PROPOSED STUDY & EVALUATION SCHEME

FOR

III YEAR B.TECH.

(FOOD TECHNOLOGY)

ON

CHOICE BASED CREDIT SYSTEM (CBCS)

[EFFECTIVE FROM THE SESSION 2018-19]
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DEPARTMENT ELECTIVE COURSE-1:
1. RFT051: Food Additives
2. RFT052: Frozen Foods and Cold Chain Management
3. RFT053: Technology of Beverages

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DEPARTMENT ELECTIVE COURSE-2:
1. RFT061: Cereals, Pulses and Oilseed Products
2. RFT062: Engineered, Fabricated and Textured Foods
3. RFT063: Food Process Engineering

*Note: Case study pertaining to Food Industry, Processes, Safety audit etc.*
UNIT -I
Structural, Compositional and Nutritional aspects of fruits and vegetables. Physiological development: Growth, Maturation, Ripening and Senescence. Post harvest handling including controlled and modified storage. Techniques of processing and preservation of fruits and vegetables by refrigeration and freezing, canning and bottling, drying and dehydration.

UNIT -II

UNIT -III
Spices: Composition, Structure and characteristics. Preservation and processing of major and minor spices of India; whole spice, Spice powder, Paste and extracts, Spice oils and oleoresins. Composition, Structure, characteristics & processing of cashew nut and other dry fruits

UNIT -IV
Composition, Production and processing of Tea leaves: Black tea, Green tea and Oolong tea. Instant tea. Production and processing of coffee cherries by wet and dry methods to obtain coffee beans, grinding, storage and preparation of brew, Soluble /Instant coffee, Use of chicory in coffee, decaffeinated coffee.

UNIT -V
Production, processing and chemical composition of cocoa beans. Cocoa Processes: Cleaning, roasting, alkalization, cracking and fanning, Nib grinding for cocoa liquor, cocoa butter and cocoa powder. Manufacturing process for chocolate: Ingredients, Mixing, Refining, Conching, Tempering, Moulding etc. to obtain chocolate slabs, chocolate bars. Enrobed and other confectionary products.

Text Books:
2. B. Shrilakshimi: Food Science (2003), New Age International.
UNIT - IV
Preservation by water removal:
(a) Principles, Technological aspects and application of evaporative concentration process; Freeze concentration and membrane process for food concentrations.
(b) Principles, Technological aspects and application of drying and dehydration of foods, Cabinet, tunnel, belt, bin, drum, spray, vacuum, foam mat, fluidized-bed and freeze drying of foods.

UNIT - V
Principles, Technological aspects and application of sugar and salt, Antimicrobial agents, Biological agents, non ionizing and ionizing radiations in preservation of foods. Hurdle technology.

Text Books:

RCH-501 CHEMICAL REACTION ENGINEERING
UNIT 1
Rate of Reaction, Elementary and non-elementary homogeneous reactions, Molecularity and order of reaction, Mechanism of reaction, temperature dependency from thermodynamics, collision and activated complex theories. Integral and differential methods for analyzing kinetic data, interpretation of constant volume reactor, zero, first, second and third order reactions, half life period, irreversible reaction in parallel and series, catalytic reaction, autocatalytic reaction, reversible reactions.

UNIT 2
Interpretation of variable volume batch reactions for zero, first and second order reactions, design equation for batch, continuous stirred tank, plug flow reactors for isothermal reaction.

UNIT 3
Optimum reactor size, plug flow/mixed flow reactors in series and parallel, recycle reactor.

UNIT 4
Design of reactors for multiple reactions, parallel and series reactions. Temperature and pressure effects for single reaction.

UNIT 5
Residence time distribution of fluids in vessels, E, F and C curves, Dispersion model, Tank in series model. Non Isotherm PFR and CSTR, Safety issues in Non Isothermal Reactors.

Text Books:

Reference Book:

DEPARTMENTAL ELECTIVE COURSE-1
RFT-051 FOOD ADDITIVES
UNIT I
Definitions of Food Additives, Classification and Functions, Legitimate uses of Additives in foods, Intentional & Non Intentional additives, Indirect food additives; Difference between Additives & Adulterants, Food uses and functions in formulations; Toxicological evaluation of food additives.

UNIT II
Uses & functions of: Acid, Base, Buffer systems, Salts and Chelating/Sequestering agents, Masticatory substances. Low calorie and non nutritive sweeteners, Polyols.

UNIT III
Antioxidants, Emulsifying and stabilizing agents, Anti-caking agents, Thickeners, Firming agents. Flour bleaching agents and Bread improvers.

UNIT IV

UNIT V
Colours and Flavours (synthetic and natural) Types of flavours, Flavours generated during processing – reaction flavours, Stability of flavours during food processing, flavour emulsions; essential oils and oleoresins.

