MUGBERIA GANGADHAR MAHAVIDYALAYA
P.O.—BHUPATINAGAR, Dist.—PURBA MEDINIPUR, PIN.—721425, WEST BENGAL, INDIA
NAAC Re-Accredited B+Level Govt. aided College
CPE (Under UGC XII Plan) & NCTE Approved Institutions
DBT Star College Scheme Award Recipient
E-mail : mugberia_college@rediffmail.com // www.mugberiagangadharmahavidyalaya.ac.in

Syllabus distribution of 2020-2021

Mughberia Gangadhar Mahavidyalaya

Dept of Nutrition

Programme: B.Voc (Food Processing)

SEM	COURSE	COURSE CONTENT & SYLLABUS	DETAILS SYLLABUS	ALLOTTED TEACHER	CREDIT MARKS	CLASS ALLOTTED PER WEEK	TOTAL CLASS
SEM 1	BVFPS101T&P	BASIC PRINCIPLE OF FOOD PROCESSING AND PRESERVATION	**THEORY** **Unit I** **Food Processing**: Scope and importance of food processing; historical developments in food processing, classification of food on basis of shelf life, pH and origin **Unit II** **Food spoilage**: microbial, physical, chemical & miscellaneous. **Unit III** **Thermal processing methods and preservation**: heat resistance of microorganisms, thermal death curve. Blanching, pasteurization, sterilization, Canning of foods, heat penetration **Unit IV** **Preservation by low temperature** Refrigeration, refrigeration load, refrigeration systems, Freezing and frozen storage: freezing curves, slow and quick freezing, factors determining freezing rate, freezing methods, advantages and disadvantages, changes in food during freezing, freeze drying in food processing **Unit V** **Moisture removal**: Evaporation, drying, dehydration and concentration, Principle, Methods, equipment and effect on quality: Drying curve, drying methods and type of dryers; physical and chemical changes in food during drying. Need and principle of concentration, methods of concentration (thermal concentration, freeze concentration, memberane concentration) changes in food quality by concentration **Unit VI** **Preservation by salt and sugar**: Pickling, fermentation, intermediate moisture foods **Unit VII** **Food Additives**: Different types of food additives (preservatives, acidulants, emulsifiers, antioxidant, leavening agents etc.) and its application in food industry	Sayan Das	3(Class test-30+attendence +assignment-10+theory-30practical-30)	5	5x15=75

			Unit VIII **New and unconventional methods of preservation:** pulse electric field processing, high pressure processing, ohmic and infrared, microwave heating. **PRACTICALS** 1. Demonstration of various machineries used in food processing. 2. To study the effect of enzymatic browning in fruits and vegetables and its prevention. 3. To study different types of blanching of fruits and vegetables. 4. Preservation of food by canning. 5. To perform cut out analysis of caned product. 6. Preservation of food by high concentration of sugar i.e. jam. 7. Preservation of food by high concentration of salt/acid i.e. pickle. 8. Preservation of food by addition of chemicals i.e. tomato ketchup. 9. Preservation of food by drying in a cabinet drier. 10. Preservation of fruits & vegetables by freezing. 11. Preservation of milk by pasteurization and sterilization. 12. Preservation of food by using acidulants i.e. pickling by acid, vinegar or acetic acid 13. Demonstration on drying of green leafy vegetables				
	BVFPS102T&P	CEREAL AND PULSE PROCESSING TECHNOLOGY	**THEORY** **UNIT I** Present status and future prospects of cereals and millets; Morphology: physico-chemical properties; Chemical composition and nutritive value Rice: Paddy processing and rice milling: conventional milling, modern milling, milling operations, millingmachines, milling efficiency, byproducts of rice milling. Quality characteristics influencing final milled products. Parboiling: rice bran stabilization and its methods; Aging of rice; Enrichment – need, methods; processed foods from rice – breakfast cereals, flakes, puffing, canning and instant rice. Wheat: break system, purification system and reduction system; extraction rate and its effect on flour composition; Quality characteristics of flour and their suitability forbaking. Corn: Corn milling – dry and wet milling, starch and gluten separation, milling fractions and modified starches. Barley: Malting and milling Sorghum: milling, Malting, Pearling and industrial utilizationMillets: Importance of Millet, composition, processing of millets for food uses, major and minor millets Products and Byproduct of cereal and millets: infant foods from cereals and millets, breakfast cereal foods – flaked, puffed, expanded, extruded and shredded products, etc. **UNIT II** Present status and future prospects of legumes; Morphology of legumes; Classification and types of legumes, Anti-nutritional compounds in legumes; Methods of removal of anti-nutritional compounds, Milling of legumes: home scale, cottage scale and modern milling methods, milling quality, efficiency and factors affecting milling; problems in dhal milling industry, Soaking and germination of pulses, Cooking quality of legumes – factors affecting cooking quality, Byproduct of pulses and their value addition. **PRACTICALS** 1. Determination of physical properties of cereal grains 2. Determination of chemical properties of cereal grains 3. Germination of grains 4. Studies on cooking quality of cereals (cooking time, grain elongation, etc)	Suchet a Sahoo	3(Class test-30+attende nce +assign ment-10+theory-30practical-30)	6	6x15=90

