Swami Ramanand Teerth Marathwada University, Nanded.

FACULTY OF SCIENCE

SYLLABUS

B.Sc. (Food Technology)

First, Second & Third Year (CBCS Pattern)

(SEMESTER I - VI)

[Syllabus progressively effective from 2016-17 onwards]

Swami Ramanand Teerth Marathwada University, Nanded

Choice Base Credit System (CBCS) Course Structure (New Scheme)

Faculty of Science

B.Sc First Year

First Semester Food Technology Syllabus

Semester Pattern effective from June 2016

Course No.	Course title	Periods/ Week	Total Period	Internal Evaluation	Marks 25/credit	Credits
	Theory Papers					
CCFT-IA	English & science communication skills - I	03	45	10	50	2
CCFT-IIA	Principles of food processing	03	45	10	50	2
CCFT-IIIA	Food Production Trends and programmes	03	45	10	50	2
CCFT-IVA	Biochemistry	03	45	10	50	2
CCFT-VA	Food Chemistry-I	03	45	10	50	2
CCFT-VIA	Fundamentals of Microbiology	03	45	10	50	2
CCFT-VIIA	Fundamentals of Computer Applications	03	45	10	50	2
CCFTP- 1A	Practicals based on CCFT-IV & VA	03+03	20	20	100	4
CCFTP- 2A	Practicals based on CCFT-VI & VIIA	03+03	20	20	100	4
					550	22

Swami Ramanand Teerth Marathwada University, Nanded

Choice Base Credit System (CBCS) Course Structure (New Scheme)

Faculty of Science

B.Sc First Year

Second Semester Food Technology Syllabus

Semester Pattern effective from June 2016

Course No.	Course Title	Periods'/ Week	Total Period	Internal Evaluation	Total Marks	Credits
	Theory Papers					
CCFT-IB	English & science communication skills - II	03	45	10	50	2
CCFT-IIB	Food Chemistry –II	03	45	10	50	2
CCFT-IIIB	Human Nutrition	03	45	10	50	2
CCFT-IVB	Cereal Processing	03	45	10	50	2
CCFT-VB	Food Microbiology	03	45	10	50	2
CCFT-VIB	Fluid Mecahanics and Hydraulics	03	45	10	50	2
CCFT-VIIB	Heat and Mass transfer	03	45	10	50	2
CCFTP- 1B	Practicals based on CCFT-II & IVB	03+03	20	20	100	4
CCFTP- 2B	Practicals based on CCFT-V, VI & VII B	03+03	20	20	100	4
					550	22

Swami Ramanand Teerth Marathwada University, Nanded

Choice Base Credit System (CBCS) Course Structure (New Scheme)

Faculty of Science

B.Sc Second Year

Third Semester Food Technology Syllabus

Semester Pattern effective from June 2017

Course No.	Course title	Instruction Hrs/Week	Total Period	Internal Evaluation	External Evaluation	Total Marks	Credits
	Theory Papers						
CCFT-IC	English & science communication skills - III	03	45	10	40	50	2
CCFT-IIC	Fruit and vegetable processing	03	45	10	40	50	2
CCFT-IIIC	Wheat milling and baking technology	03	45	10	40	50	2
CCFT-IVC	Meat, poultry and fish technology	03	45	10	40	50	2
CCFT-VC	Confectionary technology	03	45	10	40	50	2
CCFT-VIC	Techniques in food analysis	03	45	10	40	50	2
CCFT-VIIC	Food processing equipments-I	03	45	10	40	50	2
CCFTP- 1C	Practicals based on CCFT-II, III & IV C	03+03	20	20	80	100	4
CCFTP- 2C	Practicals based on CCFT-V, VI & VII C	03+03	20	20	80	100	4
SEC-I	**Skill enhanced Course-1 (Food Packaging)	30	45	20	10	50	2
						600	24

Swami Ramanand Teerth Marathwada University, Nanded

Choice Base Credit System (CBCS) Course Structure (New Scheme)

