurance, and Process of Packaging, Storing & marketing.
3. To acquaint with production and consumption trends, structure, composition, quality evaluation, and processing technologies for product development and value addition of various cereals, pulses and oilseeds.
4. Study of food processing, packaging and preservation in industry.

SBE: III
FOOD PROCESSING IN FRUITS AND VEGETABLES

Contact Hours per week: 2 **Subject Code: B22FSE33**
Contact Hours per semester: **30 (20 Theory + 10 Skill)** **Credits:** 2(1 Theory + 1 Skill)

Course outcomes:
Students, after successful completion of the course, will be able to

CO1: Understand Biological, Chemical & Physical Properties of Fruits & Vegetables.
CO2: Understand Technologies involved in Processing, Preservation & Value Addition of Fruits & Vegetables.
CO3: Gain knowledge on Industrial Processes for Commercial Production of Jams, Jellies, Marmalade, Fruit Juices, Juice Powder, Dehydrated Fruits, and Canning of Fruits &Vegetables.
CO4: Understand Basics of New Food Products Development & Ideas Generation for Product Development.

Unit - 1 **(4 Hours)**

Production and processing scenario of fruits and vegetables in India and world; Scope of fruit and vegetable processing industry in India.

Unit - 2 **(4 Hours)**

Overview of principles and preservation methods of fruits and vegetables; Supply chain

of fresh fruits and vegetables Primary processing and pack house handling of fruits and vegetables; Peeling, slicing, cubing, cutting and other size reduction operations for fruits andvegetables.

Unit - 3 **(4 Hours)**

Minimal processing of fruits and vegetables; Blanching –operations and equipment. Canning:-Definition, processing steps and equipment; Cans and containers, quality assurance and defects in canned products.

Unit-4 **(4 Hours)**

Preparation and preservation of juices, squashes, syrups, sherbets, nectars and cordials. FSSAI specifications of crystallized fruits and preserves, jam, jelly and marmalades, candies. Preparation, preservation and machines for manufacture of above products.

Unit-5 **(4 Hours)**

Preparation, preservation and machines for manufacture of chutney, pickles, sauce, puree, paste, ketchup, papads and soup powders. Production of pectin and vinegar.

Text Books:

1. Chavan, U.D. and Patil. J.V. 2013. *Industrial Processing of Fruits and Vegetables*. Astral International Pvt. Ltd., New Delhi.
2. Rajarathnam, S. and Ramteke, R.S. 2011. *Advances in Preservation and Processing Technologies of Fruits and Vegetables*. New India Publishing Agency, New Delhi.
3. Hui, Y.H. 2006. *Handbook of Fruits and Fruit Processing*. Blackwell Publishing Ltd., Oxford, UK.
4. Cruess, W.V. 2004. Commercial Fruit and Vegetable Products. Agrobios India, Jodhpur.
5. Y.H. Hui, Sue Chazala, Dee M. Graham, K.D. Murrell and Wai-KitNip. 2004. *Handbook of Vegetable Preservation and Processing*. Marcel Dekker, Inc., NY, USA.
6. Thompson, A.K. 2003. *Fruit and Vegetables: Harvest, Handling and Storage*, 2nd Ed. Blackwell Publishing Ltd., Oxford, UK.

Reference Books:

1. Srivastava, R.P. and Kumar. S. 2002. *Fruit & Vegetable Preservation: Principles and Practices*, 3rd Ed. International Book Distribution Co., Delhi.
2. Pandey, P.H. 1997. *Post Harvest Technology of Fruits and Vegetables*. Saroj Prakashan, Allahabad.
3. Mircea Enachescu Dauthy. 1995. *Fruit and Vegetable Processing*. FAO Agricultural Services Bulletin No.119. FAO of UN, Rome.
4. Girdhari Lal, G.S. Siddappa and and on G.L. T. 1959. *Preservation of Fruits and Vegetables*. ICAR, New Delhi.
5. EIRI Board of Consultants and Engineers. 2008. *Manufacture of Snacks, Namkeen, Papads and Potato Products*. EIRI, New Delhi.

Section – B Skill Component

Contacthourspersemester:**30** **Credits:1**

- Study the various processing methods of fruits and vegetables.
- Learning of post-harvest technology of fruits and vegetables.
- Study the processing and storage techniques applied in fruits and vegetables
- Study the preparation methods and spoilage of fruits and vegetable products.
- Learning of preservation techniques and preservatives used in prepared products.