			5. Functional properties of different cereal flour 6. Determination of starch content of cereal 7. Study on gelatinization of starch 8. Determination of amylase content of rice 9. Determination of fat acidity of cereals 10. Phenol test for cereals Determination of sedimentation value 11. Milling of cereal grains 12. Visit to milling industry 13. Determination of physical properties of legumes 14. Determination of anti nutritional factors in legumes 15. Cooking quality of dhal 16. Puffing of legumes 17. Milling of legumes 18. Preparation of composite legume flour 19. Preparation of soy milk and soy paneer 20. Preparation of protein isolate 21. Preparation of quick cooking dhal 22. Visit to dhal mill				
	BVFPS103T&P	LIQUID MILK PROCESSING TECHNOLOGY	**THEORY** **UNIT I** Milk Production Management - Distinguishing characteristics of Indian and exotic breeds of dairy animals and their performance; feed resources for milk production and their nutritive values; structure and function of mammary system; milk secretion and milk let-down; milking procedure and practices for quality milk production (clean milk production) **UNIT II** History and status of dairy in India, Annual milk production and per capita availability, Five year plans and dairy development, public sector milk supply schemes, co-operative dairy organizations, Anand pattern and perspectives, milk products manufacture in private sector, National Dairy Development Board - aim and objectives, Operation Flood, Dairy problems and policies. Contribution of Verghese Kurien in Indian dairy. **UNIT III** Milk - Definition, Composition, factors affecting composition of milk, nutritive value, Physico-chemical properties of milk constituents, Physico-chemical properties of milk, microbiology of milk. **UNIT IV** Importance of market milk, Collection and transportation of milk-Organization of milk collection routes, Practices for collection of milk, preservation at farm, refrigeration, natural microbial inhibitors, lactoperoxidase system., Adulterations in milk and its detection, processing, packaging and storage. UHT sterilization, Aseptic packaging, Judging and grading of milk, Flavour defects in milk, their causes and prevention, Effect of thermal treatment on milk constituents. **Unit V** Special milk: manufacture, packaging, storage of sterilized milk, homogenized milk, soft-curd milk, flavoured milk, vitaminized milk, frozen concentrated milk, fermented milk (natural butter milk, cultured butter milk, acidophilus milk, bulgarian butter milk, Kumiss, Kefir, yoghurt), standardized milk, reconstituted milk, recombined milk, toned milk, double tonned milk, humanized milk, filled milk, imitation milk, vegetable tonned milk, soya milk	Dr.Apurba Giri	5(Class test-30+attendence +assignment-10+theory-30practical-30)	6	6x15=90

