Designs of experiments, principles of experimental design, randomized block design, completely randomized design, Latin square design, split plot design. Factorial experiment 2x2 and 3x2, factorial design (Yates method of analysis) 2x3 and 2x4 factorials, Durcan's multiple range test, Newman's keul test.

Practical:

1. Graphical presentation of data
2. Measures of central tendency (mean, median, & mode)
3. Measures of dispersion
4. Probability distributions: Binomial, Poisson & Normal.
5. Applications of T-test, Z-test, F-test, Chi-Square test.
6. Analysis of Variance (ANOVA)

SUGGESTED READINGS:

1. Pillai and HC Sinha, Statistical Methods for Biological Workers; Ram Prasad and Sons, Agra.
2. GW Snedeco and W Cochran, Statistical Methods; Oxford and IBM Publishing Corp. New Delhi
3. S C Gupta and V K Kapoor, Fundamental of Mathematical Statistics, S Chand.
4. SRS Chandel, Hand Book of Agricultural Statistics; Anchal Prakashan Mandir, Kanpur.
5. Nageshwara Rao G, Statistics for Agricultural Sciences; Oxford and IBH Publishing Co., New Delhi.
6. KA Gomez and AAGomez, Statistical Procedure of Agricultural Research; John Wiley and Sons, New York and Singapore.
7. R P Hooda, Statistics for Business and Economics (Macmillan)
8. Alexander M. Mood, Ranklin A. Graybill & Duane C. Boes , Introduction to the theory of Statistics (Tata McGraw-Hill).
9. D. N. Elhance., Fundamentals of Statistics, Kitab Mahal (1984).

Course Outcome:

Students will develop the conceptual understanding of statistical techniques. And after completion of the course they will be in a state to apply appropriate techniques to different types of data for best analysis and that analysis will support them to make wise-decisions in their professional as well as personal life.

ENG-E01	Dairy Process Engineering	2 -1- 0 =3

THEORY

UNIT-1

Definition of milk, composition, factors affecting milk quality, , milk fat, proteins, minerals, vitamins and enzymes. Physic chemical properties of milk, Importance of psychrophilic, mesophilic and thermophilic spoilage organisms in storage, pasteurization and sterilization.

UNIT-2

Milk procurement, grading, handling, receiving, chilling, transport. Different types of processed milk. Clarification, filtration etc.
Cream Separation: Principles of separation, equipment, effectiveness, cut-off diameter and energy requirement.
Homogenization: Principle of operation, design calculation for laminar and turbulent regimes. Concentration and Evaporation: Water and solid balance: Boiling point elevation- pressure/temperature relationship; Falling and rising film evaporators, thermocompressors, steam economy.

UNIT-3

Pasteurization and Sterilization: Decimal reduction time, Z value, activation energy, sterilizing value, nutrient destruction; Equipment for pasteurization, direct and indirect sterilization; Ultra - High - Temperature (UHT) sterilization.
Spray Drying: Efficiency and energy consumption in spray drying: Cyclone separation principle; Instantization - fluidized bed drying.

UNIT-4

Dairy Products Manufacturing: Butter making; Ice-cream manufacture; Cheese making; Malted milk drinks; Indigenous dairy products manufacturing.
Chlorination of Water: Chlorination principle for microbiological safety.

UNIT-5

Plant Sanitation: Sanitation chemistry, CIP cleaning, equipment.
Effluent Treatment: Pollution control in dairy plant: BOD, COD, enzyme kinetics, continuous stirred tank reactor, activated sludge system, trickle filter.