INDUSTRIAL VISITS

Contact Hours per week: Nil **Subject Code:** B19FSIV3/ **B22FSIV31**
Contact Hours per semester: Nil **Credits:** 2 (2 Skill)

Course Outcomes:

Students, after successful completion of the course, will be able to

CO1: Industrial visits of great source to gain practical knowledge.

CO2: Students can observe and learn as to how theoretical concepts are put to into action, there by aiding their practical learning.

CO3: Students are exposed to real working environment and shown how things are done in an organization.

Keeping this objective at hand, the department organizes excursion tours cum industrial visits which are within the framework of the curriculum. The excursions and industrial visits are for the academic year students which are relevant to the stream of study of the programme.

SEMESTER – IV

Core 7 MARKETING, BUSINESS ADMINISTRATION AND INTERNATIONAL TRADE

Contact hours per week: 6 **Subject code: B22FSC41**
Contact hours per semester: **90 (60 Theory + 30 Skill)** **Credits:** 5(3 Theory + 2 Skill)

Section–A Theory

Course outcomes:

Students, after successful completion of the course, will be able to

CO1: Contribute to economic development by maintaining consumer confidence in the food system and providing a regulatory foundation for international trade in food

CO2: Create and modify food safety and quality assurance system components such as policies, procedures, and instructions, based on scientific principles.

CO3: know the financial accounting, financial management and budgeting

Unit-1 **(12Hours)**

Marketing management: Introduction, structure of market and consumer buying behavior; marketing opportunities analysis.

Unit - 2 **(12Hours)**

Market measurement; product policy and planning; pricing decisions; promotion – mix decisions.

Unit-3 **(12Hours)**

India's Foreign trade: Basis, trends and composition. Institutes for promotion of Indian agricultural/horticultural trade and export inspection agencies. Export documentation, Procedures.

Unit - 4 **(12 Hours)**

Trade Act regulations relating to maintaining hygienic conditions, Consumer Protection Act 1986; international marketing and international trade; exports. Role of Institute like Export/Import Bank and ECGC (Export Credit Guarantee Corporation)

Unit-5 **(12Hours)**

Introduction to Financial Accounting: Recording of transactions, Preparation of Final Accounts; Fundamentals of Financial Management: Steps in Capital Budgeting, Working Capital Management; Factors affecting Working Capital, NPV.

Text Books:

1. Adams, M.R. and Moss, M.O. *Food Microbiology*, New Age International Pvt. Ltd. Publications, London.
2. Frazier,W.C. and Westhoff, D.C. 2014. *Food Microbiology*. Fifth Edition, McGrawHill publications, New York.

Reference Books:

1. Export/import policy by Govt. of India. Export/import data by DGCIS-Calcutta. Export documentation by Nashi Publication.
2. Darrah, L.B. 1971. *Food Marketing*. The Ronald Press Comp. NewYork.
3. Kacker, M. 1982. *Marketing and Economic Development*, Deep and Deep Pub., New Delhi.

Section – B Skill Component

Contact hours per semester: **30** **Credits: 2**

- Understanding the financial accounting and fundamentals financial management.
- Study of marketing management and analysis of marketing opportunities.
- Learningthemarketmeasurementandproductpolicy,planningandpricings.
- Study the composition of foreign trade and export credit Guarantee Corporation.
- Study of trade act regulations, consumer act and international marketing.

Core 7 – FOOD COMMODITIES AND FOOD PRESERVATION TECHNOLOGY

Contact hours per week: 6 **Subject Code: B22FSC42**
Contact hours per semester: **90 (60 Theory + 30 Skill)** **Credits: 6** (4 Theory + 2 Skill)

Course outcomes:
Students, after successful completion of the course will be able to

CO1: Identify the important pathogens and spoilage microorganisms in foods and the conditions under which they will grow.
CO2: Identify the conditions under which the important pathogens are commonly inactivated, killed or made harmless in foods.
CO3: Know the principles involving food preservation via fermentation processes.

Section–ATheory

Unit-1 **(12Hours)**

Cereals (Rice and Wheat), Millets (Ragi and Bajra) and Pulses (Moong Dhal and Black gram dhal) - methods of storage, Nutritional aspects and cost.

