PROPOSED STUDY & EVALUATION SCHEME

FOR

B.TECH. IV YEAR

(FOOD TECHNOLOGY)

ON

CHOICE BASED CREDIT SYSTEM (CBCS)

[EFFECTIVE FROM THE SESSION 2019-20]
### B.TECH. (FOOD TECHNOLOGY)

#### 4th Year VII-SEMESTER  
Session- 2019-20

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#### DEPARTMENT ELECTIVE COURSE-3:
1. RFT071 : Technology of Animal Foods
2. RFT072 : Logistics and Supply chain Management
3. RFT073 : Nutraceuticals and Functional Foods

#### DEPARTMENT ELECTIVE COURSE-4:
1. RFT074 : Traditional Fermented Foods
2. RFT075 : Food Plant Layout, design and Sanitation
3. RFT076 : Fermentation Technology
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**DEPARTMENT ELECTIVE COURSE-5:**
1. RFT081: Food Processing Waste Management
2. RFT082: Rheological and Sensory Assessment of Foods
3. RFT083: Food Physics

**DEPARTMENT ELECTIVE COURSE-6:**
1. RFT084: Food Products and Process Development
2. RFT085: Speciality Foods
3. RFT086: Food Packaging
DEPARTMENTAL ELECTIVE COURSE-3

RFT071        TECHNOLOGY OF ANIMAL FOODS               L- T- P
                          3- 0- 0

UNIT -I
Ante-mortem examination of meat animals, Scientific slaughtering; Meat cuts and portions of meat, Post mortar changes in meat; Conversion of muscle to meat; Colour of meat; composition and nutritional value, Meat microbiology and safety.

UNIT -II
Meat processing- curing and smoking; Fermented meat products (sausages and sauces); Frozen meat & meat storage. Beef Mutton, Pork Sausages and other meat products.

UNIT -III

UNIT -IV
Classification of fresh water fish and marine fish; Commercial handling, storage and transport of raw fish. Average composition of fish; Freshness criteria and quality assessment of fish; Spoilage of fish. Methods of processing and preservation of fish- Canning, Freezing, Drying, Smoking and Curing. Fish products – fish meal, fish protein concentrate, fish liver oil, fish sauce and surimi; Fish processing industries in India.

UNIT –V
Meat plant hygiene – GMP and HACCP. By-products from meat industries and their utilization; Meat industries in India. Production of chitin, chitosan; Production of non-food items from fish processing wastes. Byproduct Utilization – commercial processing of lecithin and other egg solids, Utilization of egg-derived products as food ingredients; Fertilizer from shells.

Text Books :
5. Jhingram VG; Fish & Fisheries of India; 1983, Hindustan Pub Corp

RFT072        LOGISTICS AND SUPPLY CHAIN MANAGEMENT   L- T- P
                           3- 0- 0

UNIT- I
Introduction. Logistics and supply chain management - Scope, Significance and Drivers; Basic Model - Primary and Secondary Activities; Role and Challenges of Logistics and supply chain management in food industry.

UNIT- II
Demand Forecasting And Warehousing Demand and supply management, Forecasting techniques, Strategic planning for material sourcing, Outsourcing strategies, Warehouse strategies, Inventory models and control techniques

UNIT- III
Distribution And Transportation .Various sources of distribution channels, Distribution models, 3PL and 4PL, Distribution network planning, Modes of transportation, Design of transshipment, Containerization.

UNIT- IV
Packaging And Information Technology ,Applications of Packaging in logistics, Types of packaging and packaging materials, Export & import packaging and labeling details, Reverse Supply Chain, Information Technology and the Supply Chain ( ERP, Bar-coding, RFID, GPS, E-Procurement).
UNIT- V
Global Lscm And Performance Analysis, Export and import procedure and Documentation, Customer relationship management in LSCM, Performance metrics in Supply Chain, Challenges in SCM.

Text Books:

RFT073   NUTRACEUTICALS & FUNCTIONAL FOODS   L- T- P
3- 0- 0

UNIT -I

UNIT –II
Nutraceuticals for specific situation such as cancer, heart diaseases, stress, Osteoartehritis, hypertension etc. Antioxidants and other phytochemicals, isoflavones, lycopenes, their role in nutraceuticals and functional foods, dietary fibers and complex carbohydrates as functional food ingredients.