PRACTICAL

1. Determination of milk pH and acidity
2. Determination of milk specific gravity
3. Determination of milk fat
4. Determination of milk protein
5. Study on cream separation from milk
6. Preparation of dairy products i. e. Curd
7. Preparation of dairy products i. e. Paneer
8. Study on cleaning methods of dairy equipments
9. Determination of BoD and CoD of dairy effluent

SUGGESTED READINGS:

1. Milk and Milk Product by Eckles and Eckles

2. Indian dairy product by K S Rangappa Asia Publishing House
3. Outline of Dairy Technology by Sukumar De; Oxfort University Press
4. Dairy Plant System and Layout by Tufail Ahmed, Kitab Mahal Allahabad

Course Outcome:

To acquaint the students with various dairy engineering operations such as homogenization, pasteurization, thermal processing, evaporation, freezing and drying of milk.

FST-E01	Technology of Fats and Oils	2 0 2 =3

THEORY

Unit 1

Physico-chemical aspects of fats and oils, Physical properties Factors affecting physical properties, Chemistry of Fats and Oils, Lipid deterioration, Lypolysis, Factors affecting oxidation, Thermal oxidation of fats and oils, Photosensitised oxidation, Autoxidation,

Unit 2

Antioxidant chemistry, Lipids and health, Important characteristics of oils from coconut, cotton seeds, palm, sunflower, sesame, safflower, rice bran, rape seed, mustard, linseed, soybean, castor and lard, Tests for adulteration, Physical modification (Fractionation, winterisation) and Chemical modification (Hydrogenation, esterification) of fats

Unit 3

Extraction of oils, Degumming, refining, bleaching, deodorizing, Margarine, Flavored Butter and Herbal Ghee, Fat Substitutes and Replacer, Role of lipids in food flavor

Unit 4

Lipids as functional foods and nutraceuticals, Omega polyunsaturated fatty acids and related products, Value added products from vegetable oil refining industry like lecithin, wax, Vitamin-E, oryzanol.

Course Outcome:

General objectives

1. Impart knowledge on isolation and purification of fats and oils.
2. Impart knowledge and skills in fat and oil products development
3. Impart skills in quality assurance, assessment and measurement of physical and chemical changes occurring in fat and oil products

Specific objectives

1. Isolation and purification of lipids from animal sources
2. Isolation and purification of lipids from plant sources
3. Measurement of acid value, iodine value, and peroxide value as indices of quality of lipid product

FST-E02	Processing of Plantation Crops, Herbs and Spices	2 0 2 =3

THEORY

UNIT-1

Introduction to Plantation Crops, Herbs and Spices processing. Importance and role of spices in food processing, Classification and properties of spices, Scope of spice processing in India, Spices and culinary herbs: Types, spice qualities and specifications, uses and physiological effects, components, antimicrobial and antioxidant properties of spices and herbs, important spices and medicinal herbs added in food products and their processing.

UNIT-2

Processing of tea - various types of tea, chemistry of constituents, harvesting, fermentation, tea concentrates, decaffeination process. Evaluation and grading of tea. Processing of coffee - type of coffee, drying, fermentation, roasting and browning processes and their importance, chicory chemistry and technology. Analysis of tea and coffee quality components, standards and specification of tea and coffee products.

UNIT-3

Processing and analysis of cocoa bean, beverages and study of factors that affect quality and uses for the consumers.

UNIT-4

Spice processing: condiments and spice products, spice blends and extractives, essential and encapsulated oils, salad dressings and seasonings, oleoresins, uses in processed foods. Processing and manufacturing of major Indian spices and herbs, Pepper, cinnamon, cardamom, Nutmeg, saffron, Turmeric and Ginger, Minor spices- cloves, leafy spices, bay oregano, seed spices, common herbs-brahmi, tulsi, mint, thyme, curry leaves, lemon grass etc. Spice processing machineries, Cryogenic processing of spices.

UNIT-5

Condiments and spice products, spice blends and extractives, essential and encapsulated oils, salad dressings and seasonings, oleoresins, uses in processed foods, spice processing machineries. Packaging of spices and herbs: Packaging of spices, handling, Packaging machineries, uses and limitations.