Unit-2 **(12Hours)**

Milk and Milk products -, processing, quality analysis, methods of storage, nutritional aspects, shelf life, spoilage and cost. Fermented (curd, shrikhand and cheese) and non-fermented (khoa, milkkhoa and rasagulla) milk products.

Unit-3 **(12Hours)**

Eggs, Meat, Fish and Poultry - Quality selection, methods of storage, cost, nutritional aspects - Vegetables and Fruits - methods of storage, nutritional aspects of raw and processed products.

Unit-4 **(12Hours)**

Sugar and sugar Products - Types of sweeteners and methods of storage. Salt - types and uses. Fats and oils - Processing, storage, cost and nutritional aspects.

Unit-5 **(12Hours)**

Food preservation: Definition, importance, methods of processing (canning, lacquering, thermal process, curing, pickling). Fermentation technology.

Reference Books:

1. Potter, N.N. and Hotchkiss, J.H. 1998. *Food Science*. Springer Science and Business Media, New York.
2. Tandon, G.L. Siddappa, G.S., Lal, G. 2009. Preservation of Fruits & Vegetables by IRRI.
3. Lavies, S. 1998. *Food Commodities Ltd*. London.
4. Hughes, O. and Bennion, M. 1970. *Introductory Foods*. Macmillan & Co., New York.
5. Pyke, M. 1974. *Catering Service and Technology*. John Murrey Publication, London.

Section – B Skill Component

Contact hours per semester: **30** **Credits:2**

- Study of cereals, millets and its processing, storage and spoilage.
- Learning of egg, meat, fish and its processing, storage and spoilage.
- Study of sugar, fat, salt and its processing, storage and spoilage.
- Learning the physical and chemical methods of preservations.
- Study of various types of fermentation technology.

Core – 6 TRAINING ATANY FOOD INDUSTRYFOR FCFP

Contact hours per week: 6 **Subject Code:** B19FSC43/ **B22FSC43**
Contact hours per semester: **90** **Credits: 4** (4Skill)
Course outcomes:
On successful completion of this module the student will:

CO1: It helps to narrate and compile the information and data that is used to construct and assess about the company safety and risk management programs.

CO2: Format: Introduction review on instrumentation, labors and processing and predict the company future developments.

- Cocoa food products, Coffee manufacture company, Orange juice Frozen & Preservation Company,
- Grains, wheat, soybeans, soybean oil, rice, oats, and corn production and Preservation Company.
- Sugar and sugar recipes, jam, jellies and pickles products and Preservation Company.

Allied 7 – FOOD CHEMISTRY - II

Contact hours per week: 6 **Subject code:** B19FSAP41/ **B22FSAP41**
Contact hours per semester: 90 (60 Theory + 30 Skill) **Credits: 6**(4 Theory + 2 Skill)

Course outcomes:

Students, after successful completion of the course, will be able to

CO1: Know the spoilage and deterioration mechanisms in foods and methods to control deterioration and spoilage.
CO2: Enlist the principles that make food products for consumption.
CO3: Get knowledge about the transport processes and unit operations in food processing as demonstrated both conceptually and in practical laboratory settings
CO4: Operate the mass and energy balances for a given food process and describe the unit operations required to produce a given food product.

Section – A Theory

Unit-1 **(12Hours)**

Food and its functions constitution of chemicals in food – Basic five Food groups– Functional foods and nutraceuticals –Definition and health benefits.

Unit-2 **(12Hours)**

Introduction to nutrition: Definition, nutritional status, good nutritional status, poor nutritional status, malnutrition, and Biological functions of nutrients.

Unit-3 **(12Hours)**

Food and our body: digestion and absorption of food Buccal digestion, gastric digestion and intestinal digestion-factors affecting digestion and absorption

Unit-4 **(12Hours)**

Energy metabolism: Introduction, unit of measurement, energy value of food – Bomb calorimetry; Total energy requirements of the body - Reference man and reference woman; basal metabolic rate, factors affecting the BMR

Unit-5 **(12 Hours)**

Nutritional assessments of humans: Clinical findings, nutritional anthropometry, biochemical tests and biophysical method.

Text books:

1. Adams, M.R. and Moss, M.O. *Food Microbiology*, New Age International Private Ltd. Publications, London.
2. Frazier, W.C. and Westhoff, D.C. 2014. Food Microbiology Fifth Edition, McGraw Hill Publications, NewYork.