UNIT –III
Protein as a functional food ingredients, Probiotic foods and their functional role, Herbs as functional foods, health promoting activity of common herbs. Cerals products as functional foods- Oats, Wheat bran, rice bran etc.

UNIT -IV
Functional vegetable products, oil seeds and sea foods. Coffee, tea and other beverages as functional foods/ drinks and their protective effects. Effects of processing and storage and interaction of various environmental factors on the potentials of such foods.

UNIT -V
Marketing and regulatory issues for functional foods and nutraceuticals Recent developments and advances in the area of nutraceuticals and functional foods.

Text Books :

DEPARTMENTAL ELECTIVE COURSE-4
RFT074    TRADITIONAL FERMENTED FOODS   L- T- P
3- 1- 0

UNIT –I
Indian traditional sweet, savory and snack food products: Sweetmeats, Namkins, Papads Idli and Dosa. Raw materials, Role of Ingredients and preparation.

UNIT -II
Preparation and Maintenance of Bacterial, Yeast and Mold cultures for food fermentations. Lactic acid bacteria-activities and health-promoting effects. Mushrooms: Cultivation and preservation.
UNIT -III

UNIT -IV

UNIT –V

Text Books :
1. K.H. Steinkrus : Handbook of Indigenous Fermented Foods, Marcel Dekker, Inc
3. Prescott & Dunn Industrial Microbiology, CBS Publishers and Distributors, 2004

RFT075 FOOD PLANT LAYOUT, DESIGN & SANITATION L- T- P 3- 1- 0

UNIT-I
Food Plant Layout and Equipment Design General principles of food plant Design and layout ,Design of food processing equipments :Size Reduction, mixing, separation, extraction, filtration, centrifugation, distillation and, gas absorption equipments.

UNIT –II
Warehousing and Cold Chain Management Food hygiene and safety in transportation, with a focus on warehouse storage and refrigerated ships- Safe food storage at shopping outlets: use of coolers/chillers/freezers, length of time in storage ,Design of warehouses .Scope of Cold Chain for enhancing marketing potentials of perishables in domestic and international markets Principles of Cold Chain Creation and Management.

UNIT –III
Physicochemical changes in stored products during storage Air tight, Non-air tight, Under ground, Conventional & Modern storage structures for fruits, vegetables, meat and marine products .

UNIT –IV
Aerated, refrigerated and controlled atmospheric storage.Modified Atmosphere storage. Layout and Design of storage structures, economics of storage structures

UNIT –V
Food Plant Hygiene and Sanitation Waste disposal, Control methods using Physical and Chemical Agents, Pest and Rodent Control, ETP Design and Layout. Food storage sanitation, transport sanitation and water sanitation.

Text Books:

RFT076 FERMENTATION TECHNOLOGY L- T- P 3- 1- 0

UNIT-I
Introduction and scope of microbial processes. Sources of industrial cultures and maintenance. Alcoholic fermentation: Production of Industrial Alcohol – Fermentation mechanism. Recent developments, brewing and malting, manufacture of wine and other distilled liquors.
UNIT-II
Microbial Foods – Food, Fodder and Bakers yeast, applications of the nonconventional raw materials (cellulosic material and hydrocarbons) Nutritional characteristics of food yeast, mushroom production. Vitamins-Vitamin B-2, Riboflavin, Soya-sauce & cheese production.

UNIT-III
Organic acids: Production of acids, viz., citric, lactic and gluconic acid. Mechanism of each fermentation, their uses.

UNIT-IV
Production of Amino acids (Lysine and glutamic acid) and Antibiotics (Pencillin, Streptomycin and Tetracyclines) and its new developments.

UNIT-V
Production of Organic Acids (Acetic acid and vinegar) its spoilage and prevention.

Text Books:
2. Prescott & Dunn Industrial Microbiology, CBS Publishers and Distributors, 2004

RFT701 FOOD QUALITY AND FOOD LAWS L- T- P 3- 0- 0

UNIT -I

UNIT -II
Instrumental measurements of sensory attribute of foods: Appearance, color, volume, density and specific gravity, Rheological and textural characteristics. Texture profile analysis. Correlation between instrumental and Sensory analysis of food quality attributes.

