

Tel. No.: 2419700/2419567
Fax: 0821-2419363/2419301



Email: registrar@uni-mysore.ac.in
www.uni-mysore.ac.in

Vishwavidyanilaya Karyasoudha
Crawford Hall, Mysuru- 570 005

(Re-accredited by NAAC with 3.01 CGPA of 4.0 Scale)

(NIRF-2021 Ranked 19 in University Category & 34 in Overall Category)

No.: PMEB/AC10/759(4)/2019-20

Date: 10-01-2022

NOTIFICATION

- Sub.: Introduction of **B.Sc. (Food Processing and Quality Management)** course under Specialized Programmes from the academic year 2020-21-reg.
- Ref.: 1. Decision of the BOS Meeting held on 04-10-2021.
2. Decision of the Faculty of Science & Technology meeting held on 20-12-2021.
3. Decision of the Academic Council meeting held on 23-12-2021.

The Board of Studies in **B.Sc. (Food Processing and Quality Management) (UG)** at its meeting held on 04-10-2021 has recommended to approve the 2nd and 3rd year Syllabus of **B.Sc. (Food Processing and Quality Management)** course in University of Mysore under specialized/specified programs.

The Faculty of Science & Technology and the Academic Council at their meetings held on 20-12-2021 and 23-12-2021 respectively, are also approved the above said proposal and the same is hereby notified.

The Syllabus of **B.Sc. (Food Processing and Quality Management)** course is uploaded in University website. The contents may be downloaded from the University website <https://uni-mysore.ac.in/PMEB/>.


REGISTRAR
REGISTRAR
University of Mysore
MYSURU - 570 005

To;

1. The Registrar (Evaluation), University of Mysore, Mysuru.
2. The Dean, Faculty of Science & Technology, DOS in Earth Science, Manasagangothri, Mysuru.
3. Prof. Asna Urooj, DOS in Food Science & Nutrition, Manasagangothri, Mysuru.
4. The Principal Co-ordinator, MES, PBMM Education Centre, KRS Road, Metagalli, Mysuru.
5. The Deputy Registrar/ Asst. Registrar/ Superintendent, Examination Branch, UOM, Mysuru.
6. The Special Officer to Hon'ble Vice-Chancellor, University of Mysore, Mysuru.
7. The PA to Vice-Chancellor/Registrar/Registrar (Evaluation), University of Mysore, Mysuru.
8. Office Copy.

Specialized Program
Bachelor of Science (Food Processing and Quality Management)
COURSE CREDIT STRUCTURE AND SYLLABUS

S.No	Course	Title	Credits	Total Credits	Maximum Marks			Total
			L+T+P		IA		Exam	Marks
					C1	C2	C3	
SEMESTER-I								
1	DSC1A	Food Processing– I	3+0+0	3	10	10	80	100
	DSC1B	Practical	0+0+2	2	5	5	40	50
2	DSC2A	Dairy Science- I	3+0+0	3	10	10	80	100
	DSC2B	Practical	0+0+1	1	5	5	40	50
3	DSC3A	Bakery and Confectionery –I	3+0+0	3	10	10	80	100
	DSC3B	Practical	0+0+1	1	5	5	40	50
4	AECC1	MIL – I (Sanskrit , Hindi or any other as approved by UGC)	3+0+0	3	10	10	80	100
5	AECC2	English–I	3+0+0	3	10	10	80	100
6	AECC3	Environmental Studies	3+0+0	3	10	10	80	100
Total Credits/Marks				22				750
SEMESTER-II								
1	DSC4A	Food Processing– II	3+0+0	3	10	10	80	100
	DSC4B	Practical	0+0+2	2	5	5	40	50
2	DSC5A	Dairy Science–II	3+0+0	3	10	10	80	100
	DSC5B	Practical	0+0+1	1	5	5	40	50
3	DSC6A	Bakery & Confectionery-II	3+0+0	3	10	10	80	100
	DSC6B	Practical	0+0+1	1	5	5	40	50
4	AECC4	MIL – II (Sanskrit , Hindi or any other as approved by UGC)	3+0+0	3	10	10	80	100
5	AECC5	English–II	3+0+0	3	10	10	80	100
6	AECC6	Constitution of India	3+0+0	3	10	10	80	100
Total Credits/Marks				22				750

S.No	Course	Title	Credits	Total Credits	Maximum Marks			Total
			L+T+P		IA		Exam	Marks
					C1	C2	C3	
SEMESTER-III								
1	DSC7A	Agro Processing – I	3+0+0	3	10	10	80	100
	DSC7B	Practical	0+0+1	1	5	5	40	50
2	DSC8A	Fruits & Vegetable Processing-I	3+0+0	3	10	10	80	100
	DSC8B	Practical	0+0+2	2	5	5	40	50
3	DSC9A	Food Quality Control and Waste Management-I	3+0+0	3	10	10	80	100
	DSC9B	Practical	0+0+2	2	5	5	40	50
4	AECC7	Food Safety and Food Regulations	3+0+0	3	10	10	80	100
5	AECC8	Communicative Skills-I	3+0+0	3	10	10	80	100
6	AECC9	Disaster Management	2+0+0	2	05	05	40	50
Total Credits/Marks				22				700
SEMESTER-IV								
1	DSC10A	Agro Processing-II	3+0+0	3	10	10	80	100
	DSC10B	Practical	0+0+1	1	5	5	40	50
2	DSC11A	Fruits & Vegetable Processing-II	3+0+0	3	10	10	80	100
	DSC11B	Practical	0+0+2	2	5	5	40	50
3	DSC12A	Food Quality Control and Waste Management-II	3+0+0	3	10	10	80	100
	DSC12B	Practical	0+0+2	2	5	5	40	50
4	DSC13	Food Preservation	4+0+0	4	10	10	80	100
5	AECC10	Basic Principles of Nutrition	3+0+0	3	10	10	80	100
6	AECC11	Communicative Skills-II	3+0+0	3	10	10	80	100
Total Credits/Marks				24				750

S.No	Course	Title	Credits	Total Credits	Maximum Marks			Total
			L+T+P		IA		Exam	Marks
					C1	C2	C3	
SEMESTER-V								
1	DSC14A	Food Chemistry	3+0+0	3	10	10	80	100
	DSC14B	Practical	0+0+2	2	5	5	40	50
2	DSC15A	Meat ,Fish & Poultry Processing	3+0+0	3	10	10	80	100
	DSC15B	Practical	0+0+2	2	5	5	40	50
3	DSC16A	Food and Beverage Processing	3+0+0	3	10	10	80	100
	DSC16B	Practical	0+0+1	1	5	5	50	50
4 & 5	DSE1 & DSE2	Choose any two						
		A. Start-up Entrepreneurship	5+0+0	5	10	10	80	100
		B. Cold Chain Management	5+0+0	5	10	10	80	100
		C. Food Marketing	5+0+0	5	10	10	80	100
		D. Computer Application in Food Processing	5+0+0	5	10	10	80	100
6	SEC1	Skill Development-I	4+0+0	4	10	10	80	100
Total Credits/Marks				28				700
SEMESTER-VI								
1	DSC17	Training components A. Internship training in Food Processing Company (6Weeks)	0+0+5	5	--	--	100	100
2	DSC18	B. Training report + Presentation & VivaVoce	0+0+5	5	--	--	100	100
3	DSC19A	Food Microbiology	3+0+0	3	10	10	80	100
	DSC19B	Practical	0+0+1	1	5	5	40	50
4 & 5	DSE3 & DSE4	Choose any two						
		A. Project Report	0+0+5	5	10	10	80	100
		B. Food Packaging	5+0+0	5	10	10	80	100
		C. Food Cost Management	5+0+0	5	10	10	80	100
		D. Food Hygiene and Sanitation	5+0+0	5	10	10	80	100
6	SEC2	Skill Development-II	4+0+0	4	10	10	80	100
Total Credits/Marks				28				650

DSC –Discipline Specific Course
DSE-Discipline Specific Elective
SEC-Skill Enhancement Courses
AECC-Ability Enhancement Compulsory Courses

Bachelor of Science (Food Processing and Quality Management)
(Choice Based Credit System)
SEMESTER - III

DSC7A AGRO PROCESSING – I

Total Credits: 3

Total Hours 45hrs

Objective:

1. To study the science and its scope in plant growth.
2. To study the processing of Major Spices.

Learning Outcome:

1. To understand the selection of crops and varieties for multiple cropping.
2. To understand the types of packing and packaging Materials.

Module I: Principles of Agronomy

10 hrs

Agronomy as a science and its scope, plant growth and development, environmental effects on crop growth, ideal plant type, tillage seed quality, sowing, crop density and spatial arrangement, crop nutrition, organic manures and fertilizers, irrigation and drainage, weed management, distribution of crops, cropping system, selection of crops and varieties for multiple cropping, Organic farming concept, practices and scope in India.

Module II: Fundamentals of Soil Science

10 hrs

Soil formation, classification, physical and chemical properties; manures and fertilizers essential for plant nutrients, uptake of N,P, & K by important crops, methods of manure and fertilizer application, composition of bulky organic manures, concentrated organic manures, green manures and various types of inorganic fertilizer.

Module III: Spices, Spice oils and Oleoresin

10 hrs

Definition, Classification, Chemical composition, Use of Spices. Spice oil and Oleoresins- Definition, Technology of Manufacturing.