			Unit VI Liquid milk collection, processing, packaging and storage systems and equipment - bulk milk coolers, milk chilling units, milk reception equipment, milk tanks/silos, centrifuges, clarifiers, filtration units, cream separator, homogenizers, pasteurizers, sterilizers, packaging and filling machines **Unit VII** Cleaning and sanitization of dairy equipments, CIP units, etc.; Hygienic design concepts, sanitary pipes and fittings, corrosion process and their control. **PRACTICALS** 1. Method for milking of dairy animals 2. Cleaning and sanitation of milking equipments 3. Method for sampling of milk 4. Microbiological tests for grading raw milk - MBRT 5. Chemical tests for grading raw milk- Platform tests of raw milk. 6. Detection of adulterants in milk 7. Determination of physical properties of milk - pH, titratable acidity of milk. 8. Determination of Moisture, fat, SNF, casein, whey proteins, total milk proteins, lactose, ash 9. Determination of phosphorus and calcium, chloride in milk. 10. Estimation of alkaline phosphatase and lipase in milk. 11. Identification and demonstration of liquid milk processing equipment, pipes and fittings 12. Preparing standardized milk as per requirement 13. Separation of fat from milk 14. Pasteurization and homogenization of milk 15. Packaging of liquid milk 16. Preparation of sterilized flavored milk, reconstituted milk/rehydrated milk, buttermilk, yogurt, Lassi 17. Campaign on clean milk production in rural area 18. Visit to chilling center and dairy plant				
	BVFPS104T&P	FOOD ADDITIVES AND INGREDIENT	**THEORY** **UNIT I** Food additives- definitions, classification and functions, Preservatives, antioxidants, colours and flavours (synthetic and natural), emulsifiers, sequesterants, humectants, hydrocolloids, sweeteners, acidulants, buffering salts, anticaking agents, etc. - chemistry, food uses and functions in formulations; indirect food additives; toxicological evaluation of food additives. Food additives as toxicants - Artificial colours, preservatives, sweeteners; toxicants formed during food processing such as nitrosamines, maillard reaction products acrylamide, benzene, heterocyclic amines and aromatic hydrocarbons; risk of genetically modified food, food supplements, persistent organic pollutants, toxicity implications of nanotechnology in food. **UNIT II** Scope of spice processing industry in India. Spices -definition. Chemical composition, uses and processing of different spices- pepper, cinnamon, turmeric, fennel, chilli, cardmom (small and big), cumin, mint, ginger cloves and fenugreek. Condiments- definition. Spice oleoresins, spice essential oils, encapsulated spices (Brief). Packaging of spices and spice products. Microbial contamination and insect infestation in spices and its control. **UNIT III** Food flavours- natural and synthetic flavourings. Flavour enhancers their properties and toxicity. Flavours from vegetables, cocoa, chocolate, coffee, vanilla beans. Evaluation tests for flavours.	Monalisa Roy	3(Class test-30+attendence +assignment-10+theory-30practical-30)	5	5x15=75

			stability of flavours during food processing, analysis of flavours, extraction techniques of flavours, flavour emulsions; essential oils and oleoresins; authentication of flavours etc. **UNIT IV** Proteins, starches and lipids as functional ingredient; isolation, modification, specifications, functional properties and applications in foods and as nutraceuticals **PRACTICAL** 1. Determination of moisture in whole and ground spices. 2. Determination of total ash in spices. 3. Sampling and determination of extraneous matter in spices. 4. Determination of pungency rating (Scoville method) in red pepper. 5. Adulteration tests for different spices. 6. Organoleptic evaluation of flavours. 7. Identification of saffron by sulphuric – diphenylamine test. 8. Determination of cold water extract. 9. Determination of alcohol soluble extract. 10. Determination of calcium oxide. 11. Determination of volatile oil. 12. Microscopic examination of spices. 13. Detection of Argemone seeds in mustard. Detection of oil soluble color. Extraction of oleoresins from spices. Analysis of different types of flavours such as essential oils, oleoresins, synthetic flavours, plated anddispersed spices-general tests. Sensory analysis of flavours; monitoring flavours during food processing Preparation of flavour emulsions and their stability Study of off-flavours in different foods. Extraction of flavors from various fruits and vegetables				
	BVFPS105T&P	FOOD CHEMISTRY	**THEORY** **UNIT I:** **Water-** Introduction to food chemistry- Definition, scope and importance, structure of water molecule, hydrogen bonding, effect of hydrogen bonding on the properties of water, moisture in foods, free water, bound water, water activity, estimation of moisture in foods, determination of moisture and water activity. **UNIT II** **Carbohydrates** Nomenclature, composition, sources, structure, reactions, functions, classification - monosaccharide, disaccharides, oligosaccharides and polysaccharides. Properties of Starch – gelatinisation, gel formation, syneresis**,** starch degradation, dextrinisation, retrogradation, Qualitative and quantitative tests of carbohydrates. **UNIT III** **Proteins** Nomenclature, sources, structure, functions, classification - essential and non-essential amino acids, Physical and chemical properties of proteins and amino acids, functional properties - denaturation, hydrolysis, changes in proteins during processing. Enzymes - criteria for purity of enzyme, Specificity, mechanism of enzyme action, factors influencing enzymatic activity, controlling enzyme action, enzymes added to food during processing, **Browning reaction**- Enzymatic and non enzymatic browning, advantages and disadvantages, factors affecting their reaction and control. **UNIT IV** **Fats and oils** Nomenclature, composition, sources, structure, functions, classification, essential fatty acids. Physical and	Dr.Sandip Basu	4(Class test-30+attendence +assignment-10+theory-30practical-30)	5	5x15=75