PRACTICAL

1. Tea - Withering and Drying with respect to product quality.
2. Coffee - Drying and processing
3. Cocoa processing and quality evaluation.
4. Identification of different spices.
5. Determination of moisture content in spices.
6. Demonstration of process of oil extraction of different spices.
7. Physico-chemical characteristics and their sensory evaluation of spice oil,
8. Analysis of principles constituents in pepper, ginger, chilly, and turmeric, analysis of spice oils and oleoresins.
9. Low temperature grinding of seed spices.
10. Estimation of solvent in spice oleoresin

SUGGESTED READINGS:

1. Kelnneth T. Farrell, Spices, condiments and seasonings, The AVI Pub.
2. W. Purseglove, E G Brown, C L Green and S R Robbins, Spices, Longman Publications.
3. Kenji Hirasa and Mitsno Takemasa, Spice Science and Technology, Marcel Dekker, Inc.
4. S. Pruthi, Quality assurance in spices and spice products (Modern methods of analysis), Allied Publishers Limited.
5. Barundeb Banerjee, Tea Production & Processing, Oxford & IBH Publishing Co Pvt Ltd
6. Coffee: Growing, Processing, Sustainable Production: A Guidebook for Growers, Processors, Traders, and Researchers Jean Nicolas Wintgens, Wiley-VCH.
7. Cocoa, 4th Edition by and R. A. Lass, ISBN: 978-0-470-69842-6, Blackwell Willey Publishing..
8. Cocoa: production and marketing in India by V. N. Asopa, S. Narayanan, Oxford & IBH Publisher, ISBN, 8120404858, 9788120404854.

Course Outcome:

1. The students will develop an understanding about the herbs processing
2. The students will develop an understanding about the processing of tea leaves
3. The students will be able to demonstrate the knowledge about coffee processing
4. The students will develop a knowledge about cocoa processing
5. The understanding for spice and condiments processing will get developed

FBM-E01	Business Laws	3 0 0 = 3

THEORY

Unit I

The Indian Contract Act, 1872 Definition of a Contract and its essentials, Formation of a valid Contract - Offer and Acceptance, Consideration, Capacity to Contract, Free consent, Legality of object, Discharge of a Contract by performance, Impossibility and Frustration, Breach, Damages for breach of a contract, Quasi contracts. Special Contracts Contract of Indemnity and Guarantee, Contract of Bailment and Pledge, Contract of Agency

Unit II

The Indian Partnership Act, 1932 Definition of Partnership and its essentials, Rights and Duties of Partners: Types of Partners, Minor as a partner, Doctrine of Implied Authority, Registration of Firms, Dissolution of firms.

UNIT III

The Sale of Goods Act, 1930 Definition of a Contract of Sale, Conditions and Warranties, Passing of Property, Right of Unpaid Seller against the Goods, Remedies for Breach.

The Negotiable Instrument Act, 1881 Definition and characteristics, Kinds of negotiable instruments, Promissory Note, Bill of Exchange and Cheques, Holder and Holder in due course, Negotiation, Presentment, Discharge from Liability, Noting and Protest, Presumption, Crossing of Cheques, Bouncing of Cheques.

UNIT IV

The Companies Act, 1956 Nature and Definition of a Company, Registration and Incorporation, Memorandum of Association, Articles of Association, Prospectus, Kinds of Companies, Directors: Their powers and duties, Meetings, Winding up.
The Consumer Protection Act, 1986 Aims and Objects of the Act, Redressal Machinery under the Act, Procedure for complaints under the Act, Remedies, Appeals, Enforcement of orders and Penalties.

UNIT V
The Information Technology Act, 2000 Definition, Digital Signature, Electronic Governance, Attribution, Acknowledgment and Dispatch of Electronic Records, Sense Electronic Records and Sense Digital Signatures, Regulation of Certifying Authorities, Digital Signature Certificates, Duties of Subscribers, Penalties and Offences.