Production and processing of Major Spices - Pepper, Cardamom, Ginger, Chillies, Turmeric, onion

Production and processing of Minor spices –Ajwan, coriander, cumin, cinnamon, fenugreek, vanilla, asafoetida

Module IV: Farm Technology and Packaging

10 hrs

Role of biotechnology in Agriculture, Commercialization of agriculture, Tissue culture, Green house operations and genetically modified crops. Objectives and functions of food packaging, Requirements for effective food packaging, Types of packaging Materials, General properties of packaging material.

Module V: Thermal processing

5 hrs

Principles of Blanching, Pasteurization and Sterilization. Microbial survivor curves, thermal death time, spoilage probability, methods for process calculations

DSC7B**PRACTICALS****Total Credits: 1**

1. Identification of crops, manures and fertilizers.
2. Collection and processing of soil sample for analysis of organic carbon, soil pH and electrical conductivity
3. Determination of Moisture
4. Determination of Water absorption power
5. Preparation of Hcl extract of soil
6. Identification of garden tools and plants.
7. Preparation of seed beds and rising of seedlings.
8. Practice of lifting and packing of nursery plants.
9. Visit to nurseries, gardens and research stations.

REFERENCES

- 1) Chhidda Singh, Modern techniques of raising field crops. Oxford and IBH Publishing Co. Ltd., Bangalore.
- 2) Gopal Chandra De. 1980. Fundamentals of Agronomy. Oxford and IBH Publishing Co. Ltd., Bangalore.
- 3) Hand book of Agriculture, ICAR Publication.
- 4) Palaniappan, S.P., Cropping Systems in the tropics – Principles and Practices. Willey Eastern Ltd., New Delhi.
- 5) Panda, S.C. 2006. Agronomy Agribios Publication, New Delhi.

DSC8A - FRUITS AND VEGETABLE PROCESSING - I

Total Credits: 3

Total Hours 45hrs

Objective:

1. To study the processing pattern of fruits and vegetables.
2. To study the processing of food products and canning process.

Learning Outcome:

1. To understand the selection, ingredients and their role.
2. To understand the health benefits of fruits and vegetables and its nutritive value.

Module I - Introduction to Fruits and Vegetables

10 hrs

Classification and composition of fruits and vegetables; Scope, importance, production and processing status of Fruits and Vegetables in India, Storage of fruits and vegetables- principles and types of storage systems. Dehydration of fruits and vegetables (mechanical dehydration, osmotic dehydration, dehydrated products- vegetable granule, powder and flakes)

Module II - Fruit Beverages

10 hrs

Definition and types, Post harvest handling, precooling methods, post harvest treatments, edible coatings, Methods of preparation- Juice, RTS, squash, nectar, syrup, crush, cordial and blended beverages, Pickling (Ingredients and their role, Pickling process), Storage of fresh fruits and vegetables-ambient, refrigerated, modified atmosphere, evaporative cool storage

Module III - Jam, Jelly and Marmalade

10 hrs

Jam-Definition of pectin, classification, pectic enzymes, properties, jelly grade of pectin, testing of pectin, selection of fruits, used and their role, jam making.

Jelly: Essential constituents (Role of pectin, ratio), theory of jelly formation, processing and technology, defects in jelly

Marmalade: Types, processing and technology, defects method of preparation, chutney and sauces (definition, process, types and examples)

Module IV - Food products and canning process

8 hrs

Fruit preserves, candied fruits, glazed fruits and crystallized fruits, enzyme inactivation, sulphuring sun drying - grapes and dates. Definition, history: process of canning- fruits, vegetables, spoilage of canned fruits and vegetables, syrups and brines for canning

Module V – Nutritional aspects

7 hrs

Nutritive value and pigments, Antinutritional and toxic factors, health benefits of fruits and vegetables. Stability of nutrients – chemical changes, flavor changes, changes in nutritive value (Physical and biological changes). Dehydration of vegetables and fruits: tunnel and cabinet drier, drying and dehydration.

DSC8B**PRACTICALS****TOTAL CREDITS 2**

1. Studies on maturity indices of fruits and vegetables.
2. Estimation of total soluble solids (TSS).
3. Studies on the physiological disorders-chilling injury of banana.
4. Preparation of fruit jam
5. Preparation of fruit jelly/marmalade
6. Preparation of fruit preserve and candy.
7. Preparation of fruit juice/squash/cordial/nectar
8. Preparation of pickle/mixed pickle.
9. Preparation of tomato products- sauce, puree, ketchup.
10. Visit to fruit and vegetable processing industry.

REFERENCES:

- 1) Girdhari Lal, Siddhapa and Tondon, Preservation of Fruits and Vegetables – ICAR, New Delhi.
- 2) Ranganna, S. Hand Book of Analysis and Quality Control of Fruits and Vegetable Products –Tata, McGraw Hill, New Delhi.
- 3) Srivastava R.P. and Sanjeev Kumar, Fruit and Vegetable Preservation: Principles & Practices International book distributing Co. Lucknow.
- 4) Giridhari Lal, Siddappa, G.S. and Tondon G.L. Preservation of Fruits and Vegetables CFTRI, ICAR, New Delhi -12.
- 5) Hui, Y.H., Ghazala, S., Graham, D.M., Murrell, K.D. & Nip, W.K. 2003. Handbook of Vegetable Preservation and Processing Marcel Dekker.

DSC9A - FOOD QUALITY CONTROL AND WASTE MANAGEMENT - I
Total Credits: 3 **Total Hours 45hrs**

Objective:

1. To study the concept of sanitization.
2. To study the concept of safe food.

Learning Outcome:

1. To understand the types of sanitizers in food industry and importance of thermal properties.
2. To understand different types of food hazards and its management.

Module I - Sanitizers and methods of sanitation **10 hrs**

Sanitation: Definition, Sources of food contamination, Prevention and control of contamination of food. Physical and chemical agents used in food industry. Sanitizers, chemical and physical properties of sanitizers, Mechanism of activity of most frequently used sanitizers. Sanitizing methods, Sanitation equipments and systems, Mechanized sweepers and scrubbers, high pressure cleaners, CIP and COP equipment.

Module II - Heat transfer in food processing **10 hrs**

Thermal properties of foods- specific heat, thermal conductivity and thermal diffusivity
Modes of heat transfer (conductive, convective and radioactive heat transfer), Systems for heating and cooling food products (plate heat exchanger, tubular heat exchanger, scraped surface heat exchanger, steam infusion and steam injection heat exchanger).

Module III - Cleaning compounds **7 hrs**

Cleaning compounds, Classification of cleaning compounds, Sequestrates, Chemical and physical characteristics of detergents, Personal hygiene and pest control- Food handling and personal hygiene, GMP for Personal Hygiene, Pest control methods.

Module IV - Physical and chemical hazards **10 hrs**

Definition of food safety and concept of safe food; characterization of food hazards- Physical hazards (Glass, Wood, Stones, Metal Fragments, Insulation Materials, Plastic).
Chemical hazards: Natural occurring toxicants in foods and antinutritional factors in foods.
Unintentional Chemicals: Pesticides, Fertilizers, Pollutants, Toxic metals (Lead, Cadmium, Mercury, Aluminium and Arsenic); Intentional Chemicals (Food preservatives & Food additives)

Module V - Waste storage and disposal methods **8 hrs**

Storage and disposal of liquid and gaseous waste- land-filling, burial, incineration, recycling, biological treatment of food, industry wastes. Storage and disposal of liquid and gaseous waste, Environment management systems (ISO 14000) and its application in food industry. Microbiological tests, tests for adulterants, tests for filth, tests for moisture and ash definition,

DSC9B **PRACTICALS** **TOTAL CREDITS 2**

1. Determination of viscosity by Brookfield viscometer

2. Texture profile analysis by texture analyzer
3. Color analysis by Tintometer
4. Determination of Brix by Refractometer
5. Sensory analysis of food products
6. Study of solid waste disposal methods
7. Study of liquid waste disposal methods
8. Visit to waste disposal section in food industry

REFERENCES:

1. Robert R. Zall. 2004. Managing Food Industry Waste: Common sense methods for Food Processors, Blackwell Publishing.
2. Loannis S. and Arvanitoyannis. 2008. Waste Management in Food Industry, Academic Press.
3. Vasso Oreopoulou and Winfried Russ. 2007. Utilization of byproducts and treatments of waste in Food Industry, Springer publication.
4. Waldron K. 2007. Handbook of waste Management and Co- product Recovery in Food Processing, Woodhead Publishing Company.
5. Bhatia, R. and Ichhpujan, R.L. 2004. Quality assurance in Microbiology. CBS Publishers and Distributors, New Delhi.

AECC7 - FOOD SAFETY AND FOOD REGULATIONS

Total Credits: 3

Total Hours 45hrs

Objective:

1. To study the Quality Management of food
2. To study the quality control and regulations in food industry

Learning Outcome:

1. To understand the Good Manufacturing Practices
2. To understand different types Regulations and Certifications needed in the Food Safety

Module I Basic Quality Concepts

8 hrs

Definition of food safety and concept of safe food; Basic concepts of Quality control and Quality Assurance, Total Quality Management, Current Good Manufacturing Practices (GMP), Standard Sanitary Operation Procedures, Good Laboratory Practices (GLP), ISO 22000 FSMS

Module II

7 hrs

Introduction and Need of enforcing to Food Laws. Mandatory food laws; The food safety and standards Act 2006, Establishment of the authority, composition of authoring functions of chief executive officer, scientific part.

Module III Quality Assessment and Quality Control

8 hrs

Need for food laws, Microbiological Tests, Tests for Adulterants, Tests for Filth, Tests for Moisture and Ash. Statistical Quality Control: Definition, Seven tools for SQC (Flow chart, Check sheet, Fishbonediagram, Pareto charts, Histogram, Runcharts and Control chart).

