

**VFP5G14TB - Processing of Fruits and Vegetables
(GENERAL COURSE - 14)
Semester V**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To understand about the proper post harvest handling technologies of fruits and vegetables and to know the process of development of fruit and vegetable processing products.

Course Overview and Context

- ☐ To know about the status of fruit and vegetable production in India with importance to losses.
- ☐ To study about the processing of fruits and vegetables.
- ☐ To impart knowledge about the various products from them.
- ☐ To study the various methods of drying of fruits and vegetables

Content

MODULE	CONTENT	LECTURE
1	Introduction-Composition and nutritive value of fruits and vegetable. Factors effecting composition and quality of fruits and vegetables. Quality requirements of raw materials for processing; grading, sorting, cleaning, washing, peeling, slicing and blanching	12
2	Spoilage of fruits and vegetables-Different types of spoilages in fruits and vegetables. Spoilage during storage of fruits and vegetables and their prevention. General methods of preservation of whole fruits/vegetables and processed fruits and vegetables. Spoilage of pickles. Methods of preparation. Types of preservatives commonly used in Fruits and vegetables processing industry, limits of usage of preservatives.	12

3	Processing of fruits and vegetables- Dehydration of fruits and vegetables using various drying technologies like sun drying, solar drying (natural and forced convection), osmotic, tunnel drying, fluidized bed drying, freeze drying, convectional and adiabatic drying; applications to raisins, vegetables, intermediate moisture fruits and vegetables. Fruit powders using spray drying.	16
4	Manufacture of Fruit products- Manufacturing process of juice, soup, puree, Jellies and marmalades: selection, preparation, production. Difference between jam and jelly. Theory of jell formation, failure and remedies in jam and jelly making.	10
5	Manufacture of vegetable products- Manufacturing process of sauce, ketchup, vegetable juices and concentrated products	10

Learning Resources

Reference Books

1. Nirmal Sinha, Y. H. Hui, et al; (2010), "Handbook of Vegetables and Vegetable Processing", John Wiley & Sons.
2. Olga Martin-Belloso, Robert Soliva Fortuny, (2010), "Advances in Fresh-Cut Fruits and Vegetables Processing". CRC Press.
3. W Jongen (2002), "Fruit and Vegetable Processing: Improving Quality", Elsevier Publications.

**VFP5G15TB – Engineering Properties of Foods
(GENERAL COURSE - 15)
Semester V**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To understand the concept of rheological and thermal properties of foods on measuring the various engineering properties of food products.

Course Overview and Context

- ☐ To study the various engineering properties of food materials under different condition
- ☐ To study about the different methods of determining the quality and properties of different foods

Content

MODULE	CONTENT	LECTURE
1	Physical Properties of Foods- Methods of estimation of – Shape- roundness, roundness ratio, size, volume- platform scale method, density, specific gravity-apparatus, porosity and surface area.	10
2	Thermal Properties of Foods- Definitions - specific heat, enthalpy, conductivity and diffusivity, surface heat transfer coefficient. Measurement of thermal properties like specific heat, thermal conductivity and thermal diffusivity	15

3	Aerodynamic properties and frictional properties of Foods-Aerodynamic property-definition- terminal velocity - application in handling and separation of food materials. Frictional property-coefficient of friction,angle of repose, angle of internal friction, application in food handling and storage	15
4	Rheology and texture of foods-Rheology-rheological classification-viscoelasticity-viscometers. Texture of foods- methods of textural evaluationsubjective and objective method- texture profile method	10
5	Electrical, optical properties and mechanical damage-Electrical and optical property- importance and its application. Mechanical damagecauses of mechanical damage-methods for detection and evaluation of mechanicaldamage.	10

Learning Resources

References

4. M.A. Rao, Syed S.H. Rizvi, Ashim K. Datta, Jasim Ahmed, (2014), “Engineering Properties of Foods”, Fourth Edition, CRC Press.
5. M. Anandha Rao, (2010), “Rheology of Fluid and Semisolid Foods: Principles and Applications: Principles and Applications”, Springer Science & Business Media Publishing.
6. Zeki Berk, (2008), “Food Process Engineering and Technology”, Academic Press Publishers.