Faculty of Science

B.Sc. Second Year

Fourth Semester Food Technology Syllabus

Semester Pattern effective from June 2017

Paper No.	Name of the Course	Instruction Hrs/Week	Total Period	Internal Evaluation	Marks of Semester	Total Marks	Credits
CCFT-ID	English & science communication skills - IV	03	45	10	40	50	2
CCFT-IID	Legume and Oil Seed technology	03	45	10	40	50	2
CCFT-IIID	Fermentation and Industrial Microbiology	03	45	10	40	50	2
CCFT-IVD	Processing of milk & milk products	03	45	10	40	50	2
CCFT-VD	Spice and flavor technology	03	45	10	40	50	2
CCFT-VID	Food additives	03	45	10	40	50	2
CCFT-VIID	Instrumentation and process control	03	45	10	40	50	2
CCFTP- 1D	Practicals based on Section A & CCFT-II, III & IV D	03+03	20	30	80	100	4
CCFTP- 2D	Practicals based on CCFT-V, VI & VII D	03+03	20	30	80	100	4
SEC-II	**Skill enhanced Course-2 (Food Quality)	03	45	10	40	50	2
						600	24

Swami Ramanand Teerth Marathwada University, Nanded

Choice Base Credit System (CBCS) Course Structure (New Scheme)

Faculty of Science

B.Sc Third Year

Fifth Semester Food Technology Syllabus

Semester Pattern effective from June 2018

Paper No.	Name of the Course	Periods/ Week	Total Period	Internal Evaluation	External Evaluation	Total Marks	Credits
DSEFT-IE	Environmental Studies	03	45	10	40	50	***
DSEFT-IIE	Food Biotechnology	03	45	10	40	50	2
DSEFT-IIIE	Product development and formulations	03	45	10	40	50	2
DSEFT-IVE	Food industrial byproducts & industrial waste management	03	45	10	40	50	2
DSEFT-VE	Carbonated beverage technology	03	45	10	40	50	2
DSEFT-VIE	Biochemical Engineering	03	45	10	40	50	2
DSEFT-VIIE	Refrigeration Engineering and Cold chain	03	45	10	40	50	2
DSEFTP-1	Practicals based on DSEPFT-II, III & IV E	03+03	20	20	80	100	4
DSEFTP-2	Practicals based on DSEPFT-V, VI & VII E	03+03	20	20	80	100	4
DSEFTP-3	Industrial Training (Min. 1 Week)	--	--	--	--	--	2
SEC-III	Skill enhanced Course-3 (Speciality Foods)					50	2
Total						600	24

Swami Ramanand Teerth Marathwada University, Nanded

Choice Base Credit System (CBCS) Course Structure (New Scheme)

Faculty of Science

B.Sc Third Year

Sixth Semester Food Technology Syllabus

Semester Pattern effective from June 2018

Paper No.	Name of the Course	Instruction Hrs/Week	Total Period	Internal Evaluation	Marks of Semester	Total Marks	Credits
DSEFT-II F	Co-operation, Marketing & Finance	03	45	10	40	50	2
DSEFT-IIF	Extrusion Technology	03	45	10	40	50	2
DSEFT-IIIF	Food hygiene and sanitation	03	45	10	40	50	2
DSEFT-IVF	Food safety and Microbial Standards	03	45	10	40	50	2
DSEFT-VF	Food quality assurance and certification	03	45	10	40	50	2
DSEFT-VIF	Food Laws and Regulations	03	45	10	40	50	2
DSEFTP-1	Practicals based on Section A & Section B of CCFT-I, II & III F	03+03	20	20	80	100	4
DSEFTP-2	Practicals based on CCFT-IV, V & VI F	03+03	20	20	80	100	4
DSEFTP-3	Dissertation	04	20	10	40	50	2
SEC-IV	Skill enhanced Course-4 (Entrepreneurship development)					50	2
Total Marks and credits of TY						600	24
Total Marks and credits of B.Sc. I, II and III year	Total Marks of B.Sc.Food Technology Degree (Three years of course with dissertation, CBCS Pattern)						44+ 48+ 48= 140.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based credit System (CBCS)

B.Sc. Food Technology

II year III semester

Subject: Fruits and Vegetable Processing Code: CCFT II C

Credits: 02 Marks: 50 (External 40, Internal 10)

Unit I : Introduction to fruits and vegetable processing and preservation 08

Production and processing scenario of fruits and vegetable in India and world, scope, importance, present constraints, prospects, principles and methods of preservation of fruits and vegetable.

Unit II : Commercial processing technology of fruits (I) 08

Mango (Pulp, RTS, squash, canned pulp, toffee, amchur, pickle, powder), **Banana** (wafers, puree, powder, banana fig), **Papaya** (jam, candy, RTS, nector, squash, papian), **Pomegranate** (Juice, squash, syrup, anardana, anargoli), **Guava** (jelly, juice, canned guava, squash, toffee), **Jamun** (RTS, jelly, syrup, wine, flakes, bar, powder).