			chemical properties - hydrolysis, hydrogenation, rancidity and flavour reversion, emulsion and emulsifiers, saponification value, acid value and iodine value, Reichert-Meissl number, Polenske value, smoke point. Lipids of biological importance like cholesterol and phospholipids **UNIT V** **Minerals and Vitamins** Minerals and Vitamins: Sources and structures of minerals & vitamins; Effect of processing and storage of vitamins, Pro vitamins A & D; Vitamins as antioxidants. **PRACTICALS** 1. Determination of water activity of different food materials 2. Determination of moisture in food sample 3. Determination of Protein in food sample 4. Determination of Fat in food sample 5. Determination of Carbohydrate in food sample 6. Determination of Acidity and pH in food sample/beverages 7. Determination of total, non-reducing and reducing sugars 8. Determination of Vitamin C in food sample 9. Estimation of crude fibre in food sample 10. Analysis of lysine content in animal /vegetable sources 11. Estimation of mineral in food products 12. Estimation of Carotenoids 13. Precipitation of proteins by acid, alkali and metals. 14. Estimation of rancidity of fats. 15. Estimation of crude fibre in food sample 16. Determination of total, non-reducing and reducing sugars Calculate activity of enzymes from various fo				
SEM 2	BVFPS201T&P	DAIRY PRODUCTS PROCESSING TECHNOLOGY	**THEORY** **UNIT I** Cream: Definition, classification, composition, nutritive value, Physico-chemical properties, manufacture ofdifferent types of cream, processing of cream; defects in cream and their prevention Butter: Definition, composition; nutritive value, processing and production steps, overrun, butter makingmachines, quality testing of table butter, butter- defects, causes and their prevention, packaging and storage Butter oil and ghee: Definition, composition, nutritive value, processing, equipment, quality tests; **UNIT II** Ice cream and frozen desserts: Definition, composition, nutritive value, role of the constituents in ice cream,types, Processing steps, equipment, quality testing, defects causes and prevention, packaging and storage. **UNIT III** Condensed and Dried milk: Definition, composition, role of milk constituents in condensed milk, manufacture of condensed milk, Heat stability and its control , uses, defects, causes and prevention of condensed milk. Types of standards for dried milk, Role of milk constituents, Manufacture of SMP and WMP using roller and spray drying, cyclone separation, instantization, quality testing, defects, causes and prevention, packaging and storage. malted milk powder, infant milk food **UNIT IV** Cheese: Definition, composition, standards, origin and history of cheese, status and scope in India and abroad, types, manufacture of different varieties of cheese: Cheddar, Swiss, Mozzarella, Cottage,	Dr.Apurba Giri	5(Class test-30+attendence +assignment-10+theory-30practical-30)	6	6x15=90