Module IV Monitoring and Regulation**12 hrs**

HACCP – definition, principles, steps involved; Food standards - Voluntary and mandatory food laws and Food Safety and Standards Act of India, 2006. Edible Oils Packaging (Regulation) Order, 1998, Environment (Protection) Act, 1986, Fruit Products Order, 1955 (FPO), Meat Food Products Order, 1973 (MFPO), Milk and Milk Product Order, 1992 (MMPO), Solvent Extracted Oil, De-oiled Meal and Edible Flour (Control) Order, 1967.

Module V**10hrs**

FSSAI, Indian Food Regulations and Certifications: Food Safety and Standards Act FSSAI Rules, food adulteration, misbranding, common adulterants in foods, Duties and responsibilities of Food Safety Authorities.

REFERENCES:

1. Early, R.1995.Guide to Quality Management Systems for Food Industries. Blackie Academic.
2. Krammer, A & Twigg, B. A.1973. Quality Control in Food Industry. Vol. I, II. AVI Publ
3. Vasconcellos, J.A. Quality Assurance for the Food Industry.
4. R. H. Schmidt and G. E. Rodrick Food Safety Handbook.
5. Rasco, B. A. & Bledsoe, G. E. Bioterrorism and food safety.
6. Kramer and Twingg. Quality control in food industry (Vol. I and II)

AECC8: COMMUNICATIVE SKILLS -I (L T P -3 0 0)**Total Credits: 03****Total Hours: 35****Objectives:**

1. To learn about English communication skills.
2. To improve the vocabulary, learning and listening skills.

Learning Outcomes:

1. To be able to speak effectively in presentations.
2. Able to develop presentation skills along with interview skills.

Module I**07 hrs**

The Sentence- Kinds of Sentence- Transformation of Sentence- The Noun- Kinds – Noun-Noun Forms. The pronoun – Kinds – Personal, Reflexive, Lymphatic and Possessive. The Verb- Tense Forms and its Usage.

Module II**08 hrs**

Oral Communication Skills- Public Speaking - Group Presentations and Discussions - Participation in Meetings and Interviews – Brainstorming - Designing and Delivering Presentations, Team Presentations-Non-Verbal Communication: Forms of Non-Verbal Communication, Interpreting Non-Verbal Messages, Tips for Effective use of Non-Verbal Communication.

Module III**06 hrs**

Skills Development Through Practice - Listening Skills and Barriers; Role Plays, Debates, Elocution, Mock Interviews, etc.; Persuasive Communication, Convincing Skills, Conversations.

Module IV

08 hrs

Spoken English Skills -Vocabulary-Word Power; Grammar-Common Errors and Sentence Building, Phonetics; Reading Comprehension and Vocabulary Building Psychometrics; Aptitude and Personality Assessment and Testing.

Module V

08 hrs

Presentation Skills and Techniques -Personal Grooming and Business Etiquettes-Corporate Etiquette, Social Etiquette and Telephone Etiquette, Gestures and Body Language, Impression Management-Image Building and Self Awareness- Developing Self Awareness - Projecting a Winning Personality-Attending Interviews.

REFERENCES:

1. Kaul, Asha (2005), Effective Business Communication, PHI, New Delhi.
2. Urmila Roy (2016), Guide to Managerial Communication: Effective Writing & Speaking, PHI, New Delhi.
3. Mandal S.K. (2015), Effective Communication and Public Speaking, Jaico, Mumbai.
4. Meenakshi Raman & Prakash Singh (2012), Business Communication, Oxford University Press.
5. Bovee, Thill & Schatzman (2003), Business Communication Today, Pearson, New Delhi.

AECC9: DISASTER MANAGEMENT (L T P-2 0 0)

Total Credits: 02

Total Hours: 25

Objectives:

To familiarize students with the Disaster Management skills to enable them deal with manmade and natural disasters striking mankind

Module I

07hrs

Introduction to Disasters: Concepts, and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks). Disasters: Classification, Causes, Impacts (including social, economic, political, environmental, health, psychosocial, etc.) Differential impacts- in terms of caste, class, gender, age, location, disability Global trends in disasters, urban disasters, pandemics, complex emergencies, Climate change.

Module II

07hrs

Approaches to Disaster Risk reduction: Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural-nonstructural measures, roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre, and other stake-holders.

Module III

06hrs

Inter-relationship between Disasters and Development: Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge,

appropriate technology and local resources

Module IV

05hrs

Disaster Risk Management in India Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation)

REFERNCES:

1. Gupta Anil K, Sreeja S. Nair.
2. 2011 Environmental Knowledge for Disaster Risk Management,
3. NIDM, New Delhi Indian Journal of Social Work 2002.
4. Special Issue on Psychosocial Aspects of Disasters, Volume 63, Issue 2, April.
5. Kapur, Anu & others, 2005: Disasters in India Studies of grim reality, RawatPublishers, Jaipur
6. Kapur Anu 2010: Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi.

SEMESTER -IV

DSC10A AGRO PROCESSING – II

Total Credits: 3

Total Hours: 45hrs

Objective:

1. To study the environmental condition necessary for plantation
2. To study the improvised technology in food processing

Learning Outcome:

1. To understand the factors affecting the food crops
2. To understand the structure and chemical composition of food and its management

Module I: Agricultural Meteorology

10 hrs

1. Different meteorological variables related to agriculture. 2. Rainfall- Hydrological cycle and Rain gauge, 3. Run-off - Definition, types, factors affecting, estimation and measurement. 4. Atmosphere - climate and weather, atmospheric pressure, factors affecting and measurement. 5. Temperature – kinds, measuring instruments of temperature; factors affecting and measurement of temperature. 6. Humidity, definition, kind and importance.

Module II: Plantation crops

7

hrs

Importance of plantation crops, chemical composition; processing of Tea leaves: Black tea, Green tea and Oolong tea, Instant tea. Processing of coffee: coffee beans, grinding, storage, Soluble /Instant coffee, Use of chicory in coffee, decaffeinated coffee

Module III: Technology of Wheat and Rice Processing

10 hrs

Wheat: Structure and chemical composition of wheat grain. Criteria of wheat quality – physical and chemical factors, Milling of wheat, byproducts - Whole wheat flour, Maida, semolina, Gluten

Rice: Structure and chemical composition of rice grain, Milling of rice, byproducts of rice milling - Husk, Bran, Broken rice Parboiling- Merits and demerits, Curing, Aging of rice, Rice products - Flaked rice, Puffed rice

Module IV: Technology of Corn and pulses processing

10 hrs

Structure and composition of corn grain, different types of corn. Wet and dry milling of corn, and their products, Corn sweeteners (high fructose corn syrups) and their uses. Barley malting process: steeping, germination and drying; significance of malting; Different types of malts and their food applications.

Structure and composition of pulses. Toxic constituents in pulses, Processing of pulses- soaking, germination, decortications, cooking and fermentation, Milling of pulses- Dry milling, Wet milling, Improved milling methods.

Module V: Weed Management

8 hrs

Definition, classification of weed, Ecology of weeds: Reproduction (Seed production, seed dissemination, seed germination, vegetative reproduction), factor influencing weed distribution. Concepts of prevention, eradication and control of weeds.

DSC10B**PRACTICALS****TOTAL CREDITS 1**

1. Measurement of rainfall, Atmospheric pressure, relative humidity and evaporation.
2. Study of microscope and microscopic techniques.
3. Determination of Physical parameters of wheat and rice.
4. Simple and Gram's staining of bacteria.
5. Preparation of nutrient broth, Czapek-Dox and Richard's media.
6. Enumeration and measurement of bacteria and fungi.
7. Methods of fertilizer application.
8. Framing of crops rotations

REFERENCES

- 1) Reddy, S.R. Principles of Agronomy Kalyani Publishers, Ludhiana, India.
- 2) Sankaran, S and Subbiah Mudliyar, V.T. 1991. Principles of Agronomy. The Bangalore Printing and Publishing Co. Ltd., Bangalore.
- 3) Vaidya, V.G., Sahasrabudhe, K.R. and Khuspe, V.S. Crop production and field experimentation. Continental Prakashan, Vijaynagar, Pune.
- 4) Rao V.S. 2006. Principles of Weed Science. Oxford and IBH Publishing Co., New Delhi, India.
- 5) Gupta, O.P. 2008. Modern Weed Management, Agribios India Publication.

DSC11A - FRUITS AND VEGETABLE PROCESSING - II
Total Credits: 3 **Total Hours 45hrs**

Objective:

1. To study the processing and harvesting of fruits and vegetables
2. To study the factors affecting storage and post harvest technique

Learning Outcome:

1. To understand the processing and preservation of fruits and preservation.
2. To understand the control of post harvest losses

Module I – Maturity, ripening and harvesting of fruits and vegetables **10 hrs**

Ripening – changes during ripening, classification of fruits – climacteric and non climacteric fruits. Maturity indices and its importance, determination of harvest maturity indices – computational methods, physical methods, chemical methods and physiological methods. Harvesting of fruits and vegetables - manual and mechanical methods and mode of transportation.

Module II – Processing of fruits and vegetables **10 hrs**

Peeling, slicing/ dicing, blanching and nutritional quality of blanched food. Canning of fruits and vegetables, Processing of fruit juices (selection, juice extraction, deaeration, straining, filtration and clarification), Preservation of fruit juices (pasteurization, chemically preserved with sugars, freezing, drying, tetra-packing, carbonation), Processing of squashes, cordials, nectars, concentrates and powder. Post-harvest losses in fruits and vegetables, Control of postharvest losses: Freezing injury, chilling injury and heat injury.