Unit III :Commercial processing technology of fruits (II) 08

Grape (Rasins, juice,wine), **Fig**(Pulp, dried fig, toffee, powder, bar), **Citrus fruits** (jelly, marmalades, RTS, squash, candy), **Amala**(jam, candy, juice, squash, powder, dried shreds, chavanprash, pickle, chutney, sauce, muranba), **Tamarind** (Pulp, powder, toffee, bar, RTS), **Wood apple** (Jelly, Marmalades).

Unit IV :Commercial processing technology of vegetables(I) 08

Tomato (ketchup, sauce, puree, soup, chutney, pickle), **Ginger** (Candy, dried, pickle, RTS, Syrup) **Onion** (Dried onion, powder), **Garlic** (Dried onion, powder, pickle), **Potato** (Wafers, starch, papad),

Unit V :Commercial processing technology of vegetables(II) 08

Carrot (candy, pickle, jam), **Cauliflower and cabbage** (Dried, pickles), **Leafy Vegetables** (Dried- Spinach, fenugreek, coriander leaves, curry leaves), **Bitter guard** (Pickle, dried bitter guard).

Practical

1) Study of canning of mango/ Guava/ Papaya
2) Preparation fruit jam –Apple/mango/guava
3) Preparation of frit jelly- wood apple/ sweet orange/guava/ tamarind.
4) Preparation of fruits marmalades
5) Preparation of fruits preserve and candy
6) Preparation of fruits RTS
7) Preparation of fruits Squash
8) Preparation of fruits syrup
9) Study of preparation of grape raisin, dried flg and banana flg
10) Preparation of Pickle, mixed pickle
11) Preparation of dried Ginger
12) Preparation of amchur
13) Preparation of dried onion and garlic
14) Preparation of banana and potato wafers
15) Preparation of dehydrated leafy vegetables

Reference Books :

1) Fruits and vegetable preservation principles and practice— SrivastavaR. P.

2) Post- Harvest Technology of fruits and vegetables---- Sanjeev Kumar
3) Hi tech Horticulture----- Singh D. K.
4) Preservation of Fruits and vegetable------ Khader
5) Fruits and vegetable preservation------ Bhutani R. C.
6) Principle of Fruits Preservation----- Morris, Thomas Normon

Preparation of fruits and Vegetables ----- Gridharilal G. S. Siddappa and G. L. Tandon

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based credit System (CBCS)

B.Sc. Food Technology

II year III semester

Subject: Wheat Milling and Baking Technology Code: CCFT IIIC

Credits: 02 Marks: 50 (External 40, Internal 10)

Unit I : Wheat **08**

Importance, production, varieties, types grading, quality, structure, physiochemical, rheological properties and enzymes in wheat.

Unit II : Conditioning and milling of wheat **08**

Principles, methods of conditioning roller flour milling process , break rolls, reduction rolls, design and operation

Unit III : Flour **08**

Types, grades, supplementations, fortifications, additives, improvers, bleaching and oxidizing agents

Unit IV : Bakery Products **08**

Roll of bakery ingredients(Major &minor), products from hard and soft wheat, bread processing (straight and sponge dough method), quality control, testing of raw material, bakery products faults and its shelf-life, nutritional improvements of bakery products.

Unit V: Bakery unit **08**

Setting, bakery norms, specifications for a raw materials, packing, marketing of products, project report preparation.

Practical

1) Classification of wheat based on physio-chemical properties
2) Study of quality testing of flour and yeast.
   a)falling numbers and a amylase activities
   b) sedimentation value
   c) pelshenk value
   d) rheological value
3) Study of manufacturing of bread with different types and their types
4) Test baking- biscuits, cookies, crackers, buns
5) Preparation of cakes, pastry and pizza
6) Visit to wheat milling industry and bakery unit

Reference book

1) Bakery science and cereal technology khetarpaout
2) Technology of cereals Kent
3) Bread Spensor
4) Flour milling process Scott

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based credit System (CBCS)

B.Sc. Food Technology

II year III semester

Subject: Meat, Poultry and Fish Technology Code: CCFT IVC

Credits: 02 Marks: 50 (External 40, Internal 10)

Unit I : Importance, development and composition of meat, poultry and fish 08

sources, physio-chemical properties , muscle structure, pre slaughter transport, care anti- mortem inspection, abattoir design and layout.

