

**DR. A.P.J ABDUL KALAM TECHNICAL UNIVERSITY,  
LUCKNOW**



**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)

### 4<sup>th</sup> Year VII-SEMESTER

Session- 2019-20

SNo	Subject Code	Subject Name	L-T-P	Th/La b Marks	Sessional		Total	Credit
					Test	Assig/Att.		
1		OPEN ELECTIVE COURSE-1	3---0---0	70	20	10	100	3
2		DEPTT ELECTIVE COURSE-3	3---0---0	70	20	10	100	3
3		DEPTT ELECTIVE COURSE-4	3---1---0	70	20	10	100	4
4	RFT701	Food Quality and Food Laws	3---0---0	70	20	10	100	3
5	RFT702	Plant Design and Economics	3---1---0	70	20	10	100	4
6	RFT751	Food Quality Evaluation Lab	0---0---2	50		50	100	1
7	RFT752	Advanced Food Processing Lab	0---0---2	50		50	100	1
8	RFT753	INDUSTRIAL TRAINING	0-0-3			100	100	2
9	RFT754	PROJECT-1	0---0---6			200	200	3
	<b>TOTAL</b>			<b>450</b>	<b>100</b>	<b>450</b>	<b>1000</b>	<b>24</b>

#### **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

**4<sup>th</sup> Year VIII- SEMESTER****Session-2019-20**

SNo	Subject Code	Subject Name	L-T-P	Th/Lab Marks	Sessional		Total	Credit
					Test	Assig /Att.		
1		OPEN ELECTIVE COURSE-2	3---0---0	70	20	10	100	3
2		DEPTT ELECTIVE COURSE-5	3---1---0	70	20	10	100	4
3		DEPTT ELECTIVE COURSE-6	3---0---0	70	20	10	100	3
4	RFT851	SEMINAR	0---0---3			100	100	2
5	RFT852	PROJECT-2	0---0---12	350		250	600	12
		<b>TOTAL</b>					<b>1000</b>	<b>24</b>

**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 mortem 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**

Poultry processing, Canning of poultry products. Structure, composition and Nutritional and Functional characteristics of Egg. Causes of deterioration of quality of egg, Preservation and Processing of Egg. Manufacturing of egg white, Egg yolk and Whole Egg solids/powder.

#### **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 :**

1. G.J.Mountney Poultry Products Technology , AVI Publishing Company, Westport
2. R.A Lawrie: Meat Science, Pergamon Press
3. Lawrie R.A: Developments in Meat Science – I & II,;Applied Science Pub. Ltd.
4. Bremner HA : Fish as Food; Vol 1 & 2;2002, CRC Press.
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:**

1. D K Agarwal, Logistics and supply chain management, Macmillan Publishers India Ltd. (2003), Eighth Impressions, 2010.
2. Sunil Chopra and Peter Meindi, Supply chain management Pearson Education publishers, 2010.
3. David Taylor and David Brunt, Manufacturing Operations and Supply chain Management, Vikas Thomson Learning publishers, 2009.
4. Amit Sinha and Herbert Kotzab, Supply Chain Management, Tata McGraw Hill, 2011.
5. Surendra M. Gupta, Reverse Supply Chains: Issues and Analysis, CRC Press, 2013.
6. David Blanchard, Supply Chain Management Best Practices, Wiley Publications, 2010.

## **RFT073 NUTRACEUTICALS & FUNCTIONAL FOODS**

**L- T- P**  
**3- 0- 0**

### **UNIT -I**

Defining nutraceuticals and functional foods, Nature, type and scope. Nutraceuticals and functional foods applications and their health benefits, classification based on chemical and biochemical nature with suitable and relevant descriptions.

### **UNIT -II**

Nutraceuticals for specific situation such as cancer ,heart diseases, stress, Osteoarthritis, 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. Cereals 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 :**

1. Robert E.C., T C.Wallace,Handbook of Nutraceuticals & Functional Foods, 2<sup>nd</sup> Edition ,CRC Press
2. Robert E.C. Wildman, Denis M. Medeiros, Advanced Human Nutrition,CRC Press
3. Shubhangini A. Joshi Nutrition and Dietetics, Tata McGraw-Hill Education, 2010
4. N.Shakuntala Manay and M.Swamy: Food Facts & Principles, New Age International

## **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**

Fermented Dairy Products: Cheeses, Curd and Yoghurt, Butter milk and the fermented milks. Spoilages and defects of fermented dairy products and their control. Fermented meat and fish products.

### **UNIT -IV**

Fermentative Production of Beer, Wines, Cider and Vinegar. Fermented Vegetables (Pickles). Raw materials, Role of Ingredients , Quality Factors, Common faults and Remedies.