Module III - Browning, Pigments and flavours **5 hrs**

Browning: Enzyme activity, enzymic browning, Non enzymic browning and its prevention.

Pigments and flavours: Pigments and flavors of fruits and vegetables, Chlorophyll, Carotenes, Flavanoids.

Module IV –Packing house operations and storage **10 hrs**

Post harvest operations– reception, drenching, washing, cleaning, pre-cooling, trimming, presorting, sorting/ grading, waxing, physical treatments, chemical treatments, packaging and labeling. Factors affecting storage, methods of storage – traditional storage (on site storage, pit storage, high altitude storage, clamp storage, under-ground storage and evaporative cool storage) and improved storage methods (MAP, CAP, active packaging, vacuum packaging and hypobaric storage).

Module V – Current status of production and processing of fruits and vegetables **10 hrs**

Product mix, availability of raw material, manpower, capital, lack of awareness, marketing facility, transport facility, availability of containers, publicity and role of government. Machineries for peeling, slicing/dicing, pulping, hydraulic pressing and clarification; preparation and maintenance of work area and process machineries; different materials and equipments used in the cleaning process.

DSC11B**PRACTICALS****TOTAL CREDITS 2**

1. Determination of Sulphur dioxide
2. Estimation of Vitamin C
3. Estimation of tannin – colorimetric method
4. Estimation of alcohol content
5. Determination of salt content in pickles
6. Determination of reducing sugar
7. Lye peeling
8. Preparation of ketchup
10. Preparation of Jam and Jelly
11. Preparation of squash

REFERENCES:

- 1.E.B. Pantastico, Post harvest physiology, handling and utilization of tropical and subtropical fruits and vegetables-, AVI Publishing company, INC
2. Verma L R and Joshi V.K. Post harvest technology of fruits and vegetables: handling, processing, fermentation and waste management, Vol I and Vol II
3. Lal, G., Siddhappa G., Tondon G. L. 1986. Preservation of fruits and vegetables, ICAR, New Delhi.
4. Shrivastava, R. P. and Kumar. S. 1998. Fruit and Vegetable Preservation: Principles and Practices, 2nd Edition, International Book Distribution Co., Lakhanow.
5. Salunkhe, D. K., and Kadam S. S. 1995. Handbook of Fruit Science and Technology: Production, Composition and Processing, Marcel Dekker, New York.
6. Salunkhe, D. K., and Kadam S.S. 1995. Handbook of Vegetable Science and Technology: Production, Composition, Storage and Processing, Marcel Dekker, New York

DSC12A FOOD QUALITY CONTROL AND WASTE MANAGEMENT II

Total Credits: 3 **Total Hours 45hrs**

Objective:

1. To study the concepts of quality and quality control of food
2. To study the concept of waste product handling and disposal

Learning Outcome:

1. To understand the usage of different types of equipments and sensory evaluation
2. To understand different types of quality assessment in food industry

Module I - Introduction to quality control in the food industry **12 hrs**

General concepts of quality and quality control, Major quality control functions, sample selection and sampling plans, preparation and storage of laboratory samples; Mechanical separation: different types of equipments used for mixing, clarification and evaporation. Membrane separation techniques: reverse osmosis, ultra filtration, microfiltration; Concentration – freeze concentration, sedimentation, filtration and distillation

Module II - Sensory testing of foods **8 hrs**

Sensory evaluation- Importance of sensory evaluation - Practical requirements for conducting sensory tests: Testing area, testing set up (difference tests, rating tests, sensitivity tests, descriptive flavor profile), lighting, testing schedule, preparation of samples, sample coding, evaluation card preparation.

Module III - Standard tests for quality assessment **10 hrs**

Physical tests, chemical tests, microbiological tests, viscosity analysis, consistency analysis, texture analysis, color analysis, basic concepts of quality control and quality assurance, total quality management, current good manufacturing practices (GMP), standard sanitary operation procedures, good laboratory practices (GLP), ISO 22000 FSMS

Module IV – Waste storage and disposal methods **5 hrs**

Storage and disposal of liquid and gaseous waste- land-filling, burial, incineration, recycling, biological treatment of food industry wastes.

Module V - Waste Management in Food Industry **10 hrs**

Types of waste generated: non-degradable and biodegradable Wastes, methods of utilizing wastes to make value added products. Criteria for evaluating quality of water used for food processing, Water quality standards. Waste product handling, suspended solids, total solids, BOD and COD requirements, Wastewater treatment and disposal.

DSC12B**PRACTICALS****TOTAL CREDITS 2**

1. Determination of Moisture content of food
2. Determination of Fat content of food
3. Determination of protein content of food
4. Determination of crude fibre content of food
5. Determination of ash content of food
6. Determination of total plate count
7. Determination of Yeast and Mould Count
8. Visit to quality control laboratory

REFERENCES:

1. Early, R. 1995. Guide to Quality Management Systems for the Food Industry, Blackie, Academic and Professional, London.
2. Gould, W.A and Gould, R.W. 1998. Total Quality Assurance for the Food Industries, CTI Publications Inc. Baltimore.
3. Bryan, F.L. 1992. Hazard Analysis Critical Control Point Evaluations A Guide to Identifying Hazards and Assessing Risks Associated with Food Preparation and Storage. World Health Organization, Geneva.
4. Krammer, A. and Twigg, B.A. 1970. Quality Control for the Food Industry. 3rd Edn. AVI, Westport.
5. Rekha, S. Singhal, Pushpa R. Kulkarni and Dananesh V.R. 1997. Hand Book of Indices of food Quality and Authenticity, wood head Publishing Ltd.

DSC13 - FOOD PRESERVATION

Total Credits: 4

Total Hours 50hrs

Objective:

1. To study the methods of food processing
2. To study about food additives

Learning Outcome:

1. To understand the significance of preservation
2. To understand the application of recent techniques in preservation

Module I Processing

10hrs

Principles and application of processed food, Aseptic processing, Significance of preservation, Methods of food preservation - low temperature, high temperature, preservatives, osmotic pressure, dehydration, irradiation **Drying-** Significance, Natural drying- Solar drying, Artificial drying- Hot air drying, Drum drying, Spray drying, Dehydrofreezing , Freeze drying Pre treatments blanching, sulphuring

Module II Freezing

10hrs

Refrigeration, Effect of low temperature on Fresh Fruits, Vegetables, Meat and Fish products, Chill injury. Freezing , Freezing rate Quick freezing, Slow freezing Air blast freezing, Contact freezing, Immersion freezing, Cryogenic freezing Quality of frozen foods- Retrogradation, Protein denaturation, Freezer burn

Module III Irradiation and Fermentation

10hrs

Source of ionization irradiation, Dose and Dosimetry, Mode of action, Scope of irradiation Fermentation - Principles, Types of fermentation, Advantages

Module IV Food Additives

10 hrs

Food additives – Role of food additives, antioxidants, chelating agents, colouring agents, curing agents, emulsifiers, flavour enhancers, flavour improvers, humectants and ant caking agents, leavening agents, stabilizers and thickeners, artificial sweeteners, preservatives, food fortifiers.

Module V Chemical Preservation and Recent Trends

10 hrs

Chemical Preservatives - Natural preservatives-Mode of action, Chemical preservatives- Sulphur dioxide, Benzoic acid , Sorbic acid , Antioxidants

Recent Trends Pulsed electric fields, High pressure technology, Ohmic heating, Microwave heating, Hurdle technology

REFERENCES

1. Blackburn, C. W. and McClure, P.J. 2005. Food borne Pathogens. Woodhead Publishing Limited, Cambridge, England.
2. Frederick, J.F. 2000. Encyclopedia of Food Science and Technology. Second edition vol 1-4, Wiley Interscience publication.

3. Goldberg, I. 1999. Functional foods, designer foods, pharma foods and nutraceuticals. An Aspen publication, Gaithersburg, Maryland.
4. Roday, S. 2008. Food science and nutrition. Third edition, Oxford University Press, New Delhi.

AECC10 - Basic Principles of Nutrition

Total Credits: 3

Total Hours 45hrs

Objective:

1. To study the nutritional value of food
2. To study specific dietary facts of food

Learning Outcome:

1. To understand the effect of processing of food on its nutritive value
2. To understand the effects of deficiency

Module I - Principles of Nutrition

10 hrs

Basic concept on Food, Nutrition and Nutrients. Health and nutritional status-adequate, optimum and good nutrition, Balanced diet, Malnutrition- Under Nutrition, Over Nutrition, Phytochemicals, Prebiotics, Probiotics. Food as a source of macro (Carbohydrate, fat & protein) and micronutrients (Vitamins & Minerals). Physiological, Psychological & social functions of food, Interrelationship between nutrition & health, visible symptoms of good health.

Module II - Food Science- Basic Five Food Groups

10 hrs

Food and its functions, digestion, absorption and metabolism. Factors that affect digestion, absorption and metabolism.

Basic five food groups: Cereals & grains, pulses & legumes, milk & meat products, Fruit & vegetable, Fats & sugars, RDA & its use.

Module III–Use of Food in Human Body

7 hrs

The process of digestion, absorption, transport, utilization of carbohydrate, lipids, proteins, minerals, vitamins & water in human body.

Module IV–Effect of Heat on the Nutritive Value of Foods

8 hrs

Effect of cooking & heat processing on various micro and macro nutrients of cereals, legumes, oil seeds, nuts fats, oils, milk fish/flesh, vegetables and fruits and products. Methods of cooking - Physical and chemical changes that occur during cooking. Effect of cooking and heat processing on the nutritive value of different food products

Module V–Nutrients in Food

8 hrs

Types of Nutrients – macro and micro, basis for classification. Energy value of foods. Macronutrients- food sources and functions. Micronutrients – Vitamins and Minerals- classification, sources, important functions. Loss of nutrients in foods- reasons. Food Fortification- definition, working and need with examples.