Text Books:

RFT-052 FROZEN FOODS AND COLD CHAIN MANAGEMENT

UNIT -I
Fundamentals of freezing: Glass transition in frozen foods and biomaterial, microbiology of frozen foods, thermo-physical properties of frozen foods, Freezing load and freezing time calculations, Innovation in freezing process

UNIT -II
Facilities for the cold chain: freezing methods and equipment, cold store design and maintenance, transportation of frozen foods, retail display equipment and management, household refrigerators and freezers, monitoring and control of the cold chain.

UNIT -III

UNIT –IV
Monitoring and measuring techniques for quality and safety: Chemical measurements, sensory analysis of frozen foods, Food borne illnesses and detection of pathogenic microorganisms, self life prediction of frozen foods.

UNIT -V
Packaging of frozen foods: Introduction to frozen food packaging, plastic packaging of frozen foods, paper and card packaging of frozen foods, Packaging of frozen foods with other materials, Packaging machinery.

**Text Books:**

**RFT-053 TECHNOLOGY OF BEVERAGES**

**UNIT I.**
Introduction, classification, Beverage industry in India, Traditional beverages; Effect of different ingredient on the quality of beverages; Preparation of syrups.

**UNIT II**
Manufacturing technology of mineral water and carbonated drinks; water quality, treatment and fortification process, Bottling, Packaging, storage and transportation.

**UNIT III**
Fruit beverages; Definition and preparation of squash, cordial, nectar, crush, alcoholic beverages; Milk beverages, Preparation of different beverages.

**UNIT IV**
Selection and economics of different beverages packaging materials, selection, operation and maintenance of beverage machines / equipments, Automation in beverage industries.

**UNIT V**
Quality control and safety in beverage industries, Waste management in beverage industries, Sensory evaluation of beverages, Chemical and microbiological analysis of different beverages.

**Text books:**

**RFT-551 FRUITS, VEGETABLES AND PLANTATION PRODUCTS LAB**

1. Preparation of Jam/Jelly and its preservation by sugar.
2. Preparation of tomato puree/ketchup and its preservation by chemical preservatives.
3. Preparation of Candied fruits.
4. Preparation of cordials and squash as per FPO specification.
5. Preparation of pickles.
6. Preparation of fermented Pickles (Sauerkraut).
7. Preparation of Fruit Preserves.
8. Preparation of Fruit Leather.

**Reference Books:**
2. BIS Standards.
3. FSSAI Manuals.
RFT-552 FOOD PRESERVATION LAB

1. To check the adequacy of Blanching process
2. Extension of shelf life/preservation of foods by use of low temperature.
3. Processing and preservation of Peas by use of high temperature.
4. To determine the effectiveness of sterilization process.
5. Preservation and processing of certain vegetables by drying and dehydration
6. Osmotic concentration/dehydration of certain fruits and vegetables
7. Preservation of fruit pulp with the help of Chemical preservatives.
8. Preservation of foods by Freezing (Frozen Foods).

Reference Books:

RFT-553 SOFT COMPUTING LAB

Use of following Techniques in C/C++ Language

2. Solution of single non-linear equations by Regulafalsi method.
3. Solution of system of linear simultaneous by Gauss Elimination method.
4. Solution of system of linear simultaneous equation by gauss seidel method and successive over relaxation method.
5. Solution of single first order ordinary differential equations by fourth order Runge-Kutta method.
7. Solution of Laplace equations (elliptic equation) by finite difference method.
8. Solution of wave equations (Hyperbolic equation) by finite difference method.
10. Finding Newton’s interpolatory polynomial based on finite difference table for n points.

RCH-551 CHEMICAL REACTION ENGINEERING LAB

1. Find out kinetic constant and study conversion of a given reaction in a batch reactor
2. Find out kinetic constant and study conversion of a given reaction in a plug flow reactor
3. Find out kinetic constant and study conversion of a given reaction in a CSTR
4. Study and operation of an adiabatic batch reactor
5. Study of a reversible reaction in a batch reactor
6. To determine energy of activation of reaction of ethyl acetate with sodium hydroxide
7. Find out specific rate constant and activation energy of a reaction in a plug flow reactor
8. To determine reaction equilibrium constant of reaction of acetic acid with ethanol.
9. To determine changes in free energy, enthalpy and entropy for the reaction of potassium iodide with iodine.

10. Study and operation of a cascade CSTR

**RFT-601 BAKERY TECHNOLOGY**

**UNIT-I**

**UNIT-II**

**UNIT-III**

**UNIT-IV**

**UNIT-V**

**Text Books :**
3. Samuel A.Matz: Cookie and Cracker technology, AVI Publications

**RFT-602 DAIRY TECHNOLOGY**

**UNIT-I**

**UNIT -II**
Whole, Standardized, Toned, Double toned and skim milk. Test for milk quality and Adulteration. UHT processed milk, flavored, Sterilized milk. Cleaning and sanitization of dairy equipments. Definition, Classification, Composition and physico-chemical properties of cream. Production processes and quality control.

**UNIT -III**
Butter: Definition, Classification, Composition and methods of manufacture, Packaging and storage. Butter oil/Ghee. Ice cream: Definition, Classification and Composition, Constituents and their role. Preparation of mixes and freezing of Ice cream, Overrun, Judging, Grading, and defects of Ice cream.