Reference Books:

1. Jelliffe D.B. 1966. The Assessment of the Nutritional Status of the Community (with special reference to field surveys in developing regions of the world). Series No. 53.World Health Organization.
2. Sain D.R., Lockwood R., Scrimshaw N.S. 1984. Methods the Evaluation of the Impact of Food and Nutrition programmes, **In**: Report of a workshop on the Evaluation of Food and Nutrition Programmes, sponsored by the United Nations University on behalf of the United Nations ACC Sub-committee on Nutrition (Ed. Sahn, D.E., Lockwood, R. and Scrimshaw, N.S.),*The Massachusetts Institute of Technology*, Cambridge, Massachusetts, USA.
3. Aurand, L.W. and Woods, A.E. 1973. *Food Chemistry*. AVI Publishing Company, Westport.
4. Birch, G.G., Cameron A.G. and Spencer M. 1986. *Food Science,* 3rd Ed. Pergamon Press, New York.

Section – B Skill Component

Contact hours per semester: **30** **Credits:2**

- Study of chemical constituents, scope and importance of chemicals in food.
- Learning the nutritional statuses like malnutrition, poor nutrition and good nutrition.
- Study of various metabolic functions in body and influences of various factors.
- Measurement of various levels of energy value in body and factors affecting BMR.

- Study of nutritional assessment of humans and clinical studies.

Allied 8 – FOOD CHEMISTRY – II PRACTICAL

Contact hours per week: 4 **Subject code:** B19FSAP41/ **B22FSAP41**
Contact hours per semester: 60 (40 Practical + 20Skill) **Credits: 4**

Section – A

Course outcomes:

Students, aftersuccessful completion of th ecourse, will be able to

CO1: Explain the principles and current practices of processing techniques and the effects of processing parameters on product quality.

CO2: Apply principles from general chemistry, biology, physics, statistics, and mathematics to food science problems

CO3:Generate nutritional panels for food products using the vital program. Hygiene and sanitation, including good manufacturing practice

List of Experiments:

1. Determination of pH in food sample.
2. Estimation of Vitamin C in food sample.
3. Determination of Pigments in food sample.
4. Estimation of Ash content in food products.
5. Estimation of calcium in food products.
6. Estimation of iron in food products.
7. Estimation of zinc in food products.
8. Estimation of Iodine in food products.
9. Determination of food adulterants in food products – Honey, Turmeric and Pepper.
10. Determination of tin in food products.

Reference Books:

1. Fennema, O.R. 1976. *Principles of Food Science:Part-I Food Chemistry*. Marcel Dekker, New York.
2. Meyer, L.H. 1973. *Food Chemistry*. East-West Press Pvt. Ltd., New Delhi.
3. Potter, N.N. 1978. *Food Science*. 3rd Ed. AVI, Westport

SBE : I
FOOD PROCESSING IN POULTRYAND ITS PRODUCTS

Contact Hours per week: 2 **Subject Code: B22FSE41**
Contact Hours per semester: **30 (20 Theory + 10 Skill)** **Credits: 2** (1 Theory + 1Skill)

Course outcomes:

Students, after successful completion of the course, will be able to

CO1: Know the significance and necessity of organized animal products sector, human

slaughtering of poultry and value addition of poultry egg.

CO2: Understand need and importance of livestock, egg and poultry industry

CO3: Learn the structure, composition and nutritional quality of animal products.

CO4: Learn the processing and preservation of poultry foods.

CO5: Understand technology behind preparation of various poultry food products and byproduct utilization.

CO6: Gain knowledge on status & scope of Poultry industry worldwide.

Unit-1 **(4Hours)**

Introduction to Livestock and poultry population in India, Development of poultry industry in India and its need in nation's economy, Glossary of live market terms for birds.

Unit-2 **(4Hours)**

Poultry: Introduction, sources and importance. Poultry muscle: Structure, classification, composition and types - Pre-slaughter operations and slaughtering operations for poultry.

Unit-3 **(4Hours)**

Preservation of poultry by chilling, freezing, pickling, curing, cooking and smoking, canning, dehydration, radiation, chemical and biological preservatives. Novel methods: Low dose irradiation; High pressure treatment, hurdle barrier – concept for poultry.

Unit-4 **(4Hours)**

Quality of eggs - internal and external quality evaluation, candling, albumen index, haugh unit, shape index and yolk index. Grading of eggs. Pasteurization, dehydration, freezing and desugarization of egg.