REFERENCES:

1. Ramaswamy H. and Marcotte M. Food Processing: Principles and Applications, Taylor & Francis.

2. Norman, N. Potter and Joseph H. Hotchkiss, Food Science, CBS Publishers and Distributors.
3. Barbosa-Canovas, Tapia and Cano. 2004. Novel Food Processing Technologies, CRC Press
4. Paine, F.A. and Paine, H.Y. 1992. A Handbook of Food Packaging, Blackie Academic Professional
4. Rao, C.G. 2006. Essentials of Food Process Engineering, B S publications
5. Rao, D.G. 2010. Fundamentals of Food Engineering. PHI Learning Private Ltd.
6. Robertson, G.L. 2012. Food Packaging – Principles and Practice, CRC Press Taylor and Francis.

AECC11: COMMUNICATIVE SKILLS -II (L T P -3 0 0)

Total Credits: 03

Total Hours: 38 hrs

Objectives:

1. To understand English communication skills.
2. To study and develop professional writing skills required to write job application and letters.

Learning Outcomes:

1. To able to draft formal letters.
2. To be able to know the skills required for group discussions, interviews and meetings.

Module I

04 hrs

Imaginary Writing with an Emphasis on Exploring Multiple Genres, Developing Critical Awareness.

Module II

06 hrs

Drafting Message – Letter Writing (Formal and Informal) Greetings – Condolence and Congratulations.

Module III

10 hrs

Business Letters, Tenders and Memorandum, Consumer Grievance, Reservation, Enquiry, Professional Brochures – Meetings, Notice, Minutes, Agenda, Quotations.

Module IV

06 hrs

Job Application- Curriculum Vitae, Job Offering Letter- Job Acceptance Letter.

Module V

08 hrs

Precise- Writing and Report Writing (Graph Sales Report/ Field Survey Report). Advertisement. Kinds – Interview Techniques. Preparing Situational Questionnaire. Speeches (General / Business) Analysis Of Inter Personal Problems – Writing Proposals.

Tutorials:

04 hrs

1. Group Discussion
2. Interview
3. Extempore
4. Mock meetings
5. Role-play – Telephonic conversation
6. Facial / Body Gestures (language) Voice clarity
7. Listening and Observing

REFERENCES:

1. Communication and English, Bill VanPatten, 2015
2. Pursue English Through Communication- Communicative English, Bibi Anohar, Anohar John, 2018
3. High School English Grammars and Composition – Wren & Martin
4. Living English Structure – W. Standard Allen (Orient Longman)
5. Composition Exercises in Elementary English (Macmillan)- A.S. Mornby

SEMESTER - V

DSC14A - FOOD CHEMISTRY

TOTAL CREDITS: 03

TOTAL HOURS: 45

Objectives:

1. To know the chemistry underlying the properties and reactions of various food components.
2. To know the knowledge of food chemistry to control reactions in foods.
3. To know the principles behind analytical techniques associated with food.

Learning outcomes:

1. Use the laboratory techniques common to basic and applied food chemistry.
2. Understand the basic structure of lipid and reaction involved during processing.
3. Understand the chemistry and properties of food proteins and modification of food proteins during processing.

Module I

Introduction to Food Chemistry and water (05 hours)

Definition of food, food science, food chemistry, Composition of food, Importance of food chemistry, Water, Structure of water and ice, Phase diagram of water, Types of water, Sorption isotherms, Moisture content and Water activity.

Module II

Carbohydrates (10 hours)

Definition of carbohydrates, Nomenclature, Classification of Carbohydrates, Structure of carbohydrates, Chemical reactions of carbohydrates – oxidation, reduction, crystallization.

Module III

Proteins (10 hours)

Definition of proteins, Chemical composition of proteins, Nomenclature, Protein classification and structure, Plant proteins and animal proteins.

Module IV.

Lipids (10 hours)

Definition of fats and oils, Chemical composition of fats and oils, Classification of lipids, Nomenclature, Physical properties of fats and oils, Chemical properties of fats and oils.

Module V

Food toxicology: (10 hours)

Inherent toxicants – antinutritional factors their occurrence, effects and methods of elimination or inactivation's. Terms in toxicology; Safety evaluation using traditional and modern approach; Food Contaminants.

DSC14B - FOOD CHEMISTRY PRACTICAL

TOTAL CREDITS: 02

1. Qualitative test for proteins and fats/oils and their identification in unknown mixtures - Free fatty acid, Peroxide value, Saponification value, TBA test, Iodine value.
2. Quantitative estimation of proteins by Lowry and Bradford methods
3. Estimation of vitamins - ascorbic acid.

4. Analysis of edible common salt for iodine and total chlorides.
5. Estimation of ammonia in water.
6. Estimation of plant pigments - carotenoids, flavonoids
7. To determine alcohol soluble and insoluble solids in peas.
8. Effect of heat on proteins.
9. Determination of smoking points of fat and oils.
10. Determination of total sulphates, total alkalinity and total CO₂ in water

REFERENCES:

1. Fennema, O.R. 1996. Food Chemistry, 3rd Ed., Marcell Dekker, New York.
2. Whitehurst and Law. 2002. Enzymes in Food Technology, CRC Press, Canada.
3. Wong and Dominic W. S, 1995. Food Enzymes, Chapman and Hall, New York.
4. Potter, N.N. and Hotchkiss, J.H. 1995. Food Science, 5th Ed., Chapman & Hall.
5. DeMan, J.M. 1980. Principles of Food Chemistry, AVI, New York.

DSC15A - MEAT, FISH AND POULTRY PROCESSING

TOTAL CREDITS: 03

TOTAL HOURS: 40

Objectives:

1. To study the structure and composition of muscle, connective tissue, and fat.
2. To know the pigments in meat and the changes that occurs during heating and cutting.
3. To know the factors determining meat quality.

Learning outcomes:

1. Understand the techniques of identifying meat cuts, grades, and the marketing process.
2. Understand the methods of meat cookery and the rationale for using each.
3. Understand the techniques of identifying various modified meat products.

Module I

Introduction: (05 hours)

Scope of meat, poultry and fish industry in India. Current levels of production, consumption and export of category products.

Module II

Conversion of muscle to meat: (10 hours)

Homeostasis, circulatory failure to muscle, post-mortem pH decline, rigor mortis, Enzymatic degradation. Properties of fresh meat: Water holding capacity, chemical basis of water holding capacity, colour, pigments.

Module III (10 hours)

Meat: Ante-mortem examination of meat animals, scientific techniques of slaughtering, dressing, post-mortem inspection, storage, tenderization, cuts, packaging; beef, mutton, pork as human foods, cured meat products, sausages, by-products, frozen and canned meat products.

Module IV (10 hours)

Egg: Structure, composition, nutritional and functional characteristics of eggs. Grading, spoilage, storage and transportation of whole eggs. Processing of eggs for liquid products (white, yolk and whole egg) and solid products (albumen, whole egg powder) for preservation through freezing & drying.

Poultry: Pre-slaughter care and consideration; Operations in preparation of dressed poultry, its storage and marketing; Quality and safety considerations; utilization of by-products. Poultry cuts.

Module V (10 hours)

Fish: Types, catch, examination; care in handling & transportation; processing of shell-fish, crabs, oysters, lobsters etc. for domestic and export markets. Filleting and freezing, canning salting & drying of fish. Production of fish paste, fish oils, sauce, fish protein concentrates. By products of fish processing industry.

DSC15B - MEAT, FISH AND POULTRY PROCESSING PRACTICAL
TOTAL CREDITS: 02

1. To study Pre-slaughter operations of meat animals and poultry birds.
2. To study slaughtering and dressing method of meat.
3. To study preservation of meat by different methods.
4. Preparation of meat, poultry and fish products.
5. To study quality evaluation of meat, poultry and fish products.
6. Visit to meat and poultry processing industry.
7. Estimation of meat: bone ratios.
8. Preparation of cured chicken and chicken pickle.
9. To study Quality evaluation of egg and preparation of different products.
10. To determine constituents of egg and percentage of different components of egg.

REFERENCES:

- 1) Lawrie, R.A. and Lawrie's. 1998. Meat Science, 5th Ed, Woodhead Publisher, England.
- 2) Parkhurst & Mountney, 1997. Poultry Meat and Egg Production, CBS Publication, New Delhi.
- 3) Pearson & Gillet. 1997. Processed Meats, 3 Ed, CBS Publication, New Delhi.
- 4) Shai Barbut. 2005. Poultry Products Processing, CRC Press.
- 5) Stadelman W. J. and Cotterill, O. J. 2002. Egg Science and Technology, 4th Ed. CBS Publication New Delhi.
- 6) Joshi, B. P. 1994. Meat Hygiene for Developing Country, Shree Almora Book Depot, India.
- 7) William J. & Owen J. 1977. Egg Science & Technology, AVI Publishing Company, INC. Westport, Connecticut.
- 8) Mead, G. 2004. Poultry Meat Processing and Quality. Woodhead Publishers.
- 9) Panda, P.C. 1992. Text Book on Egg and Poultry Technology, Vikas Publishers

DSC16A FOOD & BEVERAGE PROCESSING

TOTAL CREDITS: 03

TOTAL HOURS: 45

Objectives:

1. To study regarding skill and knowledge required to apply the principles and concepts behind fruit products processing.
2. Knowledge on post-harvest handling, specific processing technologies, preparing, quality analysis and stabilizing shelf life of fruit and plantation based products.