UNIT –III
Nutritional Quality of foods and its assessments: Food proteins (Digestibility, Biological value, NPU, PER), Modifications of foods constituents due to processing and storage and their nutritional implications.

UNIT –IV

UNIT –V

Text Books:
1. J.M.DeMan : Rheology and Texture in Food Quality, A V I Publishing Company, Incorporated
UNIT- I

UNIT- II
Cost Engineering: Time value of money and equivalence, Interest, cost comparisons by present worth, Annual equivalent cost and capitalised cost methods, Uniform gradient and series. Depreciation, Taxes and Insurances Nature of depreciation, Methods of determining depreciation, depreciation rates in current Indian situation, Types of taxes and insurance, Cost comparison after taxes.

UNIT- III
Cost Estimation: Types of cost estimation, capital investment cost, fixed capital cost, working capital cost, start-up costs, process equipment cost estimation, cost index, Equipment costs due to inflation, Battery limit investments, estimation of plant cost, Estimation of total product cost, Manufacturing cost, General expenses. Profitability Criteria of profitability, Payout period, Return on investment, Present value, Cash flow analysis, Alternative investment analysis, Sensitive analysis in project profitability. [8]

UNIT- IV
Economic Optimization and Optimum Design: Nature of optimization, Uni-variable and multivariable systems, Analytical, graphical and incremental methods of solution, LaGrange multiplier method, Linear programming and dynamic programming establishing optimum conditions, Break even chart for production schedule, Optimum production rates in plant operation, Optimum conditions in batch, cyclic and semicyclic operation, Sensitivity and response analysis.

UNIT- V

Text Books:

RFT751 FOOD QUALITY EVALUATION LAB
1. Sensitivity tests (Threshold/Dilution) to measure individual ability for sensory analysis.
2-3. Difference tests to evaluate qualitative and quantitative differences and/or preference between test products
4-5. Assessment of quality of wheat flour (Water Absorption Power, Gluten Content, and Sedimentation Value etc.).
6. Evaluation of quality of Bakery Products: Bread, Biscuits, Cakes etc.
7-8. Evaluation of quality of Dairy Products: Over run and fat content in Ice-cream, Specific gravity of Milks etc.
9-10. Assessment of quality of Fruit & Vegetable Products: Tomato Products, Jam, Jelly, Marmalades, Squashes & Cordials, Canned Products.
Recommended Books:
3. Official Method of Analysis of AOAC

RFT752 ADVANCED FOOD PROCESSING LAB

1. Preparation of Instant Mixes
2. Preparation of RTS beverages
3. Preparation of Value added products from Fruit wastes
4. Preparation of Fermented Products like Vinegar, Cider etc.
5. Preparation of Fermented Pickles like Sauerkraut.
6. Preparation of Noodles.
7. Preparation of Pasta products
8. Analysis of Egg Quality

RFT753 INDUSTRIAL TRAINING

The student(s) will be required to undertake training in the food industry after III year B.Tech.VI semester for a specified period and submit its report after completion for evaluation and viva-voce in the VII semester of his studies.

RFT754 PROJECT-1

The student (s) will be required to search literature pertaining to design of an equipment / processing of a food commodity / production of food product, comprehend it and prepare a report for assessment.
DEPARTMENTAL ELECTIVE COURSE-5

RFT081 FOOD PROCESSING WASTE MANAGEMENT

UNIT –I
Basic considerations: Standards for emission or discharge of environmental pollutants from food processing industries as per the updated provision of Environment (Protection) Act, 1986. Elements of importance in the efficient management of food processing wastes.

UNIT -II
Characterization and utilization of by-products from Cereal Pulses, Oilseeds, Fruits and vegetables, Plantation products, Fermented foods, Milk, Fish, Meat, Egg and poultry processing industries.

UNIT -III
Characterization of food industry effluents, Physical and chemical parameters, Oxygen demands and their interrelationships, Residues (solids), Fats, Oils and grease, Forms of Nitrogen, Sulphur and Phosphorus, Anions and cations, Surfactants, Colour, Odour, Taste, Toxicity. Unit concept of treatment of food industry effluent, Screening, Sedimentation Floatation as pre - and primary reactants.