			processed cheese, cheese spread and processed cheese foods; equipment, Microbiological changes during preparation ripening in cheese. Role of milk constituents and changes during manufacture and ripening in cheese. Accelerated ripening of cheese. quality defects, causes and prevention, packaging and storage. **UNIT V** Traditional Indian Dairy Products: Definitions, compositions, processing, packaging, storage, equipment and quality testing – Desiccated milk-based products-Khoa and Khoa based sweets, Heat-acid coagulated products- Channa and Channa based sweets, Paneer, Fermented products-Srikhand, dahi, Milk-based puddings/Dessert-Kheer **UNIT-VI** By-products-manufacturing and uses of Casein, sodium and calcium caseinates, casein hydrolysates, Cooprecipitates, Whey, Whey protein concentrates, Lactose, Butter milk, Ghee residue **PRACTICALS** 1. Process of sampling of milk products 1. Cream: Different parts of cream separators, cream separation form milk, standardization, neutralization, pasteurization of cream Preparation of ice-cream and selected frozen desserts- kulfi, sherbets/ices, Compositional analysis of ice-cream. Microbiological examination of ice-cream and other frozen desserts; SPC, coliform. 2. Preparation of condensed milk, evaporated milk, spray dried milk powder, instant milk powder, tea and coffee whitener, malted milk powder, infant milk food, Chemical and microbilogical analysis of condensed and dried milk. Evaluation of bulk density and solubility index of dried milk. 3. Cheese Technology: Familiarization with equipments, accessories and standardization numericals. Study of factors affecting rennet action. Manufacture of Cheddar cheese, Mozzarella cheese, Swiss cheese, Cottage cheese, processed cheese, processed cheese spread, processed cheese food. Analysis of cheese; proximate composition. Determination of ripening index, 4. Preparation of selected Indian dairy products – Chhana, chhana based sweets, .paneer, khoa, khoa based products, misti dahi, Shrikhand, kheer etc, their chemical and microbiological analysis 5. Dairy byproduct;Manufacture casein, sodium caseinate, calcium caseinate. co-preceinate, whey drinks, dried whey, whey protein concentrate, lactose, buttermilk, ghee residue, products of ghee residue,. Whey concentration by ultra filtration process. Chemical and microbiological analysis of casein , whey, dried whey, whey protein concentrates, co-precipitates and lactose, buttermilk. 6. Visit to milk product plant 7. , chemical and microbiological examination of cream Butter: Study of construction and cooperation of the power operated butter churn and butter packaging machine, manufacture of butter, examination of the quality of sodium chloride for butter making, chemical and microbiological examination of butter 9. Ghee: Study and operation of continuous ghee plant. Preparation of ghee from cream and butter. Determination of melting/slip point, moisture, B.R. Index and Baudouin Test, Acidity, R.M. value and Polenske value, Saponification value,				

			Iodine value, Peroxide value. Detection of animal body fats and vegetable oils, Helphen Test for the presence of cotton-seed oil.				
	BVFPS202T&P	PRINCIPLES OF FOOD ENGINEERING	THEORY UNIT I Process time calculations; Sterilizers and accessories used in canning industries; Engineering aspects ofpasteurizer; homogenizer, evaporators (basic principle and single-effect evaporator) and concentrators usedinfood industries; Seaming machine. UNIT II Construction of cold storage; Different types of freezers including plate contact freezer, air blast freezer,cryogenicfreezing and refrigerated vans. UNIT III Various types of driers (basic principle and drying time) – Tray drier, roller drier, spray drier, fluidized beddrier,freeze drier and solar drier. UNIT IV Heat exchangers (including paraflow HEs); Extruders – Basic principles and types, Difference between single-andtwin-screw extruders; Kneader; Oil expeller UNIT V Liquid transport system- pipelines and pumps for food processing plants-positive displacement pumps, air-liftpumps, propeller pumps, centrifugal pumps and jet pumps. UNIT VI Advanced separation processes: Dialysis, ultrafiltration, reverse osmosis, electro dialysis and membraneseparation. **PRACTICALS**: 1. Determination of conductivity, calorific value and filtration properties of food& water. 2. Calculation of freezing time for some typical foods 3. Determination of Textural characteristics TPA of food product 4. Study of single effect evaporator and estimation of heat/mass balance during concentration of liquidfoods 5. Study of sterilizer / pasteurizers/ homogenizers 6. Study of dryers, and its efficiency 7. Visit to food processing plants.	Sayan Das	4(Class test-30+attendence +assignment-10+theory-30practical-30)	5	5 x 15 = 75
	BVFPS203T&P	FOOD MICROBIOLOGY AND SAFETY	**THEORY** **UNIT-I** Microorganisms important in food industry: Types of microorganisms, their importance in foods, classification offood borne bacteria, their morphology and distinguishing features with examples. **UNIT-II** Growth of microorganisms in foods: Intrinsic (pH, moisture content, redox potential, nutrient content, antimicrobial constituents and biological structures) and extrinsic factors (temp., RH, presence and concentration of gases) governing growth of microorganisms in food. **UNIT-III** Food spoilage: Chemical changes caused by microorganisms in foods (breakdown of proteins, carbohydrates, fats and other constituents during spoilage), specific microorganisms causing spoilage of milk and milk products, meat, fish, egg, cereals, fruits, vegetables and their processed products, quality defects in canned foods, sugar	Suchet a Sahoo	4(Class test-30+attendence +assignment-10+theory-30practical-30)	6	6x15=90