Learning outcomes:

1. Understand the physiological changes in fruits after harvesting.
2. Understand the role and importance of preservation techniques to improve the shelf life of seasonal fruits.
3. Understand the processing of fruits and plantation products.

Module I

Introduction to food processing (05 hours)

Thermal processing methods of preservation: Principle: Canning, blanching, pasteurization, sterilization, evaporation. Use of low temperature: Principle and effect on quality. Chilling, cold storage, freezing.

Module II

Preservation by radiation: (10 hours)

Definition, Methods of Irradiation, Direct & Indirect effect, measurement of radiation dose, dose distribution and effect on microorganisms. Preservation by salt & sugar: Principle, Method and effect on food quality.

Module III

Introduction to Beverage Industry (10 hours)

Definition, Types, importance of beverages, Scope and status of beverage industry in India, Water for beverages- Water treatment- Alkalinity reduction, filtration of water, water softening, Quality Specification for beverage water

Module IV

Carbonated Beverages & Fermented beverages (10 hours)

Grain based and Fruits based beverages History and types of soft drinks, role of various ingredients in soft drinks, carbonation of soft drinks, Packaging aspects in soft drink, Quality control in soft drink –Chemical and sensory Quality of soft drink, Microbiological quality

Module V

Ready to Eat food products (10 hours)

Overview of grain-based snacks: whole grains – roasted, toasted, puffed, popped and flakes, Flour based snack– batter and dough based products; formulated chips and wafers, papads. Fruit and vegetable based snacks: chips, wafers, papads etc. Ready to eat canned fruits/vegetables and mixes. Ready- to- eat baked food products, drying, toasting roasting and flaking, coating, chipping. Technology for ready-to-cook food products- different puddings and curried vegetables etc.

DSC16B - FOOD & BEVERAGE PROCESSING PRACTICAL

TOTAL CREDITS: 01

- 1) Preparation of grape wine
- 2) Determination of saccharin
- 3) Preparation of carbonated beverages
- 4) To study different types of blanching of fruits and vegetables.
- 5) To perform cut out analysis of caned product.

REFERENCES:

1. Hardwick, W.A. 1995. Handbook of Brewing. Marcel Dekker
2. Hui, Y.H. et al 2004. Handbook of Food and Beverage Fermentation Technology. Marcel Dekker.
3. Priest, F.G. & Stewart G.G. 2006. Handbook of Brewing. 2nd Ed. CRC.
4. Richard, P.V. 1981. Commercial Wine Making - Processing and Controls. AVI Publ.
5. Varnam, A.H. & Sutherland J.P. 1994. Beverages: Technology, Chemistry and Microbiology.
6. Chapman & Hall. Woodroof, J. G., & Phillips, G.F. 1974. Beverages: Carbonated and Non Carbonated. AVI Publ.
7. Fellows, P.J. Food Processing Technology, Woodhead publishing ltd.
8. Potter, N. N. CBS publishing. Physical principles of Food Preservation. Vol. II by M. Karel, O.R. Fenema and D.B. Lurd, Maroel

DSE 1 & DSE 2 (CHOOSE ANY TWO)

A. START-UP ENTREPRENEURSHIP

Theory

TOTAL CREDITS: 05

TOTAL HOURS: 50

Objectives:

1. Start-up Entrepreneurship minors will be able to sell themselves and their ideas.
2. Start-up Entrepreneurship minors will be able to find problems worth solving.
3. Start-up Entrepreneurship minors will be able to create value.

Learning outcomes:

1. Students master oral and visual presentation skills and establish a foundation of confidence in the skills necessary to cause others to act.
2. Students advance their skills in customer development, customer validation, and competitive analysis.

Module I

Entrepreneurial Development (10 hours)

Case studies of successful entrepreneurs, Exercises on ways of sensing opportunities – sources of idea, creating efforts, SWOT Analysis, Entrepreneurial skill assessment test, Techniques of development of entrepreneurial skills, positive self image and locus of control.

Module II

Entrepreneurship: (10 hours)

Definition, requirements to be an entrepreneur, entrepreneur and manager, growth of entrepreneurship in India, women entrepreneurship, rural and urban entrepreneurship. competencies of entrepreneurs-(1) Decision Making (2) Problem Solving (3) Risk Taking (4) Leadership(5) Communication(5) Dealing with customers

Module III

Entrepreneurial Support System: (10 hours)

National Bank for Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC), Small Industries Development Bank of India (SIDBI) Role of District Industries Centre, Directorate /Commissioner of Industries Office, State Financial Corporation, Technical Consultancy Organization

Module IV

Food processing Sector in India: (10 hours)

An overview, Make In India: (Sector Food Processing Policy, Financial Support, Investment opportunities), MOFPI: (Schemes), FICSI: (Overview), MSME: (Schemes and Entrepreneurship development programmes)

Module V

Planning a small scale Module (10 hours)

Whom to approach for what, Project Identification, requirements to start a business, SSI registration, obtaining NOC from state pollution control board, The National Institute for Entrepreneurship and Small Business Development (NIESBUD) - Entrepreneurship Development Institute of India (EDII) Science and Technology Entrepreneurship Parks (STEPS) -Use of IT enabled services in entrepreneurship - E Licensing, E filing.

REFERENCES:

1. Jain, P. C. Handbook For New Entrepreneur Oxford Latest Edition
2. Khanka, S. S. Entrepreneurial Development S. Chand Latest Edition
3. Zimmerer, T. W. & Norman, M. Scarborough Essentials of Entrepreneurship and small business management 4th Edition
4. Vidya,H. 2007. Entrepreneurship Himalaya.
5. Vasant, D. 2008. Small Scale Industries and Entrepreneurship Himalaya.
6. Angadi, V. B. Cheema, H. S. & Das, M. R. 2009, Entrepreneurship, Growth, and Economic Integration-A linkage Himalaya.
7. Rajeev, R. Entrepreneurship Oxford Latest Edition
8. Gordon & Natarajan,K. 2008. Entrepreneurship Development Himalaya.
9. Coulter Entrepreneurship in action PHI 2nd Edition.

B. COLD CHAIN MANAGEMENT

Theory

TOTAL CREDITS: 05

TOTAL HOURS: 50

Objectives:

1. To understand how Logistics, Supply Chain, Operations, Channels of Distribution fit in to various types of Business viz., Manufacturing, Service and Project.
2. To understand meaning and importance of cold chain.

Learning outcomes:

1. Formulate and implement Warehouse Best Practices and Strategies.
2. Plan Warehouse and Logistics operations for optimum utilization of resources.

Module I

MEANING AND IMPORTANCE OF COLD CHAIN (10 hours)

What is cold chain? Need for the chain for chilled / frozen food item, various links of the chain; importance of shelf- life; just – in-time deliveries; Temperature limits;-in various countries- Europe, US, Australia etc; Chilling and freezing;- Chilling injury, cook-chilling systems; cold –shortening; PPP and TTT concepts; Temperature monitoring; -Critical temperatures.

Module II

MICRO ORGANISMS AND THE COLD CHAIN (10 hours)

Micro organisms and their growth phases; response of micro organisms; Inactivation mechanism during Chilling and freezing; Rapid freezing and slow thawing; Categories (groups) of Organisms in respect of their ability to survivor under Cold / Chilling environment; Cold show proteins and cold shock response. Thawing techniques, microbial quality of thawed foods.

Module III

PRINCIPLES AND METHODS OF REFRIGERATION (10 hours)

Concepts of systems and surrounding; meaning of refrigeration; Types of refrigeration; vapour compression-the refrigerating cycle, capacity, Power consumption. Types of refrigeration's –their advantages / disadvantages; Refrigeration load demands and their calculation; closed cycle air refrigeration (CCAR); Cryogenic refrigeration;

Module IV

SHELF – LIFE OF FOOD PRODUCTS (10 hours)

Defining overall Shelf-life, remaining shelf life in the context of Chilled & Frozen foods; - Deterioration modes of food items; Storage of frozen foods; - Basic design requirements of storage to uphold the shelf –life – size , insulation, entry –exit position, automatic door – closing, proper lighting, temperature monitoring and recording facility.

Module V

HAZARD ANALYSIS CRITICAL CONTROL POINTS (HACCP) (10 hours)

Definition; Purpose; origins of HACCP; Developing the HACCP plan; Preliminary steps- the five –step process-HACCP team assembly, Defining the product and its usage; Constructing the flow diagrams;

REFERENCES:

1. Anand, M.L. 2002. Refrigeration & Air-Conditioning, Asian Books Pvt., Ltd.
2. Sun, Da-Wen. 2001. Advances in Food Refrigeration, Leatherhead Publishing.
3. Kennedy, Christopher J. 2000. Managing Frozen Foods". CRC / Woodhead Publishing.
4. James, S.J. and C. James. 2002. Meat Refrigeration". CRC/Woodhead Publishing.
5. Stringer, Mike and C. Dennis. 2002. Chilled Foods: A Comprehensive Guide". 2nd Edition, CRC / Woodhead Publishing.

C. FOOD MARKETING

Theory

TOTAL CREDITS: 05

TOTAL HOURS: 50

Objectives:

1. To understand about product implementation stage of food product development.
2. Knowledge for the workforce challenges of creating innovative food products to meet market demand.
3. Knowledge to work in teams with cooperating entrepreneurs and companies to develop products of interest.