**UNIT -IV**

UNIT -V

Text Books:

RCH-604 MASS TRANSFER OPERATIONS

UNIT -I
Basic Principles of mass transfer: Molecular diffusion in fluids, mass transfer coefficients, Interphase mass transfer. Vapour pressure, enthalpy, absolute humidity, dew point, etc., Unsaturated vapour gas mixtures.

UNIT -II

UNIT -III

UNIT -IV
Adsorption and Stripping, Equipments, gas-liquid equilibria, Henry’s law, selection of solvent, absorption in tray column, graphical and analytical methods. Adsorption in packed columns. HTU, NTU & HETP concepts, design equations for packed column.

UNIT -V

Text Books:
DEPARTMENTAL ELECTIVE COURSE-2

RFT-061 CEREALS, PULSES AND OILSEED PRODUCTS L- T- P 3- 1- 0

UNIT-I
Composition, Structure and Processing characteristic of Cereal grains, Legumes and oilseeds, Post harvest, Post processing practices for their safe storage. Parboiling and Milling of paddy, Quality characteristics, Curing and aging of rice, Processed rice products.

UNIT-II
Wheat and its quality characteristics for milling into flour and semolina, Flour milling, Turbo grinding and air classification, Flour grades and their suitability for baking purposes, Assessment of flour quality and characteristics, Milling of Durum wheat, Macaroni products.

UNIT-III
Dry and Wet milling of corn, Starches and its conversion products, Cornflakes Manufacture. Malting of barley

UNIT-IV
Milling of legume-pulses by traditional and improved processes. Pearling of Millets.

UNIT-V

Text Books:
1. C.F.T.R.I. Mysore Manuals on Rice and its Processing
2. S.A.Matz : Cereal Technology, PAN-TECH International Incorporated, 1999
3. Y.Pomeranz: Cereals and Cereal Products, Wiley : VCH Verlag GmbH & Co. KGaA
5. S. A. Matz: Chemistry and Technology of Cereals as Food and Feed, AVI Publications

RFT-062 ENGINEERED, FABRICATED AND TEXTURED FOODS L- T- P 3- 1- 0

UNIT- I

UNIT -II
Textured vegetable protein products. Puffing Gun ,Puffed Products. Meat Analogues., Imitation Paneer

UNIT -III
Fabricated RTS Beverages, Bakery Products, Margarine, Peanut Butter, Imitation Milks Designer Lipids etc.

UNIT- IV

UNIT- V
Technology and manufacture of Macaroni, Pasta, Noodles, Vermicelli etc.
Text Books:
3. S.A. Matz, Cereal Technology, CBS Publishers

RFT-063 FOOD PROCESS ENGINEERING

UNIT -I
Introduction, Concept of Unit operation, Units and dimensions, Unit conversions, dimensional analysis, Mass and Energy Balances in various food processing operations. Related numericals
 Grinding and mixing Principle and equipments used in food industry

UNIT -II

UNIT -III

UNIT -IV
Refrigeration and Freezing, Concept and selection of a refrigerant, Freezing time calculation, Frozen food storage, Refrigeration requirements during storage, Related basic numericals

UNIT -V
Important considerations for designing of food plants. Types of layout.

Text Books:
2. Smith P.G., Introduction to Food Process Engineering

RFT-651 BAKERY TECHNOLOGY LAB

1. Preparation of Bread/ Test Baking.
2. Preparation of Sweet Buns
4. Preparation of Biscuits
5. Preparation of Nan-Khatai
6. Preparation of Cookies
7. Preparation of Cakes (Eggs/ Eggless)
8. Preparation of Pastries
9. Preparation of Laminated and Puffed products

Reference Books:
RFT-652 DAIRY TECHNOLOGY LAB

1. Plateform Tests of milk [COB, MBR Test, Alcohol Test, Sediment Test]
2. Determination of Fat content in Milk and Milk Products
3. Determination of SNF Content in Milk
4. Determination of Titratable Acidity in Milk
5. Determination of Overrun in Icecream
6. Quality Testing of Butter
7. Quality Testing of Butter oil / Ghee
8. Analysis of Adulteration in Milk and Milk products

Reference Books:

RCH-655 MASS TRANSFER OPERATIONS LAB

1. Separation factors of the experiments with differential distillation.
2. Separation factors of the experiments with flash vaporization.
3. Separation factors of the experiments with vapour liquid equilibrium.
4. Separation factors of the experiments with liquid – liquid extraction.
5. Separation factors of the experiments with solid – liquid extraction.
6. Separation factors of the experiments with ion exchange.
7. Separation factors of the experiments with membrane separation.
8. Studies on Bubble cap/ tray/ fractional column.
10. Studies on crystallization and adsorption.

RFT-654 CASE STUDY

Case study pertaining to Food Industry, Processes, Safety audit etc. shall be given to the students to carry out extensive search of literature/surveys and prepare a report for assessment followed with Seminar on the same.