SUGGESTED READINGS:

1. Kuchhal M.C. - Business Law (Vikas Publication, 4th Edition)
2. Gulshan S.S. - Business Law Including Company Law (Excel Books)
3. Avtar Singh - Principles of Mercantile Law (Eastern Book Company, 7th Edition).
4. N.D Kapoor & Rajni Abbi-General Laws & Procedures (Sultan Chand & Sons)
5. Durga Das Basu- Constitution of India (Prentice Hall of India) 6. Relevant Acts

Course Outcome:

1. Knowledge of important laws that have a bearing on the conduct of business in India
2. Understand the relationship between law and economic activity by developing in the student an awareness of legal principles involved in economic relationships and business transactions.
3. To demonstrate clearly and forcibly the generally accepted, but not always documented, proposition that law is an expression of the public will; that a law is valid in the real sense only when it is an expression of the public will.
4. Understanding of the significant role played by the judiciary in the protection of individual liberty and private property.
5. Develop analytical thinking and logical reasoning as a technique for decision-making.

AES-E01 Commercial Postharvest Management of Fresh Produce 3 0 0 = 3

THEORY

Unit I:
Commercial ethylene management and ripening technologies: Fruit ripening and quality relationships, biology of ethylene production and action, effect of temperature management on ripening of perishable commodities, ripening facilities, instruments for measuring fruit and vegetable environment, optimum procedures for ripening of apples, avocados, banana, kiwifruit, mangoes, melons, pears, peppers, stone fruit, tomatoes, degreening citrus fruits, harmful and beneficial effects of ethylene, ethylene control in storage facilities, ripening and handling at food service operations, recommendations for maintain postharvest quality of important fruits and vegetables.

Unit II:

Commercial Cooling and Storage Technologies: Forced-air cooling – tunnel cooler, serpentine cooler, cold-wall cooler, cooling time, fan selection, container for forced air cooling, refrigeration capacity, moisture loss in forced air cooling, reducing energy costs in forced air cooling, troubleshooting slow cooling problems; Hydro cooling – types of hydro cooling, equipments for hydro cooling, containers for hydro cooling, water quality and chlorination for hydro cooling, measuring exterior heat gain of a hydro cooler, hydro cooler operation and troubleshooting; Room, ice, vacuum, and transport cooling – room cooling, package icing, vacuum cooling, transport cooling, selection a cooling method; Cooling calculations – cooling time and temperatures, use of seven-eighth cooling time, calculating momentary cooling rate, cooling coefficients, refrigeration load calculations; Cooling data – cooling and storage requirement for produce, ideal holding temperatures, relative humidity, highest freezing temperatures, maximum market life for produce, produce cooling times by method of cooling. Controlled atmosphere storage – Simple CA system, permanent CA facilities viz., room size, walls and ceilings, floors, doors, pressure relief, pressure test, Atmosphere modifications, equipments foe CA systems, safety considerations, commercial CA recommendations for fruits and vegetables.

Unit III:
Commercial Transportation Technologies: Refrigerated trailer transport – selecting and using boxes for highway trailer shipment, load planning, product temperature at loading, trailer operating conditions, trailer loading, temperature recording devices, record keeping, heat transfer in trucks; Marine container transport – selecting and using boxes for marine container shipment, load planning, produce temperature at loading, container operating conditions, container loading, recording keeping, troubleshooting produce problems in marine container transport; Air Transport of Perishable Products – Advantages and limitations of air freight, freight forwarding services, selecting packaging for air freight, packaging the product, load planning, handling and loading at the airport.

Unit V:
Commercial Handling at Destination Markets, Standards and Export Regulations: Temperature compatibility groups, handling during direct marketing, handling during wholesale and retail distribution, handling in retail markets, restaurants and institutional facilities, home storage; Export potential of horticulture crops in India, introduction to various standards viz., codex alimentarius, ASEAN standards, OECD standards; Export regulations and requirement for selected fresh fruits viz., Mango, Banana, Pomegranate, Citrus, Guava, Apples, Litchi and selected fresh vegetables of national importance - Okra, Chilies, Snow peas, Onion, Potato.