Learning outcomes:

1. Understand factors that affect viability and potential of new food products. Patent literature, competition, costs.
2. Understand new products from consumer viewpoint.
3. Understand critically assessing of the development cycle of a food product and review relevant principles of marketing theory.

Module I

Marketing (10 hours)

Concept, functions, scope and marketing management; Process: Concepts of marketing-mix, elements of marketing-mix; Market structure and consumer buying behaviour: micro- and macro-environments;

Module II

Marketing research and marketing information systems (10 hours)

Market measurement, market forecasting, market segmentation, targeting and positioning; Allocation and marketing resources; Marketing planning process;

Module III

Product policy and planning (10 hours)

Product-mix, product line, product life cycle; New product development process; Product brand, packaging, services decisions; Marketing channel decisions; Retailing, wholesaling and distribution;

Module IV

Pricing decisions (10 hours)

Price determination and pricing policy of milk products in organized and unorganized sectors of dairy industry; Promotion-mix decisions; Advertising: Objectives, budget and advertising message, media planning, personal selling, publicity, sales promotion;

Module V

World consumption of food (10 hours)

Patterns and types of food consumption across the globe; Salient features of international marketing, composition and direction of Indian exports, international marketing environment,

deciding which and how to enter international market; Direct exports, indirect exports, licensing, joint ventures, direct investment and internationalization process, distribution channels

REFERENCES:

1. Philip, K., Kevin, L. K., Abraham K, and Mithileshwar J. 2013. Marketing Management: A South Asian Perspective, 14th Ed. Pearson Education.
2. Willium, J. S. 1984. Fundamentals of Marketing. Tata McGraw-Hill Publication, New Delhi.
3. Sontakki, C. N. Marketing Management. Kalyani Publishers, New Delhi.
4. John, D., Lee R., Brigham and Daniel S. International Business, 15th Ed., Pearson Education.
5. Aswathappa. International Business. Tata McGraw-Hill Education, New Delhi.
6. Fransis, C. International Business: Text and Cases, 5th Ed. PHI Learning, New Delhi.

D. COMPUTER APPLICATION IN FOOD PROCESSING

Theory

TOTAL CREDITS: 05

TOTAL HOURS: 50

Objectives:

Fundamental knowledge on hardware and software of computers. It will also impart knowledge related to the applications of computation in food industries.

Module: I

06hrs

Introduction: Introduction to various software for their application in food technology

Module: II

10hrs

Application of MS Excel to solve the problems of Food Technology - Chemical kinetics in food processing: - Determining rate constant of zero order reaction - First order rate constant and half life of reactions - Determining energy of activation of vitamin degradation during food storage - Rates of Enzymes catalyzed reaction

Module: III

12hrs

Microbial distraction in thermal processing of food - Determining decimal reduction time from microbial survival data - Thermal resistance factor, Z-values in thermal processing of food - Sampling to ensure that a lot is not contaminated with more than a given percentage - Statistical quality control - Probability of occurrence in normal distribution - Using binomial distribution to determine probability of occurrence - Probability of defective items in a sample obtained from large lot

Module: IV

10hrs

Sensory evaluation of food - Statistical descriptors of a population estimated from sensory data obtained from a sample - Analysis of variance - One factor, completely randomized design - For two factor design without replication - Use of linear regression in analyzing sensory data Mechanical transport of liquid food - Measuring viscosity of liquid food using a - capillary tube viscometer

Module: V

12hrs

Solving simultaneous equations in designing multiple effect evaporators while using matrix algebra available in excel -. Familiarization with the application of computer in some common food industries like, milk plant, bakery units & fruits vegetable plants, starting from the receiving of raw material up to the storage & dispatch of finished product

REFERENCES:

1. Computer Applications in Food Technology : Use of Spreadsheets in Graphical, Statistical and Process Analysis by R. Paul Singh, AP.
2. Manuals of MS Office 95 5.2

SEC1 SKILL DEVELOPMENT – I

Total Credits (L + T + P): 4 + 0 + 0

Total Hours: 45

Objective:

- a. The importance of interpersonal communication.
- b. The role of soft skills in contemporary world.

Learning Outcomes:

- a. The decision making and problem solving skills.
- b. The stress and stress management techniques.

Module: I

05hrs

Soft Skills: Introduction – Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development.

Module: II

10hrs

Interpersonal Communication: Interpersonal relations; communication models, process and barriers; team communication; developing interpersonal relationships through effective communication; listening skills; essential formal writing skills; corporate communication styles – assertion, persuasion, negotiation.

Module: III

05hrs

Decision-Making and Problem-Solving Skills: Meaning, Types and Models, Group and Ethical Decision-Making, Problems and Dilemmas in application of these skills.

Conflict Management: Conflict - Definition, Nature, Types and Causes; Methods of Conflict Resolution.

Module: IV

10 hrs

Stress and Stress Management: Definition, Nature, Types, Symptoms and Causes; Stress Analysis Models and Impact of Stress; Measurement and coping with stress - techniques.

Module: V

15hrs

Tutorials: Seminar/ Group Discussion/Assignment.

Reference Books:

1. Managing Soft Skills for Personality Development – edited by B.N.Ghosh, McGraw Hill India, 2012.

English and Soft Skills – S.P.Dhanavel, Orient Blackswan India, 2010

SEMESTER – VI
DSC 17 and DSC 18 - TRAINING COMPONENTS

DSC 17 - Internship in Forensic related Institutions (04 Weeks)
No. of Credits: 5

DSC 18 - Training Report Evaluation (TRE)
No. of Credits: 5

The training period shall be of 06 weeks and only 200 marks (DSC17 & DSC18 – 100 marks each) are to be awarded.

Any student who is not able to complete these training components will not be awarded degree.

SCHEME OF EVALUATION TOTAL MARKS: 200
(DSC 17 and DSC 18)

DSC 17: Industrial Training (IT):
The total mark allotted for DSC 17 is 100.

Students have to submit completed Training logbooks. The IT logbook has to be duly signed by the departmental head or sectional heads in the organization. Completed IT log book carries 50 marks and six weeks Industrial training completion certificate has to be submitted with Job Training Performance Appraisal Form (The form has to be filled by the departmental head or sectional heads. - Model enclosed) which carries 50 marks.

JOB TRAINING PERFORMANCE APPRAISAL FORM SAMPLE
(Similar Criteria can be followed)

Name of Student: _____
Name of the Org.: _____
Name of Department: _____
From: _____ To _____

1. ATTENDANCE /PUNCTUALITY: 20
2. PRESENTABILITY: 20
3. SUPERVISORS REPORT: 20
4. WORK ATTITUDES: 20
5. COMMUNICATION SKILLS: 20

Name of Appraiser: _____ Signature _____
Designation of Appraiser: _____ Date: _____
Signature of Student: _____ Date: _____

Note: Sample report format any suitable format can be followed

DSC 18: Training Report Evaluation:

The total mark allotted for DSC 18 is 100.

Students should prepare the detailed training report which carries 50 marks and Presentation on Training 25 marks, Viva Voce 25 marks.

A PowerPoint presentation on that department (based on the report) should be made. This will be presented in front of examiners. It should be based on the same department that the report is being made in.

DSC19A - FOOD MICROBIOLOGY

TOTAL CREDITS: 03

TOTAL HOURS: 45

Objectives:

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

Learning outcomes:

1. Utilize laboratory techniques to identify microorganisms in food.
2. Understand the characteristics of food borne, waterborne and spoilage microorganisms, and methods for their isolation, detection and identification.

Module I

Introduction to Food Microbiology (5 hours)

History and Development of Food Microbiology, Definition and Scope of food microbiology, Inter-relationship of microbiology with other sciences.

Module II

Microbial Growth in Food (10 hours)

Bacterial growth curve and microbial growth in food, Factors affecting the growth of microorganisms in food.

Microbial Food Spoilage

Sources of Microorganisms in foods, some important food spoilage microorganisms, Spoilage of specific food groups- Milk and dairy products, Meat, poultry and seafood's, Cereal and cereal products, Fruits and vegetables and canned products.

Module III

Food Fermentations (10 hours)

Fermentation –definition and types, Microorganisms used in food fermentations, Dairy Fermentations-starter cultures and their types , concept of probiotics, Fermented Foods-types, methods of manufacture for vinegar, soya sauce ,beer, wine and traditional Indian foods.

Food borne Diseases

Types – food borne infections, food borne intoxications and toxin infections, Common and Recent Examples.

Module IV

Cultivation of Micro-organisms (10 hours)

Types of growth media (natural, synthetic, complex, enriched, selective- definition with example), pure culture methods (streak plate, spread plate, pour plate, stab culture, slant culture).

Module V

Control of Microorganisms in Foods (10 hours)

Principles and methods of preservation, Physical Methods of Food Preservation- Dehydration, Freezing, Cool Storage, Heat Treatment (esp.thermobacteriology), Irradiation, Bio preservatives (Bacteriocins) Introduction to Hurdle concept and Non Thermal methods.

Trends in Food Microbiology

Rapid Methods of Detection, Recent Advances.

DSC19B- FOOD MICROBIOLOGY PRACTICAL
TOTAL CREDITS: 01

1. Introduction to the Basic Microbiology Laboratory Practices and Equipments.
2. Functioning and use of compound microscope.
3. Cleaning and sterilization of glassware.
4. Preparation and sterilization of nutrient broth.
5. Cultivation and sub-culturing of microbes.
6. Preparation of slant, stab and plates using nutrient agar.
7. Morphological study of bacteria and fungi using permanent slides.
8. Simple staining.
9. Gram's staining.
10. Standard Plate Count Method.