UNIT –IV
Biological oxidations: Objects, Organisms, Reactions, Oxygen requirements, Aeration devices Systems: Lagoons, Activated sludge process, Oxidation ditches, Rotating biological cont caters and their Variations and advanced modifications.

UNIT -V

Text Books:
1. J.H. Green, Food Processing Waste Management, AVI Publications, Westport
2. Environment (Protection) Act 1986
3. AFST(I) & CFTRI Proceedings of the Symposium on By-products From food Industries: Utilization and Disposal

RFT082 RHEOLOGICAL AND SENSORY ASSESSMENT OF FOODS

UNIT -I
Mechanical properties of foods. Mechanical models to visualize behaviour of foods. Basic and applied rheological considerations and their application to foods.

UNIT -II

UNIT -III
Requirement of test systems for measuring food texture. Types of texture instrument and their operating mechanisms, Calibration, Performance of test and measurements of test parameters. Interpretation of test results.

UNIT –IV
Textural properties of fruits & vegetables; Dough, Pasta and Baked products; dairy products; Meat; Fat and fat products; and their instrumental Measurements.

UNIT -V
Rheology of chocolate, Textural characteristics of food emulsions, Functions of emulsifiers in relation to food texture, Sensory measurement of food texture and texture profile.

Text Books:
1. J.M. DeMan : Rheology and Texture in Food Quality, AVI Publishing Company, Incorporated
UNIT –I
Physical and Engineering properties - importance and applications in the crop process equipment design. Physical characteristics – shape, size, volume, bulk density, particle density, porosity, Surface area. Frictional characteristics- angle of repose, co-efficient of friction - determination.

UNIT-II

UNIT- III

UNIT –IV

UNIT –V

Text Books :

DEPARTMENTAL ELECTIVE COURSE-6

UNIT –I

UNIT -II
Detailed study of product, process and market, Planning and developmental activities and evaluating them.

UNIT -III
Development of prototype product and its testing for acceptance.

UNIT –IV
Development of process and planning for production trials. Planning the test market. Actual production trials and test marketing. Evaluation of test results.

UNIT -V
Launching of the product. Advertising and marketing plans. Suggestions for improving success.
**RFT085  SPECIALITY FOODS**

UNIT -I

UNIT -II
Foods / Diets in metabolic disorders and disturbances. Composition and Role of Ingredients.

UNIT -III
Foods and Diets recommended and restricted in Gastrointestinal disorders; Fever and Infection; Liver, gallbladder and pancreatic disturbances.

UNIT -IV
Foods and Diets recommended and restricted in blood, circulatory and Cardiac diseases; urinary and Musculoskeletal diseases. Allergies.

UNIT -V
Beneficial Effects of Spices, gamma-linolenic acid, Spirulina, antioxidants and other food constituents. New Developments.

**Text Books :**
5. B. Srilakshmi : Dietetics, New Age International
6. CFTRI Proceedings of IFCON

**RFT086  FOOD PACKAGING**

UNIT-I

UNIT -II
Cellulosic and Polymeric packaging materials and forms: Food grade polymeric packaging materials, Rigid plastic packages. Films: Oriented, Co-extruded, Laminates and Metallised; Cellophane, Olefins, Polyamides, Polyesters, PVC, PVDC, PVA, Inomers, Copolymers, Polycarbonates, Phenoxy, Acrylic and Polyurethane. Their mechanical sealing and barrier properties.

UNIT -III

UNIT -IV

UNIT -V

**Text Books :**
RFT851  SEMINAR  L- T- P
0- 0- 3
The student(s) will be required to present a Seminar pertaining to the Project Topic/ Advanced Food Processing Techniques/ Advanced Food analysis and Quality Control Techniques etc comprehend it, prepare a report and deliver a Seminar for assessment.

RFT852  PROJECT-2  L- T- P
0- 0- 12
The student(s) will be required to perform experimental work as per the finalized Plan of Work and prepare a detailed report for assessment. The Internal assessment shall be done through periodic reviews of the experimental work done and results obtained.