**VFP5G16TB – Sensory Evaluation of foods
(GENERAL COURSE - 16)
Semester V**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: The course provides knowledge about Sensory test methods and procedures used to evaluate the flavor, color and texture of foods which helps to enhance acceptance of a product.

Course Overview and Context

- ☐ To study the appropriate sensory evaluation tests related to the sensory quality of foods.
- ☐ To understand the relationship between sensory and instrumental methods for the evaluation of food quality.
- ☐ To acquire knowledge on statistical methods for sensory evaluation.

Content

MODULE	CONTENT	LECTURE
1	Introduction-Definition of sensory evaluation; basic tastes; human senses and sensory perception; threshold; psychophysics, Tongue surface	10
2	Arrangements for Sensory Evaluation Test controls -Environment and test room design; product controls: sample preparation and presentation; panelist controls; factors influencing measurements: psychological and physiological errors	10

3	Statistical Methods for Sensory Evaluation-Classification of test methods; discrimination tests: paired-comparison, duo-trio and triangle tests; affective tests: qualitative (interview and focus group) and quantitative tests (paired preference and acceptance tests); Two sample test, Ranking test, Two sample difference test, numeric scoring test, hedonic ranking test	15
4	Subjective and objective methods -Texture analyser- mechanical characteristics- chewiness, brittleness, and geometric characteristics, Sensory panel-types- criteria for panel selection	15
5	Applications of Sensory Analysis in the Food Industry- Quality control; storage stability testing; product development and consumer acceptance testing	10

Learning Resources

References

1. Herbert Stone, Joel L. Sidel, (2012), "Sensory Evaluation Practices", Academic Press Publishers.
2. Maynard A. Amerine, Rose Marie Pangborn, Edward B. Roessler, (2013), "Principles of Sensory Evaluation of Food", Elsevier Publications.
3. Harry T. Lawless, Hildegard Heymann, (2010), "Sensory Evaluation of Food: Principles and Practices", Springer Science & Business Media.

VFP5S13PB – Processing of Fruits and Vegetables (Practical)
(SKILL COURSE - 13)
Semester V

Total Credits: 6

Total Laboratory Hours: 90 (6 Hours/ Week)

Aim of the course: To study the principles and methods of preservation of fruits and vegetables into various products and to practically gain skill in development of these products.

Course Overview and Context

- ☐ To understand the Handling and operating of food processing equipments and Instruments.
- ☐ To acquire knowledge about Quality analysis and quality testing of fruit and vegetable products.
- ☐ To prepare different fruit and vegetables products.

Content

MODULE	CONTENT	LECTURE
1	Handling and operating of food processing equipments and Instrument-Pulper, Sealers, Juice extracting machines, Autoclaves, Corking machines, Refractometer, Thermometer, Vacuum gauge, pressure gauge, seam checking gauge, Electronic weighing balance	15
2	Quality analysis- Quality evaluation of fruits and vegetables	15
	Quantitative analysis of cut fruits and vegetable yield	
	Effects of pretreatment on quality of cut fruits and vegetables	
	Refrigeration storage of fruits and vegetables	
	Determination of Maturity indices of fruits & vegetables	

3	Quality Testing-Determination of Degree Brix (TSS), pH and % acidity in fruits and vegetable products	15
	Estimation of benzoic acid, sulphur dioxide and KMS in terms of ppm present in fruits and vegetable products.	
	Estimation of reducing and non reducing sugars in fruit and vegetable products	
	Estimation of chloride content in food products.	
4	Preservation techniques- Extraction of juice by different methods.	20
	Preservation of fruits juices with addition of preservative	
	Preparation of fruit and synthetic beverages	
	Preparation of carbonated beverages.	
5	Product Preparation- Preparation of tomato juices, ketchups, soup, paste.	25
	Preparation of jam, jelly and marmalades.	
	Effects of pre- treatment and process variables on quality of preserve and candied fruits.	
	Preparation of chutney	

**VFP5S14PB – Food Processing Equipments
(SKILL COURSE - 14)
Semester V**

Total Credits: 6

Total Lecture Hours: 90 (6 Hours/ Week)

Aim of the course: To introduce basic equipment design and various control mechanisms.