SUGGESTED READINGS:

Arpaia, M.L., Mitcham, E., Cantwekk, M., Reid, M., Crisosto, C., Suslow, T., Kader, A.A., and Thompson, J. 2017. Fruit Ripening and Ethylene Management. Postharvest Technology Centre, University of California, Davis, US.
Kader, A.A. 2002. Postharvest Technology of Horticultural Crops. Agriculture and Natural Resources Publication 3311, University of California, Davis, US.
Mitcham, T. 2002.Postharvest Integrated Pest Management. Postharvest Technology Research and Information Centre, Department of Pomology, University of California, Davis, US.
Pareek, S. 2016. Postharvest Ripening Physiology of Crops. CRC Press, US.
Thompson, J.F., Bishop, C.F.H., and Brecht, P.E. 2004. Air Transport of Perishable Products. Agriculture and Natural Resources Publication 21618, University of California, Davis, US.
Thompson, J.F., Brecht, P.E., and Hinsch, T. 2002. Refrigerated Trailer Transport of Perishables Products. Agriculture and Natural Resources Publication 21614, University of California, Davis, US.
Thompson, J.F., Brecht, P.E., Hinsch, T., and Kader, A.A. 2000. Refrigerated Trailer Transport of Perishables Products. Agriculture and Natural Resources Publication 21595, University of California, Davis, US.
Thompson, J.F., Mitchell, F.D., Rumsey, T.R., Kasmire, R.F., and Crisosto, C. 2008. Commercial Cooling of Fruits, Vegetables, and Flowers. Agriculture and Natural Resources Publication 21567, University of California, Davis, US.

Course Outcome:

1. Able to apply best postharvest practices to enhance shelf life of fruits and vegetables in supply chain
2. Understand the latest advances made in ripening, storage and transportation of fruits and vegetables and maintain the postharvest quality for longer duration.

ENG-E02 Food Industry Waste and By-Product Management 2 0 0 =2

THEORY

UNIT-1

Sources of waste and pollutants, Classification and characterization of Solid, Liquid and Gaseous wastes, treatment of solid wastes from agro wastes. Waste Generation in Different Food Processing Industries: Concept, scope and importance of waste management and effluent treatment Temperature, pH, Oxygen Demands (BOD, COD), Measurement of levels of Pollution such as COD, BOD, TOD, fat, oil and grease content, metal content, forms of phosphorus and sulphur in waste waters, microbiology of waste, other ingredients like insecticide, pesticides and fungicides residues. effluent safe disposal- effluent treatment plant - waste recycling plant - feasibility report for food industries using food waste and by products.

UNIT-2

Animal and community waste. Landfill and composting. Pre-treatment of waste : sedimentation, coagulation, flocculation and floatation, Secondary treatments: Biological oxidation-trickling filters, oxidation ditches, activated sludge process, rotating biological contractors, lagoons. Tertiary treatments: Advanced waste water treatment process-sand, coal and activated carbon filters, phosphorus, sulphur, nitrogen and heavy metals removal.

Unit 3

Environmental protection act and specifications for effluent of different food industries, waste Utilization, Effluent treatment, other laws pertaining to environment and enforcing agencies

Unit 4

Waste and Byproduct Management for Fruit and Vegetable Industries, Sugar Mills, Dairy Industries, Rice Milling, Meat Industry. Concept of Sustainable Processing

SUGGESTED READINGS:

1. Green and Krammer, Food Processing Work Management ; CBS Publication
2. Mariett NG, Principles of Food Sanitation; CBS Publication
3. Lawrence K.Wang, Yung-Tse Hung Howard H.Lo, Waste Treatment in the Food Processing Industry; Constanitine Yapijakis : CRC Taylor and Francis group, Boca Raton London, New York
4. Metcalf and Eddy, Waste Water Engineering Treatment Disposal and Reuse; Tata McGrawHill Book company NY
5. GN Pandey and GC Carney, Environmental Engineering; Tata McGraw Hill Pub Co Ltd. New Delhi.