Unit II:Slaughtering of animals and poultry. 08

Postmortem inspection, grading of meat , factors affecting post mortem changes and shelf life of meat

Unit III: Processing and preservation of meat 08

Mechanical deboning , aging or chilling, frezzing pickling curing ,cooking , smoking of meat, principles and methods of meat tenderization, meat emulsion and manufacture of meat and poultry products.

Unit IV : Egg 08

Structure, composition, quality characteristics processing and preservation of egg.

Unit V : Meat plant 08

Sanitization, safety and by product utilization

Practical

1) Pre slaughtering operations of meat animals and poultry birds
2) Study of slaughtering and dressing of meat animals
3) Study of post mortem changes
4) Study of meat cutting and handling
5) Study of evaluation of meat quality
6) Study of preservation of meat by different methods and preparation of meat and poultry products
7) Evaluation of quality and grading of eggs
8) Study of preservation of shell eggs
9) Study of by products utilization

Reference book

Principles of Meat science	F.J. Forrest
Meat handbook	Albert Levie
Developments in Meat Science Vol I & II	Ralston Lawrie
Poultry production	R. A Singh
Meat Technology	Gerard F

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based credit System (CBCS)

B.Sc. Food Technology

II year III semester

Subject: Confectionery Technology Code: CCFT VC

Credits: 02 Marks: 50 (External 40, Internal 10)

Unit I : Introduction to confectionery 08

History, traditional confectionery good, types of confectionery, classification, basic technical consideration (TS, TSS, Ph, invert sugar, ERH, Glucose syrup, RH,)

Unit II: Role of ingredients 08

Types of ingredients used- sugar, milk and milk products, whipping agent, release agent, thickeners, acidulents, flavours, emulsifiers, additives, starch derivatives and colours.

Unit III :Coca and chocolate processing 08

Coca bean processing- roasting, fermentation, production of coco butter, powder and its quality.

Chocolate processing- ingredients, mixing, refining, conching, tempering, molding, cooling, coating, fat bloom

Unit IV :High boiled sweets, caramel and toffee processing 08

Definition, composition, ingredients, methods of preparation, recipes, faults, factors affecting on quality.

Unit V : preparation of Fondant, Tablet, marshmallow, panning 08

Definition, methods of preparation, composition, faults and factors affecting on quality of products, packaging and marketing.

Practical

1) Study of production of invert sugar
2) Preparation of high boiled sweets
3) Preparation of toffee and candy
4) Preparation of chocolate
5) Preparation of milk based Indian sweets
6) Preparation of flour based sweets
7) Preparation of petha
8) Visit to confectionery industry

Reference book

1) Sugar confectionery and chocolate manufacture R. Less
2) Industrial chocolate manufactory and use S. T. Beeketi
3) Basic baking S. C. Dubey

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based credit System (CBCS)

B.Sc. Food Technology

II year III semester

Subject: Techniques in Food Analysis Code: CCFT VIC

Credits: 02 Marks: 50 (External 40, Internal 10)

Unit I : Nature and concepts of food analysis 08

Rules and regulations of food analysis, safety laboratory,

sampling techniques.

Unit II : Principles and methodology involved in analytical techniques 08

pH meter and use of ion selective electrodes, spectroscopy, UV visible, florescence, infrared spectrophotometer , Atomic absorption and emission spectroscopy, mass spectroscopy, nuclear magnetic resonance and electron spin resonance, chromatography, Asorption, column, partition, gel-filtration, affinity, ion- exchange, Size-exclusion method, gas liquid chromatography.

Separation techniques- Dialysis, electrophoresis (Paper, SDS gel electrophoresis, immune electrophoresis), sedimentation ultra-filtration, ultra centrifugation, Iso electric focusing, isotopic techniques, monomeric techniques.

Unit III :Immuno assay techniques in food analysis 08

Isotopic and non -isotopicimmune assay, Enzyme immune assay.

Unit IV : Principle and methodology involved in analysis and evaluation of analytical data **08**

Rheological analysis, textural profile.
Evaluation of data- accuracy and precision, statistical significance, co relations regression, computers for data analysis and result interpretation.