Course Overview and Context

- ☐ To enable the student to design and develop equipments used in Food Processing operations.
- ☐ To identify and discuss critical design of typical processing equipment.
- ☐ To Understand the relationship between process design and Safety

Content

MODULE	CONTENT	LECTURE
1	Introduction to equipments used in food industry - Equipments: Types, planning, factors affecting selection and purchase	15
2	Mechanical Equipments- Transport equipments: Fluid food transport equipment, mechanical conveyors. Storage equipments: Solid and liquid food storage equipments. Processing equipments: Size reduction, homogenization, mixing and foaming equipments. Separation equipments: Grading and sorting equipments.	20

3	Heat exchangers, dryers and evaporators -Heat transfer equipments: Heat exchangers. Food evaporation equipments: food evaporators, evaporator components. Food dehydration equipments – Food dehydration principle, food dryers, hygiene and safety considerations.	15
4	Refrigeration and thermal processing equipments -Refrigeration and freezing equipments: Refrigerants, freezers, chillers. Thermal processing equipments: sterilizers, pasteurizers, blanchers.	20
5	Food packaging Equipments - Introduction, preparation of food containers, filling equipments, closing equipments, group packaging.	20

Learning Resources

Reference Books

1. Saravacos, George, (2015), “Handbook of Food Processing Equipment”, Springer Publishing.
2. H. L. M. Lelieveld, John Holah, David Napper, (2014), “Hygiene in Food Processing: Principles and Practice”, Elsevier Publications.
3. Sue Azam-Ali, (2003), “Small-scale Food Processing: A Directory of Equipment and Methods”, ITDG Publishing.

**VFP5S15PB – Computer Applications
(SKILL COURSE - 15)
Semester V**

Total Credits: 6

Total Lecture Hours: 90 (6 Hours/ Week)

Course Overview and Context

- ☐ To understand the operations of windows operating system, desktop, text editing and printouts in word pad
- ☐ To understand the operations of MS WORD-(Editing , Formatting, inserting)
- ☐ To understand the various operations in MS-Excel

Content

MODULE	CONTENT	LECTURE
1	Office Automation - Introduction-Tools, Windows 7, desktop, files and folders, printers, Microsoft Office button, Quick access tool bar	10
2	MS Word 7 - Introduction- Typing text, Saving, opening, Closing, common edit functions (cut copy paste, change case). Text Editing - Inserting text, spell check, correcting mistakes, common formatting functions. Formatting paragraph, tables, bullets & numbering, inserting clipart & word art, picture & Drawing tool bar, Header & footer.	20

3	MS Excel 7 -Introduction- Parts of MS Excel windows, opening, saving and closing, workbook, entering data and numbers, Texts, date & time, formatting data, tool bar, drawing in MS Excel, Drawing tool bar, formatting & editing worksheet.	10
4	MS Power Point 7 -Introduction- Parts of power point windows. Features, background design, word art, clipart, 3D settings. Animations, sound views, types of views, inserting, deleting , arranging slides, slide shows	10
5	DBMS, Internet & Email -DBMS Intro & basic concepts, Internet introduction, Creating Email- Inbox, compose, draft, attachments.	10

Learning Resource

References

1. Study material for Diploma in Computer Application, Centre for continuing Education, Kerala.
2. Tom Bunzel, MS Office Research Guide; Information IT.com.