Course Outcome:

Generic Outcomes

Recognize & comply safe working practices, environment regulation and housekeeping. 2. Understand and practice soft skills, OSH&E, working with Computer and communicate with required clarity. 3. Demonstrate knowledge of concept and principles of basic arithmetic calculation and apply knowledge of specific area to perform practical operations. 4. Explain time management, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.

Specific Outcomes

1. Explain the useful agriculture waste and food processing product from their waste. 2. Demonstrate different type of water testing. 3. Demonstrate the leaf protein and explain the process of banana fiber. 4. Prepare vinegar and kernel starch 5. Explain the process of production of gelatin from waste and utilization of egg shell. 6. Explain the process of different type of germ oil and protein extraction. 7. Demonstrate the oil cake and soap formation 8. Prepare different type of whey beverages, toffee or pinni from ghee residue and butter milk product.

FST-E03	Dietetics	2 0 0 = 2

THEORY

UNIT-1

Basic concept of diet therapy, Normal diet as a basis of therapeutic diets, Team approach to health and nutrition care, Therapeutic adaptations of the normal diet. Qualitative and quantitative adaptations. Introduction to enteral and parenteral nutrition. Concept of Vegetarian, non-vegetarian and vagon diet.

UNIT-2

Dietary management of some common disorders, Etiology, clinical features, and nutritional management of infections and fevers , stress and trauma, GI tract- gastritis , peptic ulcers, diarrhoea, constipation, lactose intolerance, steatorrhoea and celiac disease, Liver - Infective hepatitis, Cirrhosis.

UNIT-3

Nutritional care for Weight management, etiology, clinical features and nutritional management and prevention. Overweight and obesity, underweight, eating disorders -anorexia nervosa and bulimia.

UNIT-4

Common degenerative disorders, etiology, clinical features, nutritional management and prevention: Diabetes mellitus - Type 1 and Type 2, cardio-vascular disorders, hypertension, hyperlipidemias, atherosclerosis, metabolic syndrome.
Nutritional Management in Cancer - an overview, Etiology, nutrition management and prevention of common cancers
Renal disorders - an overview, Glomerulonephritis, nephrotic syndrome, CKD

UNIT-5

Food allergy and food intolerance. Clinical features and nutritional management. Introduction to Nutrigenomics in Diet-therapy. Introduction to Dietetic Food Product Development. Miscellaneous Disorders - an overview. Osteoporosis; Alzhimer' disease; Parkinson's disease.

PRACTICAL

Calculation, preparation and evaluation of dishes or food items suitable for the following (incorporating appropriate consistency and nutrient modifications).

1. Obesity - Low energy, low modified fat.
2. Undernutrition / Underweight - High protein, high energy Fevers, stress, trauma etc - High energy, high protein + blenderized tube feed.
3. Gastro Intestinal Tract Disorders.
4. Diarrhoea - Fibre restricted, bland.
5. Constipation - High fibre.
6. Lactose intolerance - Lactose free.
7. Celiac disease - Gluten free.
8. Infective Hepatitis -Modified fat.
9. Type 1and 2 Diabetes - Low fat, modified carbohydrate low glycemic load, high fibre, modified energy.
10. Hypertension and CHD - Restricted energy, low fat, low cholesterol, high fibre, low sodium.
11. Renal disease - Low HBV protein, modified sodium and potassium, calcium and phosphate. Dietetic food product development - Project on developing 2-3 dietetic food products - standardization, shelf life, consumer evaluation etc.
12. Survey of Dietetic foods available in the market, their labelling and Consumer Survey for identifying scope of new/better dietetic foods.

SUGGESTED READINGS:

1. Mahan, L. K. and Escott Stump. S., Krause's Food and Nutrition Therapy , Saunders Elsevier
2. Williams S.R., Basic Nutrition and Diet Therapy, Times Mirror Mosby College Publishing
3. Joshi S ,Nutrition and Dietetics, Tata McGraw Hill.
4. Bamji MS, Krishnaswamy K and Brahmam GNV Ghafoorunissa and Krishnaswamy K , Diet and Heart Disease, National Institute of Nutrition, Indian Council of Medical Research, Hyderabad.