Unit V : Sensory analysis of food **08**

Objective and Subjective method

Practical

1) Analysis of heavy metal using atomic absorption spectrophotometer
2) Estimation of phytic acid trypsin inhibitor activity using spectrophotometer
3) Separation of amino acids by two dimensional paper chromatography
4) Identification of fruit juice sugar using TLC
5) Separation of praline by ion exchange
6) Molecular weight determination using sephadox-gel
7) Identification of organic acids by paper chromatography
8) Gel-electrophoresis for analytic techniques
9) Quantitative determination of sugars and fatty acid profile by GLC
10) Study of Quantitative make up of water and fat soluble vitamins using HPLC
11) Study of determination of rheological characteristics of food sol / gel and sensory evaluation of foods.

Reference Book:

1) Food Analysis- Theory and practical Pomeranze&Melson
2) Methods in food analysis Mayanarnd
3) Introduction to practical Biochemistry Plume Thamiah
4) Practical biochemistry

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based credit System (CBCS)

B.Sc. Food Technology

II year III semester

Subject: Food Processing Equipments Code: CCFT VIIC

Credits: 02 Marks: 50 (External 40, Internal 10)

Unit I :Material Handling 08

Material handling machines, conveyors, pre-treatment unit operation (cleaning, dehulling, dehusking, sorting, grading, peeling and forming), size reduction, separation, agitation and mixing.

Unit II :Engineering Properties of Food material 08

Introduction, significance in equipment design, processing and handling of food products, hygienic design of food processing equipment's, sanitary requirements, sanitary pipes and fittings, rheology texture of food material, elastic, plastic and viscous behavior, methods of texture evaluation, subjective, objective measurements.

Unit III : Evaporation, Drying and Thermal Processing 08

Principles, types, classification, methods and equipments, mass and energy balance

Unit IV : Mechanical separations, Filtration, expression and Irradiation Process 08

Principles, types, classification, and equipments used

Unit V :Equipments used in various food processing 08

Baking, roasting, frying, blending, pulverization.

Practical

1) Study of centrifugal separators
2) Study of ultra- filtration equipments
3) Study of microwave oven, infrared moisture meter and universal moisture meter
4) Study of Instron and working
5) Study on the sorting and grading of materials
6) Study of evaporator, dryer, sterilizer with their design problem
7) Determine flow parameters of Newtonian, non- Newtonian food products by- capillary tube viscometer, Hokke's viscometer

Reference Book

1) Unit operation of chemical engineering- McCobe Smith Harriott
2) Food Engineering Operation- Brennan, Butters, Cowell and Lilly
3) Process Heat transfer- Kern
4) Introduction to food engineering- Heldman D. R. & Singh R. P.
5) Fundamental of food engineering- Charm S. E.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based credit System (CBCS)

B.Sc. Food Technology

II year III semester

SEC - I: Food Packaging

Credits: 02 **Marks: 50 (External 40, Internal 10)**

Unit I : Food packaging -

Introduction - packaging stituations in India & world, Need of packaging, Use of plastic in India & world, Storage & atmospheric package labelling laws.

Unit II : Package Materials -

Classification, paper - Types, manufacturing of package material, Glass - Manufacturing of package material, advantages & disadvantages, Aluminium - Advantages & disadvantages, Plastic - Classification of plastic, use of each plastic.

Unit III : Lamination, coating & Aseptic packaging. -

Need, types, properties, advantages & disadvantages, Coating on paper, System of aseptic packaging - material & machinery used.

Unit IV : Packaging of specific foods - Bread, Biscuit, Foffee, Milk Powder,

Carbonated Beverages, Snack Food etc.

Unit V : Mechanical & Functional tests on package

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based credit System (CBCS)

B.Sc. Food Technology

II year IV semester

Subject: Legume and Oil Seed technology Code: CCFT IID

Credits: 02Marks: 50 (External 40, Internal 10)

Unit I : Importance of legumes, pulses & oil seeds 08

Presents status, morphology, chemical composition, anti- nutritional factors, classification and types.

Unit II :Milling 08

Principles, methods and equipment's used for milling, fermented products of legumes.

Unit III : Removal of anti-nutritional factors 08

Soaking- Principles and their methods, Cooking quality of dal

Unit IV : Oil extraction and refining of oil 08

Oil extraction- Traditional method- ghani, modern methods-expellers- Principle and structure, solvent extraction- principles, pre treatment, factors affecting on extraction process, refing- degumming, neutralization, bleaching ,filtration and deodorization.

Unit V : New technology in oil seed processing 08

Utilization of oil seed, meals for different food uses, high protein products, protein concentrates and protein isolates.