			and confectionary products, Antimicrobial substances in milk: immunoglobulin, lactoferin, lysozymes, LP systems etc. **UNIT-IV** Food fermentations: General description of fermenters, parts and their functions, different types of fermentations (static, submerged, agitated, batch, continuous). Microbial culture selection by screening methods and strain improvement. Starter cultures - definition, types, Fermentation - definition, types (acid, alcohol). Fermented foods types, methods of manufacture for vinegar, ethyl alcohol, cheese, yoghurt, baker's yeast and traditional Indian foods. PRACTICAL 1. Study and experiments with different microscopes. 2. Measurement of microorganisms. 3. Simple staining and Gram staining. 4. Sterilization techniques and equipments. 5. Preparation of culture media. 6. Isolation of microorganisms and Enumeration. 7. Growth of bacteria - Colorimetric method - Plating method. 8. Purification of bacteria. 9. Purification of fungi. 10. Detection of sources of contamination: air, water, utensils, equipment and personnel line testing 11. Enumeration of coliforms, yeasts and molds and total viable bacteria in fruits and vegetables, Dairyproducts 12. Enumeration of aerobic spore forming bacteria in food sample. 13. Estimation of alcohol content in fermented product 14. Isolation and identification scheme for detection of Salmonella in foods 15. Casein hydrolysis by microorganism on SMA 16. Starch hydrolysis by microorganism using starch agar 17. Evaluation of Starter Culture by Starter Activity Test 18. Assessment of surface sanitation by swab /rinse method and assessment of personnel hygiene by handwash 19. To study the given sample (milk) using Methylene blue reduction test (MBRT) 20. To find total viable bacteria and coliforms in water by membrane filtration technique 21. Evaluation of canned products for anaerobic spore formers 22. Spoilage of milk caused by microorganisms souring, sweet curdling, gassiness, lipolysis, ropiness, proteolysis and discoloration. 23. Detection of mastits milks, pH, SLST, somatic cell count, chloride content, Hotis test, CAMP test. Detection and estimation of coliforms; presumptive test, rapid coliform count, IMVIC test. Estimation of microbial load in milk by SPC and Dye reduction tests-(MBRT, RRT). 24. Detection of antibiotic residues using qualitative test				
	BVFPS204T&P	INTRODUCTION TO COMPUTER APPLICATION	**THEORY** **UNIT I** Components of Computers – Hardware: Hardware elements – input devices, storage devices, processing & outputdevices. Block diagram of computer; Software concept **UNIT II** Microsoft Word and its applications (in relation with Food Industry) - Font formatting, Paragraph formatting,Inserting images,	Monalisa Roy	3(Class test-30+attendence +assignment-10+theory-30practical-	4	4x15=60

			auto shapes symbols, diagrams, header & footer, References, watermarks and Hyperlinks, Style & Formatting, Mail Merge through word, Access database, Page setup, Printing a document. Concept of files and folders. **UNIT III** MS Excel and its applications (in relation with Food Industry) - Making column chart & pie chart and chart formatting, Use of general functions & formula (autosum, using basic arithmetic operators: +,-,*,/), Use of filter & sorting, Cell references, header & footer, age setup, use of page break preview, printing worksheets. **UNIT IV** MS PowerPoint and its applications (in relation with Food Industry) - Creating own design, formatting objects on a slide, Use of Slide Master to control the design & formatting of a presentation, Use of Image, audio, video in the presentation, Slide show setup, slide transition, use of animation, Use of narration in presentation, Print setup & Printing handouts of a presentation. **UNIT V** Internet & Web Applications (in relation with Food Industry) **UNIT VI** Websites, Internet applications, Google Applications (G mail, Google search, G Drive, Google Docs) and other Email Services, Industry customer approach. **UNIT VII** Statistics: Data and Data Types: Primary data and Secondary Data; Measures of Central Tendency: Mean, Median, Mode: Dispersion: Range, Standard Deviation, Standard error; Kurtosis, Skeness. Hypothesis Testing:Chi-square Test, Student't' test, One Way Analysis of Variance (ANOVA). **PRACTICAL** 1. Typing practice (ability of typing without watching keyboard). 2. Use of Microsoft word and Excel with specific problem. 3. Tabular form of data presentation in computer. 4. Graphical presentation of data. 5. PowerPoint presentation 6. Opening e-mail account and its different uses		30)		
	BVFPS205P	EXCURSION	Indistry Visit	Sruti Mandal	1	2	
SEM 3	BVFPS301T	SANITATION AND HYGIENE	**THEORY** **Unit I** **Sanitation and Health:** Definition, importance of sanitation, application of sanitation to food industry and food service establishments. control of microbial growth in food. Food contamination and spoilage, food borne diseases- Introduction, types of microbial foodborne diseases (foodborne intoxications and foodborne infections), symptoms and prevention of some commonly occurringfood borne diseases. **Unit II** **Hygiene and food handling:** Purchasing and receiving safe food, food storage, sanitary procedures in food preparation, serving and displaying of food, special food operations. **Unit III** **Environmental Sanitation:** Location and layout of premises, constructional details, sanitary requirements for equipments, guidelines for cleaning equipments, cleaning procedures, pest control, water supply, storage and waste disposal, environmental pollution. **Unit IV** **Hygiene Practices in food industry:** Introduction, necessity, personnel hygiene, sanitary practices,management and sanitation, safety at work place. **Unit V** **Sanitation regulations and Standards:** Introduction, regulatory agencies, control of food quality, localhealth authority. Food sanitation check lists.	Monalisa Roy	2(Class test-30+attendence +assignment-10+theory-60)	4	4x15=60