### **UNIT -V**

Production of Baker's Yeast, Microbial Proteins and fats, Food enzymes, and Food additives. Oriental fermented foods.

#### **Text Books :**

1. K.H. Steinkrus : Handbook of Indigenous Fermented Foods, Marcel Dekker, Inc
2. Sukumar De: Outlines of Dairy Technology, Oxford University Press, 1980
3. Prescott & Dunn Industrial Microbiology, CBS Publishers and Distributors, 2004
4. L.E. Casida Industrial Microbiology, John Wiley & Sons Canada, Limited, 1986

## **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:**

1. Norman G. Marriott and Robert B. Gravani. (2006). Principles of Food Sanitation,5th edition
2. Rao, D. G. (2010). Fundamentals of Food Engineering, PHI learning Private Ltd.
3. Fellows P. (2000). Food Processing Technology, 2nd Edition. Woodhead Pub.Ltd. and CRC Press
4. James A (2013) The supply chain handbook, Distribution group.

## **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 (Penicillin, Streptomycin and Tetracyclines) and its new developments.

**UNIT-V**

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

**Text Books:**

1. Crueger : Biotechnology: a textbook of Industrial microbiology. Panima publications.
2. Prescott & Dunn Industrial Microbiology, CBS Publishers and Distributors, 2004
3. L.E. Casida Industrial Microbiology, John Wiley & Sons Canada, Limited, 1986

**RFT701 FOOD QUALITY AND FOOD LAWS****L- T- P**  
**3- 0- 0****UNIT -I**

Ways of describing of Food Quality, Quality control and Quality Assurance functions. Total Quality Control (TQC) and the role of management/ TQM.. Statistical quality control. Quality costs., Analysis and Interpretation of sensory scores. Application of sensory evaluation in Quality Management of foods.

**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**

Food standards and Specifications: Compulsory and voluntary trade and Company standards. Consumer, company, In-process and finished product specifications. Relevant Food laws: PFA, FPO, SWMA, MPO, AgMark, and BIS Standards.

**UNIT -V**

FSSAI: Definitions, Provisions and standards. Penalty Provisions. Comparison with other International Standards.

**Text Books :**

1. J.M.DeMan : Rheology and Texture in Food Quality, A V I Publishing Company, Incorporated
2. Pomeranz Y., Meloan, Clifton E. 1994. Food Analysis : Theory and practice, 3rd Edn. IS: 6273 (Part-1& Part-2) Chapman and Hall.
3. M.A. Amerine Principles of Sensory Analysis of Foods, Academic Press, NY
4. Food Safety and Standards Act, 2006.

**RFT702 PLANT DESIGN AND ECONOMICS****L- T- P  
3- 1- 0****UNIT- I**

Process Development: Process selection, study of alternative processes, pilot plant, Scale up methods, Flow sheet preparation, sketching techniques, Equipment numbering, Stream designation, Material and energy balances. Plant Design: Design basis, Process selection - Selection of equipment, specification and design of equipment's, material of construction, Plant location, Plant layout and installation, Safety, Start up, Shutdown and Operating guidelines.

**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**

Optimization of Different Process Equipment: Viz., transportation systems, heat exchangers, evaporators, mass transfer equipments and reactors. Determination of height and diameter of different process equipments at conditions of optimum cost. Pinch Technology analysis. Preparation of techno-economic feasibility report.

**Text Books:**

1. Peters M., T K. & Ronald W., Plant Design & Economics for Chemical Engineers, McGraw Hill
2. James R Couper, Process Engg. Economics (Chemical Industries) CRC Press
3. Aries & Newton, Chemical Engg. Cost Estimation, McGraw Hill

**RFT751 FOOD QUALITY EVALUATION LAB****L- T- P  
0- 0- 2**

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.
- 11-12. Assessment of Quality of Beverages: Tea & Coffee, Carbonated and RTS Beverages.



**Recommended Books:**

1. Morris B. Jacobs: The chemical analysis of foods and food products, III Edition, CBS Publishers and distributors New Delhi.
2. S. Ranganna, Hand book of analysis and quality control for fruit and vegetable products, II Ed., Tata McGraw Hill Publishing Co. New Delhi.
3. Official Method of Analysis of AOAC

**RFT752            ADVANCED FOOD PROCESSING LAB****L- T- P  
0- 0- 2**

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
9. Preparation of Egg Powder.

**RFT753            INDUSTRIAL TRAINING****L- T- P  
0- 0- 3**

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****L- T- P  
0- 0- 6**

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**

**L- T- P  
3- 1- 0**

#### **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 Flootation 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 contactors and their Variations and advanced modifications.