Practical:

1) Physical properties of legumes and oil seeds
2) Estimation of protein
3) Estimation of fat
4) Study of methods and principles of dehuling
   A) Application of oil
   B) Applications of red earth slurry
5) Anti-nutritional factors and methods of illumination
6) Study of soaking, sprouting legume and cooking quality of dal
7) Fermented products of legume –Dosa , idli, wada&dhokla
8) Production of protein rich products
9) Visit to dal mill and oil extraction plant

Reference books:

1) Post-harvest biotechnology of legumes D. K. Solunke et al
2) Post-harvest biotechnology of oil seed D. K. Solunke et al
3) Processed food stuffs A. M. Alschule
4) The chemistry and technology of edible oil and fats A. E. Baily
5) Post- harvest technology of cereals, pulses and oil seeds Chakraborthy A

Oil seed processing technology B. D. Shukla

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based credit System (CBCS)

B.Sc. Food Technology

II year IV semester

Subject: Fermentation and Industrial Microbiology

Code: CCFT III D

Credits: 02 **Marks: 50 (External 40, Internal 10)**

Unit I : Microorganism in industries, Fermentation: 08

Beneficial microorganism, screening, types of screening & isolation.
Definition of fermentation, types, design of fermenter, accessories with function.

Unit II : Metabolites: 08

Definition, types of metabolite, Industrially important secondary metabolite- organic acid, antibiotic, probiotic.
Advances in strain improvement for high yields of metabolite.Bacteriocins, biocolour, carotenoids, β-carotene, lycopene.

Unit II : production and purification of microbial compound: 08
Production and purification of microbial enzymes, polysaccharides, amino acids, vitamins and bioinsecticides.

Unit IV : Plant cell culture: 08
Definition, requirments, media,types of media, callus, subculture.
Production of secondary metabolite, continuous and batch culture.
Unit V : Fermented foods: 08

Fermented dairy products, alcoholic bevarages, roll of baker's yeast,

Angkak production and purification.

Practicals:

1)Study of production and assay of citric acid.

2) Study of production and assay of β-carotene.

3) Study of production and assay ofantibiotic penicillin/tetracycline.

4)Study of production of Angkak (Red rice)

5)Study of production, purification and assay of fungal amylase/protease.

6)Study of production of Xanthan/ Pollulan.

7) Study of production and assay of amino acid.

8) Study of single cell protein.

9)Study of mushroom production

10) Study of preparation of food based fermented product like Miso/ Idli/ Dhokla.

Reference book

1) Microbial Technology Vol-I ----- H.J.Peppler& D. Perlman
2) Microbial Technology Vol-II ----- H.J.Peppler& D. Perlman
3) Industrial microbiology ---- Prescott &Dunns.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based credit System (CBCS)

B.Sc. Food Technology

II year IV semester

Subject: Processing of Milk and Milk Products

Code: CCFT IV D

Credits: 02 **Marks: 50 (External 40, Internal)**

Unit I : Introduction to Milk 08

Definition, composition of milk from different species, colostrum, physio-chemical properties of milk, nutritive value of milk and milk products, classification of milk products.

Unit II :Processing of Milk 08

Pasteurization by LTHT and HTST and UHT- filtration, UF and RO, clarification, cream separation, standardization, homogenization, heat processing, boiling, sterilization.

Unit III :Manufacturing of different milk products 08

Butter, butter oil (ghee), yoghurt, cheese, ice cream types, roll of ingredients, various methods of preparations and fermented milk and milk products

Unit IV :Manufacturing of Indigenous milk products and Indian Milk confectionery 08

Ghee, Khoa, Chenna, paneer, dahi, shrikhand, Khoa and Chenna based sweets

Unit V : By products and packaging of milk products 08

Types of by- products of dairy industry and theirutilization, packaging and storage of milk and milk products

Practicals

1) Sampling and analysis of milk- physio-chemical properties and composition, DMC and DYc reduction tests, presence of adulterants and preservation
2) Standardization of milk for markets
3) Study of clarification and separation of milk
4) Study of heat processing of milk- pasteurization
5) Preparation of butter, ghee
6) Preparation of ice cream
7) Preparation of dahi, shrikhand, lassi
8) Preparation khoa and its sweets
9) Preparation of chenna, paneer and chenna based sweets
10) Visit to dairy plant