	BVFPS302T&P	MEAT, POULTRY AND FISH PROCESSING TECHNOLOGY	**THEORY** **UNIT-I** Introduction to meat and poultry industries; Pre-mortem selection of animals; Modern Abattoir Practices: slaughtering techniques of animal and slaughtering practices; Meat cuts and portions of meat; Inspection and grading of meat; Physico-chemical composition of muscle; Post-mortem changes in muscle; Conversion of muscle to meat. **UNIT-II** Chemical and nutritional composition of meat ; The eating quality of meat - color, water holding capacity (WHC) and juiciness, texture and tenderness, odour and taste; Meat microbiology and safety; Spoilage characteristics of meat; Endogenous and exogenous infections; Preventive (prophylaxis) measures for avoiding meat spoilage. UNIT-III Meat processing- comminution, emulsification, curing, smoking, cooking, ageing and tenderization; Meat products - meat emulsion, fermented meats, sausages, ham, bacon and comminuted meat products; Meat analogs; Meat storage and preservation- by temperature control (refrigeration, freezing, thermal processing), by moisture control (dehydration, freeze drying, curing, IMF meat), by microbial inhibition (chemical preservation, ionizing radiation); Packaging of meat products. Meat production, processing and consumption trends; Meat plant sanitation and waste disposal; By-products from meat industries and their utilization. UNIT-IV Inspection of birds, poultry slaughter and dressing, Factors affecting quality of poultry; Classification of poultry meat; Composition and nutritional value of poultry meat; Processing of poultry meat, spoilage and control; By- product utilization. Egg and egg products- Structure, composition and functions of eggs; Abnormalities in eggs; Functions of eggs in food products; Inspection and grading for egg quality; Preservation and safe handling of eggs; Coagulation of eggs, egg foams, egg powder and egg based products. **UNIT-V** Fish as raw material for processing and its biochemical composition. Factors affecting the quality of product and post harvest losses. Chilling and freezing of fish and other aquatic products. Physical, chemical, microbiological and sensory changes during storage. Principles of thermal processing. decimal reduction time, thermal death time, "Z" and "F" values, 12D concept, determination of process time. Canning process for fish. Value added fish products. Hurdle technology and its application. Composition and role of muscle proteins, Factors influencing denaturation of muscle proteins. Fisheries Byproducts Technology. **PRACTICALS** 1. Physico-chemical and microbiological quality of different types of meat. 2. Canning of meat products and determination of thermal process time. 3. Preservation of meat by curing, freezing, smoking, drying and determination of shelf-life 4. Preparation of Various value added meat products 5. Estimation of nitrites/nitrates in processed meat products. 6. Estimation of Water Holding Capacity and emulsification	Suchet a Sahoo	4(Class test-30+attende nce +assign ment-10+theory-30practical-30	6	6X15=90