Unit-5 **(4Hours)**

Liquid egg products, egg powder, value added egg products (meringues and poached egg). Packaging of egg and egg products.

Text Books:,

1. Nanda V. 2014. *Meat, Egg and Poultry Science & Technology*. I.K. International Publishing House Pvt. Ltd., New Delhi.
2. Kerry, J.P. Kerry, J.F. and Ledward, D. 2002. Meat Processing: Improving Quality. Woodhead Publishing Ltd., Cambridge, England.
3. Sharma. B.D.1999. *Meat and Meat Products Technology (Including Poultry Products Technology)*. Jaypee Brothers Medical Publishers Pvt. Ltd, New Delhi.

Reference Books:

1. Lawrie, R.A. 1985. Egg Science and Technology, 4th Ed. Food Products Press, NY, USA.
2. Brigitte Maas-van Berkel, Brigiet vanden Boogaard and Corlien Heijnen. 2004. *Preservation of Fish and Meat*. Agromisa Foundation, Wageningen.
3. FAO. 2003. Code of Practices of Canned Fishery products. FAO, UN, Rome.
4. Rautenstrauss, B.W. and Liehr, T. 2002. *Fish Technology*. Springer-Verlag, US.
5. G.M. Hall. 1997. *Fish Processing Technology*, 2nd Ed. Chapman & Hall, London, UK.

Section – B Skill Component

Contact hours per semester: **30** **Credits: 1**

- Study of poultry processing types and storage techniques.
- Learn the pre-slaughtering operations and rigor mortis of meat.

- Study the preservation techniques applied in poultry.
- Study the nutritional components in egg and its quality.
- Learn the packaging techniques for egg and meat.

SBE:II

FOOD PROCESSING IN FISH AND ITS PRODUCTS

Contact Hour sperweek:2 **Subject Code: B22FSE42**

Contact Hours per semester: **30 (20 Theory + 10 Skill) Credits: 2** (1 Theory + 1Skill)

Course outcomes:

Students, after successful completion of the course, will be able to

CO1: Know about the significance & necessity of organized animal product sector.
CO2: Acquire the ability of value - addition Fish.
CO3: Understand the processing, preservation & quality control of Fish in Food Industry.
CO4: Gain knowledge of manufacturing practices of fish based by products & their processing techniques.

Unit-1 **(4Hours)**

Fishery industry: Introduction, status in India. Selection of fishes. Fermented fish: Traditional and indigenous fish products. Fermented sea foods: crabs, lobsters, prawns, shrimps and shell-fish. Role of preservatives in fishery industry.

Unit-2 **(4Hours)**

Techniques in Fishery industry: Curing; smoking; drying and salting of fish; Chilling and freezing of fish. Relationship between chilling and storage life. Water activity and shelf-life, salting process, salting methods (brining, pickling, kench curing, gaspe curing), types of salts, dried and salted fish products-pin dang, fish wood, dried shrimp.

Unit-3 **(4Hours)**

Canning of fish - Principles, classification based on pH groupings, effect of heat processing on fish, storage of canned fish, pre-process operations, post process operations, cannery operations for specific canned products.

Unit-4 **(4Hours)**

Fish Handling and Quality: Importance, methods of handling. Quality of fresh fish. Factors affecting quality of fresh fish, Processing of fish. Manufacturing of fish paste, fish sauces, fish oil, fish protein concentrate.

Unit-5 **(4Hours)**

Modified Atmosphere Packaging (MAP) of fish, general aspects of freezing, freezing systems (air blast freezing), changes in quality of chilled and frozen storage and thawing.

Text Books:

1. Guerrero-Legarreta, I. 2010. Handbook of Poultry Science and Technology.
2. Fernandes, R. 2009. Microbiology Handbook: Fish and Seafood. Royal Society of Chemistry.
3. Varnam, A.H. & Sutherland, J.P. 1995. Meat and Meat Products: Technology, Chemistry and Microbiology: Champan & Hill, London.

Reference Books:

1. Lawrie, R.A. 1998. *Lawrie's Meat Science* (6th Ed.): Wood head, Cambridge.
2. Kerry, J.P. Kerry, J.F. and Led ward, D. 2002. Meat Processing: Improving Quality. Wood head Publishing Ltd., Cambridge, England.