Reference books

4) Outlines of dairy technology----- Sukmar De,
5) The fluid milk industry--- J. L. publishing company USA
6) Principles of dairy processing---- J . N. warner, wiley Eastern ltd, new delhi
7) Indian dairy products ----- k. s. Rangappa and k. L. Acharya
8) Judging of dairy products ---- J. A. Nelson and traout
9) Milk processing and dairy products industry ----EIRI Board of consultants Engineers Indian Research Institute, Delhi
10) Technology of milk processing ---- Q. A khan, Padamanabhan

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based credit System (CBCS)

B.Sc. Food Technology

II year IV semester

Subject: Spice and Flavour Technology

Code: CCFT V D

Credits: 02 **Marks: 50 (External 40, Internal)**

Unit I : Introduction and post harvest technology of major spices 08

Production and processing scenario of spices, flavor and plantation crops and its scope, post-harvest technology, processed products and its utilization of various major spices (Ginger, turmeric, chilly, onion, garlic, pepper, cardamom, cashunuts and cocont)

Unit II : Processing and utilization minor spices, herbs and leafy vegetables 08

Annie, caraway seeds, cassia, cinnamon, clove, coriander, cumin, dill seed, fern seed, nutmeg, saffron, asafetida, sweet basil, marjoram, mint, sage, savory, thyme, ajawan, curry leaves.

Unit III : Tea, coffee, Coca, Vanilla Processing 08

Introduction, post harvest technology, utilization

Unit IV : Spice oli and oleoresins 08

Introduction, definition, processing and utilization

Unit V :Flavours and packaging of spices and its products08

Flavouring compounds in food, separation, purification and identification of natural flavouring materials, synthetic flavouring

agents and their stability, standard specifications of spices and flavours, packaging of spice and its products

Practical

1) Study of identification and characterization of flavouring compounds of spices
2) Study of oil determination of spices
3) Study of extraction of oil from clove, pepper cardamom, chilly
4) Study of extraction of oleoresins- turmeric, ginger, pepper, clove
5) Study of piperine estimation in pepper oleoresins
6) Study of steam distillation of spices
7) Study of determination curcumin content in turmeric
8) Study of chemical analysis of spices, moisture, volatile oil specific gravity, refractive index, acid value
9) Study of standard specification of spice
10) Preparation of curry powder
11) Preparation of Indian masala for different food
12) Visit to spice industry

Reference book

1) Spices Vol II---- Parry J. W.
2) Spice and condiments--- Pruthy J. S.
3) Herbs and spices---- Rosemeryhemphill
4) The book of spices---- Rosen Gartan, F. and Living ton
5) Spices and herbs for the food industry ---- Lewies Y. S

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based credit System (CBCS)

B.Sc. Food Technology

II year IV semester

Subject: Food Additives **Code: CCFT VI D**

Credits: 02 **Marks: 50 (External 40, Internal)**

Unit I : Intentional and unintentional food additives, their toxicology and safety evaluation 08

Unit II : naturally occurring food additives and food color (natural and artificial), pigments, importance and utilization of color 08

Unit III : Food preservatives and their chemical action 08

Unit IV : Taste and flavor inducer, potentiater 08

Unit V : Role and mode of action of salt, chelating agents, stabilizers and thickeners, polyhydric alcohol, anti-caking agent, firming and coloring agent, flour anti caking agent, anti-oxidants, non –nutritional sweetness and anti- microbial agents, spices, condiments 08

Practical

1) Study of evaluation GRAS aspects of food additives
2) Study of identification of food color by TLC
3) Study of isolation and identification of naturally occurring food pigment by paper and TLC
4) Study of spectrometric method of total chlorophyll (A & B)
5) Study of determination of diacetyl content of butter
6) Study of role and mode of action of chelating agents in fruit juice

7) Study of role and mode of action of stabilizer and thickeners in frozen dairy products (ice cream)
8) Study of role and mode of anti-oxidant in frozen fish
9) Study of role of leaving agent in baked food products

Reference books

1) Food chemistry Vol I------- Fennama O. R.
2) Food chemistry ------- Mayer L. H

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based credit System (CBCS)

B.Sc. Food Technology

II year IV semester

Subject: Instrumentation & Process Control Code: CCFT VII D

Credits: 02 Marks: 50 (External 40, Internal 10)

Unit I: Introduction, definition, recorders & monitors, panel boards

Unit II: General characteristics of instruments, static and dynamic characteristics

Unit III: Temperature scales, various types of thermometers - mercury-in-glass, bimetallic, pressure-spring thermometers, thermo couples, resistance thermometers & pyrometers

Unit IV: Pressure & pressure scales, manometers, pressure elements differential pressure

Unit V: Liquid level measurements, different methods of liquid level measurement

Unit VI: Flow measurement, kinds of flow, rate of flow, total flow differential pressure meters, variable area meters

Unit VII: Transmission, pneumatic & electrical

Unit VIII: Control elements, control actions, pneumatic & electrical control systems

Practicals

1) To study instrumentation symbols
2) Measurement of temperature by different thermometers.