Course Outcome:

- Demonstrate knowledge of the scientific basis and an awareness of current research and development as well as knowledge about the relationship between science and proven experience and the significance of professional misconduct and demonstrate knowledge of relevant legislation.

F BM-E02	Business Environment	2 0 0 =2

T HEORY

U nit I

B usiness Environment- Nature, Significance. Environment scanning: meaning, nature and scope, process and techniques of environment scanning. Impact of different business environment on business and strategic decision.

U nit II

O verview of Political, Socio-cultural, Legal, Technological and Global environment. Consumer protection act and its impact on business. Laws applicable to Food processing units and its impact.

U nit III

Economic planning, nature and structure of the economy. Economic policies- Policy related to Small Scale Industries. FEMA, EXIM Policy, Budget-role and impact on business, Industrial policy- 1991 and onwards, Socio-economic implications of Liberalisation, Privatisation, Globalisation.

U nit IV

Financial Environment: overview of Indian Financial System. RBI- Role and functions, the monetary policy and fiscal policy.

U nit V

Liberalisation and Globalization: Concept and their effect on Indian business environment. Multinational corporations, WTO, GATT, Free Trade Agreement, Intra-Industry Trade.

SUGGESTED READINGS:

1. Mishra S K &Puri V K - Economic Environment of Business (Himalaya Publishing House, 3rd Edition).
2. Paul Justin -Business Environment Text and Cases (Tata McGraw Hill).
3. Shaikh &Saleem- Business Environment (Pearson, 1st Edition)
4. Suresh Bedi - Business Environment (Excel Books, 1st Edition).
5. Francis Cherunilam – Business Environment, Text and Cases (Himalaya Publishing House, 8th Edition)

Course Outcome:

1. Analyze the environment of a business from the legal & regulatory, macroeconomic, cultural, political, technological and natural perspectives.
2. Critically assess the business environment of an organization using selected strategic tools.
3. Conduct an in-depth analysis of a specific component of the business environment and relate it to the business organization.
4. Apply an understanding of the different modes of engagement with international markets and understand economic, legal, governmental, political, regulatory, cultural and other environments in which expanding companies operate.
5. Understand international business issues and apply theoretical insights to the analysis of such issues in the context of a complex international business environment

BAS E 01	Computational and Multivariate Statistical Techniques	2 0 2 =3

Unit I

Multivariate Analysis: Correlation Analysis, Rank Correlation, Auto correlation, Forecasting: Simple Moving Average methods, weighted moving average Method, Simple exponential smoothing method, Delphi Method. Linear Regression and Time Series Analysis: Multiple Regression- developing a multiple regression model, r-square, adjusted r-square, residual analysis for the multiple regression models, inferences concerning the population regression coefficients, testing proportions of the multiple regression model, using dummy variables and interaction terms in regression models. Introduction to Time Series Analysis. Practice using SPSS.

Unit2

Advanced Multivariate Analysis: Introduction, Discriminant Analysis. Factor Analysis: Centroid Method, Principal components method, Varimax method of factor rotation.

Cluster Analysis: concepts, Similarity measures, Clustering techniques, Hierarchical Clustering Algorithm, P mean clustering Algorithm based on variables, Rank Order Clustering Algorithm (ROC) for grouping based on Attributes, Mathematical model for clustering of objects into P groups based on Attributes. Practice using SPSS.

Unit 3

Algorithm design, Software designing approach, GIS application in food productions, Remote Sensing, Sensory evaluation of food.

Unit 4

Structured Programming, introduction to MATLAB, Uses of MATLAB in food science, MATLAB Basics and Programming

Unit 5

Classifications & Predictions, Bayesian Classifications, Expert System, Decision Support System, Traceability method for food ingredient tracing,