Section – B Skill Component

Contact hours per semester: **30** **Credits:1**

1. Maintains various records in processing plants like Hazard analysis work sheet, HACCP plan form, Tunnel freezer register, Plate freezer registers, Consolidated daily production register, Daily sanitation check list, Check list for personal hygiene, Chlorination register, Register for analytical report, Raw material evaluation register, Register for pre-processing summary and Register for processing.
2. To provide an understanding of the technology for handling, processing, preservation and bi-product utilization of fish and fish products processing
3. Evaluates various inspection systems and Works with HACCP in Seafood industry.

SBE : III
PROCESSING IN WATER QUALITYANALYSIS

Contact Hours perweek:2 **Subject Code: B22FSE43**
Contact Hours per semester: **30 (20 Theory + 10 Skill)** **Credits: 2** (1 Theory + 1Skill)

Course outcomes:

Students, after successful completion of the course, will be able to

CO1: Understand the principles and operation of water treatment systems
CO2: Know the suitability of the design of treatment plants and unit processes
CO3: Evaluate process operations and performance
CO4: Understand coagulation, flocculation, and sedimentation, filtration, and disinfection processes.

Unit-1 **(4Hours)**

Quantity of Water: Per-capita demand, design period, population forecast, fluctuation in demand General requirement: Sources of water, necessity of treatment, water quality standards for various water uses.

Unit-2 **(4Hours)**

Principles of sedimentation: Types of settling and settling equations, design criteria and design of settling tanks. Principle of Coagulation and Flocculation–types of coagulants, coagulant aids.

Unit-3 **(4Hours)**

Disinfection: different types of disinfectants, factors affecting disinfection, methods of disinfection and chemistry of chlorination, Ions causing hardness, Langelier index, Winkler's method.

Unit-4 **(4Hours)**

Adsorption Process: Types, factors affecting adsorption, kinetics and equilibrium– different isotherm equations and their applications.

Unit-5 **(4Hours)**

Water Softening: Ion exchange, electro-dialysis, Reverse Osmosis, Ultra filtration Distribution system design and analysis, distribution reservoirs and service reservoirs.

Text Books:

1. Peavy, H.S., Rowe and Tchobonoglous, G., 1985, *Environmental Engineering*, McGraw Hill, Pvt. Co. Ltd., New Delhi.
2. Raju, B.S.N., 1995. *Water Supply and Wastewater Engineering*. Tata McGraw Hill Pvt. Co. Ltd., New Delhi.
3. Fair, G.M., Geyer J. Cand Okun, 1969. *Water and Wastewater Engineering.* Vol-II, John Wiley Publications.

Reference Books:

1. Weber Jr. W.J. (1975). Physico-Chemical Processes for Water Quality Control.
2. AWWA, (1971), "Water Quality and Treatment" McGraw Hill.
3. CPHEEO Manual, 1991. *Water Supply and Treatment.* GOI Publications.

Section – B Skill Component

Contact hours per semester:**30** **Credits:1**

1. Determination of Acidity of different water samples
2. Determination of Alkalinity of different water samples
3. Determination of hardness of different water samples
4. Determination of presence of carbonate and bicarbonate in a water sample
5. Determination of presence of dissolved nutrients in a different water samples

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MINOR PROJECT AT ANY INDUSTRY

Contact Hours per week: Nil **Subject Code:** B19FS4PR/ **B22FS4PR**
Contact Hours per semester**:** Nil Credits: **3 (3Skill)**

Course Outcomes:

Students, after successful completion of the course, will be able to

CO1: Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
CO2: Acquire the skills to communicate effectively and to present ideas clearly and coherently to specific audience in both the written and oral forms.
CO3: Acquire collaborative skills through working in a team to achieve common goals.
CO4: Learn their own, reflect on their learning and take appropriate actions to improve it.
CO5: Learn to work in groups, they will also learn independently through self-reflection and evaluation of their own work processes.

The aim of project work (lab work) is to inculcate students to learn adequate knowledge on research methodology in the subject and prepare them for pursuing research in experimental or computational areas of the subject. Student's allotment is done by lot system. The project work study is to be undertaken under the guidance of a Teacher of the Department. The guiding teacher will make continuous internal assessment of the Project Work. No teacher shall be permitted to guide more than eight students in a semester for Project Work under his/her supervision. The project work will be evaluated by the external examiner.

- Project will be done by the second year students in the fourth semester under the guidance of respective guides.
- For projects internal marks (Max 50) will be awarded by the respective guide and external examinations.
- Minimum number of pages for B.Voc. Project thesis shall be 30.