3) measurement of pressure by 'U' tube manometer, (inclined tube manometer)
4) measurement of liquid level in the tank with the help of Bob and tape
5) determination of relative humidity by wet and dry bulb thermometer
6) measurement of velocity of fluid by using venturimeter / orifice meter/pilot tube
7) measurement of RPM of an electric motor by Tachometer
8) Study of measurement of wind velocity by anemometer
9) Study of measurement of intensity of sun shine by sunshine recorders

REFERENCE BOOKS

1. Intrumentation — F.W. Kirk & N. R. Rimboi
2. Industrial Instrumentation Fundamentals — Austin E. Fjribance
3. Process Instruments & Controls Handbook — Considine

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based credit System (CBCS)

B.Sc. Food Technology

II year IV semester

SEC - II: Food Quality

Credits: 02 **Marks: 50 (External 40, Internal 10)**

Unit I : Food quality in its attributes 08

Role in industry, need of quality control, factors affecting quality control, dominant and hidden attributes, role of color in quality spectra, types of color, measuring instruments, viscosity, types of fluids, different viscometers to measure viscosity. Consistency methods, use to measure consistency, difference between viscosity and consistency, role of size and shape method to find size and shape of food and food products

Unit II : Defects 08

Classifications genetics- P**hysiological defects**- structural, off color, character, **Entomological defects-** Holes, scars,lesions, off coloring, curled leaves, Pathological defects, mechanical defects, extraneous or foreign material defect, measurements of defects, improving visibility by dilution , white background, color differences, standardization of conditions, reference standards, counts and measure, isolation of defects by floatation, elution, electronic sorting, internal defects

Unit III :Texture, flavor and odour 08

Texture-Classification, role of firmness, yielding quality, juiciness, chewiness, fibrousness, grittiness, mealiness, stickness, measurements of texture/ kinesthetic, characteristics- by compression, mechanical thumb, puncture texture, succulometer, shearing by tendrometertexturome, maturometer, fibrometer, moisture content, by bar bender moisture, alcohol insoluble solids, color, consistency sound measurements for kinestic.**Flavor-** Definition and its role in food quality taste, classification, taste quality, relative intensify, reaction time effect of disease temperature and taste medium on taste, basic taste interaction of taste. **Odour-** Classification neutral, mechanisms olfactory abnormalities odor testing techniques, odor intensities.

Unit IV : Quality Measurements 08

Laboratory measurement type of tests, panel selection and testing environments, serving procedure, instruction to judges, different testes directional difference tests classification of difference tastes, two sample test, three sample tests, multisampling test, comparison of procedure, ranking, scoring, hedonic scaling dilution procedure, descriptive sensory analysis cotour method, other procedures. **Consumer measurement-**factors influencing acceptance and preference,objectives of consumer preference studies,information obtain from consumer study, factors influencing results from consumer surveys,methods of approach development of the questionnaire, type of questionnaire,serving procedures, comparison of laboratory panels with consumer panels, of consumer survey.

Unit V : Quality of raw materials and factors influencing the food qualities 08

Physical,chemical and microbial quality of products during processing after processing color,taste,texture,flavor,appearance,Soil

field practices, harvesting practices, procedures , packaging, transportation, storage, processing conditions, packaging and storage conditions of finished products, recording and reporting of quality.

Practicals-

1. sensory evaluation of products.

2. Study of quality evaluation of raw materials

3.Study of quality evaluation of product for size and shape

4. Study of determination of viscosity of food products.

5. Study of determination of texture

6. Study of sensory evaluation of product for taste and flavor.

7. Study of evaluation of food standards.

8. Study of determination of color by using Lovibond.

9. Consumer study for food quality.

10.Visit to food factory to know sensory evaluation problems.

11.Visit to fruits and vegetable market for quality assessment.

Reference books

1.Principals of sensory evaluation of food….Maynard A-Amerine, Rose mariepangborn, Edward

2.Quality control for food industry….Karmmertwigg

3.Quality control in food industry…S.N.herchdogfer

4.Advances in food research….Academic press vol;I