REFERENCES:

- 1) Frazier, W. C. and Westhoff, D. C. 2004. Food Microbiology, TMH, New Delhi,
- 2) Jay, J. M. 2000. Modern Food Microbiology, CBS Publication, New Delhi.
- 3) Garbutt, J. 1997. Essentials of Food Microbiology, Arnold, London.
- 4) Pelczar, M.J. Chan E.C.S and Krieg.1993. Noel R. Microbiology, 5th Ed., TMH, New Delhi.

DSE 3 & DSE 4 (CHOOSE ANY TWO)

A. PROJECT REPORT

Total Credits: 05

The Content

1. Outer cover
2. Attestation and Certificate from the Guide
3. Acknowledgment
4. Index / Chapter page
5. Introduction
6. Review of Literature
7. Research Methodology
8. Survey Report / Result & Analysis
9. Conclusion and Suggestions
10. Scope for Future Research
11. Appendix
12. Bibliography

C1 and C2 to be awarded (each 10 marks) by respective project guides based on Periodic Progress and Reporting of the Student.

C1	
Synopsis	5
Presentation	5
Total	10

C2	
Draft Report	5
Presentation	5
Total	10

C3 Components of the Project (Report Evaluation and Viva) will be assessed for 80 marks.

1. 50 Marks for the Project Report
2. 20 Marks for Evaluation
3. 10 Marks for Viva-Voce

B: FOOD PACKAGING

TOTAL CREDITS: 05

TOTAL HOURS: 50

Objectives:

1. To know the knowledge of packaging, package developments and packaging laws and regulations in food industries.
2. To know the knowledge about package performance and various testing of packaging materials.
3. To know the knowledge about storage of food and food products.

Learning outcomes:

1. Understand basic concept of packaging, printing and packaging laws & regulations in food industries.
2. Understand different types of packaging material and their properties and apply the knowledge in packaging various food commodities.

Module I

Introduction to Food Packaging (10 hours)

Packaging Functions and Requirements,, Printing of packages .Barcodes & other marking, Labelling Laws.

Module II

Food Packaging Materials (10 hours)

Paper and paper-based materials, corrugated fiber board (CFB). Plastics, formation- Injection moulding, Blow moulding, Types of plastics, Lamination, Biodegradable plastics, Edible packaging and Bio-composites. Environmental Concerns recycling and disposal of plastic waste.

Metal packaging- Metals: Tinfoil, tinning process, components of tinfoil, tin free can (TFC) types of can, metallic films, lacquers Glass: Composition, Properties, Methods of bottle making and Types of closures.

Module III

Package Designing for Foods (10 hours)

Package design for fresh horticultural produce and animal foods, dry and moisture sensitive foods, frozen foods, fats and oils, thermally processed foods and beverages.

Module IV

Testing and Regulatory Aspects of Food Packaging (10 hours)

Testing Procedures for Packaging Materials- thickness, tensile strength, puncture resistance, bursting strength, seal strength, water vapour permeability, CO₂ permeability, oxygen permeability, grease resistance, Testing Procedures for Packaged Foods - Compatibility and shelf life studies, evaluation of transport worthiness of filled packages.

Module V

Packaging Machinery and Systems (10 hours)

Bottling machines, Cartoning systems, Seal and Shrink packaging machine; Form, Fill and Sealing machine (FFS). Vacuum, Controlled and Modified atmosphere packaging systems; Aseptic packaging systems; Retort packaging, Active and Intelligent packaging systems.

REFERENCES:

1. Robertson, G.L. 2012. Food Packaging – Principles and Practice, CRC Press Taylor and Francis Group.
2. Paine, F.A. and Paine, H.Y. 1992. A Handbook of Food Packaging, Blackie Academic and Professional.
3. Coles. R., McDowell D and Kirwan, M.J. 2003. Food Packaging Technology. Blackwell.

C. FOOD COST MANAGEMENT

TOTAL CREDITS: 05

TOTAL HOURS: 50

Objectives:

1. To study about analysis of income and expenditure.
2. To study about pricing of the food and quotations.
3. To study about prevention of waste and inefficiencies.

Learning outcomes:

1. Understand basic concept of overall profit target.
2. Understand basic concept of data for management reports.

Module I

Introduction to food and beverage financial control (10 hours)

Understanding basic financial statements, Manager's financial control function and responsibility, Basic pricing strategies and competitiveness, Trends in food and beverage control methods.

Module II

Menu costing principles (10 hours)

Standardized recipes and cost calculations, Recipe evaluation, Menu pricing strategies and calculations, Ingredient quality specifications.

Module III

Product cycle policies and control procedures (10 hours)

Purchasing including supplier evaluation, Receiving, Storing, including physical inventory, Issuing.

Module IV

Sales and cost calculations (10 hours)

Cost control versus cost reduction, Guest check analysis, Cost volume profit (CVP) relationships, Breakeven analysis.

Module V

Food and beverage financial control (10 hours)

Inventory control, Revenue control through cash and accounts, Internal and external loss control methods in theft and fraud, Labour cost management, Operating budget analysis.

REFERENCES:

1. Dopson, L.R. and David, K. H. 2015. Food and Beverage cost control, Wiley.
2. Micheal L. 2012. A cook's book: Food Cost: The Chef's ultimate guide to food cost control, create space independent publishing platform.
3. Charles, L. 1988. Food and beverage operations: management control systems management –, Prentice Hall: Subsequent Edition.

D. FOOD HYGIENE AND SANITATION

TOTAL CREDITS: 05

TOTAL HOURS: 50

Objectives:

1. Students can understand good hygienic practices to prevent and control food borne diseases. Students can understand food borne diseases result from eating foods that contain infectious or toxic substances.

Learning outcomes:

1. Students learn about food control, food inspection and supportive enforcement measures that can contribute to food hygiene and safety.

Module I

Introduction to food hygiene and sanitation (10 hours)

General principle of food hygiene, Hygiene in rural and urban areas in relation to food preparation, personal hygiene and food handling habits. Sanitary aspects of building and processing equipment. Establishing and maintaining sanitary practices in food plants.

Sanitation

Definition, Cleaning agents - Classification and properties, Disinfectant, sanitizer - Classification and properties, Advantages and disadvantages of sanitizers

Module II

Sanitary aspects of water supply: (10 hours)

Sources, impurities and hardness of water, Storage of water, quality of water, water supply and its uses in food industries. Purification and disinfection of water preventing contamination of portable water supply.

Module III

Effective detergency and cleaning practices: (10 hours)

Importance of cleaning technology, physical and chemical factors in cleaning, classification and formulation of detergents and sanitizers, cleaning practices. Role of sanitation, general sanitary consideration and sanitary evaluation of food plants. Sanitary aspects of waste disposal.

Module IV

Plant and equipments design (10 hours)

Layout of plant sanitation, Construction and design of plant, Machinery design and installation, Laws related to food hygiene and sanitation.

Module V (10 hours)

Hygienic Engineering of Plants for the Processing of Dry Particulate Materials, Safe Storage and Distribution of Water in Food Factories, Safe and hygienic water treatment in food factories, packing systems for solid foodstuffs, Air Handling in the Food Industry.

REFERENCES:

1. Barry, G. Hygiene in food manufacturing and handling, Rack and Raymond Bmsted.
2. Gatson and Tiffney. Guide to improving food hygiene Ed.
3. Betty, C. H. Food Poisoning and Food Hygiene (3rd Edition)
4. Marriott, N. G. Principles of food sanitation.

SEC2 - SKILL DEVELOPMENT-II

Total Credits (L + T + P): 4 + 0 + 0

Total Hours: 45 Hrs

Objective:

- a. The importance of beliefs and values.
- b. The significance of time management.

Learning Outcomes:

- a. The leadership skills.
- b. The positive thinking and attitude.

Module: I

5hrs

Self-Discovery: Discovering the Self; Setting Goals; Beliefs, Values, Attitude, Virtue.

Module: II

10hrs

Non-Verbal Communication: Importance and Elements; Body Language.

Teamwork and Leadership Skills: Concept of Teams; Building effective teams; Concept of Leadership and honing Leadership skills.

Positivity and Motivation: Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels.

Module: III

10hrs

Etiquette and Manners – Social and Business, **Time Management** – Concept, Essentials, Tips, **Personality Development** – Meaning, Nature, Features, Stages, Models; Learning Skills; Adaptability Skills.

Module: IV

12hrs

Group Discussion: Importance, Planning, Elements, Skills assessed; effectively disagreeing, Initiating, Summarizing and Attaining the Objective.

Leadership and Assertiveness Skills: A Good Leader; Leaders and Managers; Leadership Theories; Types of Leaders; Leadership Behaviour; Assertive Skills.

Emotional Intelligence: Meaning, History, Features, Components, Intrapersonal and Management Excellence; Strategies to enhance Emotional Intelligence.

Module: V

08hrs

Tutorials: Seminar/ Group Discussion/Assignment.

References:

1. Barun K. Mitra, "Personality Development & Soft Skills", Oxford Publishers, Third impression, 2017.
2. ICT Academy of Kerala, "Life Skills for Engineers", McGraw Hill Education (India) Private Ltd., 2016.
3. Caruso, D. R. and Salovey P, "The Emotionally Intelligent Manager: How to Develop and Use the Four Key Emotional Skills of Leadership", John Wiley & Sons, 2004.
4. Kalyana, "Soft Skill for Managers"; First Edition; Wiley Publishing Ltd, 2015.

5. Larry James, "The First Book of Life Skills"; First Edition, Embassy Books, 2016.
6. Shalini Verma, "Development of Life Skills and Professional Practice"; First Edition; Sultan Chand (G/L) & Company, 2014.