#### **UNIT -V**

Advanced wastewater treatment systems. Physical separations, Micro-strainers, Filters, Ultra filtration and reverse osmosis. Physico-chemical separations: activated carbon adsorption, Ion-exchange electro-dialysis and magnetic separation. Chemical oxidations and treatment Coagulation and flocculation. Disinfection. Handling disposal of sludge.

#### **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**

**L- T- P  
3- 1- 0**

#### **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**

Food Microstructure and its study by light, Scanning and Transmission Electron microscopy. Implications of micro-structure in determining mechanical and sensory characteristics of foods.

#### **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, A V I Publishing Company, Incorporated

2. M.A. Amerine Principles of Sensory Analysis of Foods, Academic Press, NY
3. Birch GC, breman JG and parker KJ, Sensory Properties of Food ,Allied Publishers
4. Meilgard M, Civile GV and Carr BT Sensory evaluation Techniques by CRC Press Inc.

## **RFT083 FOOD PHYSICS**

**L- T- P**  
**3- 1- 0**

### **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**

Rheological Properties, Rheology - definition - various types of materials - Hook's law – classic ideal material. Stress – strain - density relationship. Rheological models – Maxwell model, Kelvin model, Four elements Burger's model.

### **UNIT- III**

Textural Properties Texture of food materials - subjective and objective methods - Initiative and Empirical tests . Texture Profile Analysis. Interpretation of results.

### **UNIT –IV**

Thermal properties - specific heat - determination - methods for solids and powders. Determination of thermal conductivity - steady state and unsteady state methods. Thermal diffusivity - determination - relationship among specific heat, thermal conductivity, bulk density and thermal diffusivity - effect of moisture content on thermal properties.

### **UNIT –V**

Electrical properties - resistance, capacitance - uses - Dielectric loss factor - method of determination. A.C. conductivity and dielectric constant – determination - Q meter. Effect of moisture content on electrical properties - energy absorption from high frequency electric field.

### **Text Books :**

1. Mohesenin. N.N, "Thermal properties of Foods and Agricultural Materials". Gordon and Breach Science Publishers, New York 1980.
2. Mohesenin. N.N, "Physical properties of Plant and Animal Materials". Gordon and Breach Science Publishers, New York 1980.
3. Rao, M.A and S.S.H.Rizvi (Eds) "Engineering Properties of Foods". Marcel Dekker Inc. New York 1986.

## **DEPARTMENTAL ELECTIVE COURSE-6**

### **RFT084 FOOD PRODUCT AND PROCESS DEVELOPMENT**

**L- T- P**  
**3- 0- 0**

#### **UNIT –I**

Innovation and product development concept. Generation of ideas. Desk Research. Screening/ appraisal of initial ideas.

#### **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.

**Text Books :**

1. Arlington, Food Product Development, Arlington Publishing Company, 1981
2. M. Earle, R. Earle and A. Anderson, Food Product Development, Woodhead Publishing Series

**RFT085 SPECIALITY FOODS****L- T- P  
3- 0- 0****UNIT -I**

Infant and baby foods, Adolescent / Teen-age foods, Geriatric foods, Foods for pregnant ladies and nursing mothers. Functional foods and Probiotics.

**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 :**

1. Benzamin T. Burton : Human Nutrition, Tata Mc Graw Hill, Inc
2. Shubhangini A. Joshi Nutrition and Dietetics, Tata McGraw-Hill Education, 2010
3. B. Srilakshmi :Dietetics , New Age International
4. CFTRI Proceedings of IFCON

**RFT086 FOOD PACKAGING****L- T- P  
3- 0- 0****UNIT-I**

Basic Concepts: Concept of packaging, Functions of a Food Package, Package development factors and Food package development. Aseptic Packaging. Newer trends.

**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**

Glass and Metal containers: Glass: Composition, Properties, Bottle making and Closures for glass containers. Metal: Bulk containers, Tin-plate containers, Tin free steel containers, Aluminum containers, Latest development in metal cans and protective lacquers.

**UNIT -IV**

Food product characteristics and package requirement, Selection of materials, Forms, Machinery and methods for fresh produce (Fruits, Vegetables, Egg, Meat and Fish), Edible oils and Fats, Spice and spice products, Processed products (Fruit & Vegetable, Cereal & Pulse, Dairy, Confectionary & Snacks, Meat & Marine products).

**UNIT -V**

Package printing, Packaging Laws and Regulations, Evaluation of food packaging materials and package performance.

**Text Books :**

1. M. Mahadeviah and R.V. Gowramma Food Packaging Materials, Tata. Mc Graw Hill co. Ltd. New Delhi

2. S. Saclarow and R.C. Griffin: Principles of Food Packaging , AVI Publishing Company
3. Proceedings of IFCON-1988

**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.