			capacity of various types of meat. 7. Physico-chemical and micro-biological quality of raw egg and their products. 8. Preservation of shell eggs by various methods 9. Studies on hygiene and sanitation in meat, poultry and egg processing plants. 10. Evaluation of meat quality 11. Evaluation of quality of eggs 12. Preparation of meat products 13. Visit to meat/poultry/egg processing plant for hands on training.				
	BVFPS303T&P	FRUITS AND VEGETABLE PROCESSING INDUSTRY	**THEORY** **UNIT-I** Fruits and vegetables as living products: Current status of production and processing of fruits and vegetables, Composition and nutritive value of fruits and vegetables; spoilage of fruits and vegetables. Pre-packaging of fresh fruits and vegetables. Storage techniques for fresh fruits and vegetables. Primary processing: grading, sorting, cleaning, washing, peeling, slicing and blanching, Maturity standards for storage and desirable characteristics of fruits and vegetables for processing, Supply chain management of Fruits and vegetables. Pre-cooling, Concept of evaporating cooling, conditions for transportation and storage. **UNIT-II** Introduction to dehydration techniques of Fruits and Vegetables: Tray drying, vacuum drying, foam mat drying, fluidized bed drying. spray drying, freeze drying, microwave drying, heat pump drying, osmotic dehydration. Technology of dry nuts. Physical and chemical changes in food during drying and dehydration. Quality of dried products. **UNIT-III** Principles of Thermal processing- review. Process of blanching, Canning and bottling, Effect of canning and bottling on nutritive value, spoilage of canned foods, detection and control. UHT processing: Aseptic processing and packaging. **UNIT-IV** Juice extraction and clarification, preparation of syrups, and chemical preservation Products processing: squashes, cordials, nectars. Principle of jel formation - Jam, jelly, marmalade and defects in manufacturing, fortified fruit drinks, Candies; chutneys; fruit juice concentrates and powders; Tomato product: sauce and ketchup, Cut fruits and vegetable, fruit toffee, **UNIT-V** Preservation by fermentation- Definition, Advantages, disadvantages, Types of fermentation, equipments. Pickles making and Vinegar; Fruit wine. Irradiation applications for fruits and Vegetable. Minimally processed fruits and vegetables, Emerging technologies for fruits and vegetables processing technologies: Hurdle technology, Ozone application and ultrasound. **PRACTICALS** 1. Estimation of sugar-acid ratio of fruits 2. Evaluation of washer and grader 3. Testing of adequacy of blanching 4. Pectin determination in fruits and vegetable products. 5. Preparation fruit juices and concentrates 6. Canning of fruits and vegetables 7. Preparation of jams and jellies, marmalade, preserves and	Dr.Apurba Giri	4(Class test-30+attendence +assignment-10+theory-30practical-30	6	6x15=90

			candies 8. Preparation of pickles, chutneys 9. Preparation of tomato products 10. Drying of fruit and vegetables 11. Processing of mushrooms. 12. Visit to fruits and vegetable processing industries				
	BVFPS304T&P	FATS AND OIL PROCESSING TECHNOLOGY	**THEORY** **UNIT-I** What is fat - Importance - chemical composition of fats. Triglycerides - their structure and composition - mono and diglycerides - free fatty acids - phosphatides- sterols, fatty acid alcohols - tocopherols. **UNIT-2** Factors affecting physical characteristics of fats and oils - chemical reactions of fats and fatty acids, stability of oils and fats. Important characteristics of oils from coconut, cotton seeds, palm, sunflower, sesame, safflower, rice bran, rape seed, mustard, linseed, soybean, castor and lard. **UNIT-3** Processing techniques - Degumming, refining, bleaching, deodorizing, fractionation, hydrogenation, inter- esterification and esterification. Alternative methods for extraction and processing of oils. **UNIT-4** Common products preparation - Salad and cooking oils, shortenings (baking and frying fats), hard butters, margarine and spreads, dressings for food (Mayonnaise and Salad dressings, pourable - type dressings, reduced calorie dressing), toppings, coffee whiteners, confectionaries coatings, low - fat spreads for traditional breakfast foods etc. **UNIT-5** Value added products from vegetable oil refining industry like lecithin, wax, Vitamin-E, oryzanol. Value added products from non-traditional oils and fat. By-products from bran oil and oil refining industry, utilization of lingo cellulosic waste from oil industry, bakery fats with zero trans fatty acids. **PRACTICALS** Common Test methods for **Fats** - 1. Cold Test 2. Colour, (Lovibond) 3. Dropping point 4. Flavour 5. FFA 6. Melting Point 7. Oil stability index 8. Peroxide Value 9. Solid fat index 10. Solid fat content 11. Total lipids and thiobarbituric and reactive substances (TBARS)	Dr.Sandip Basu	4(Class test-30+attendence +assignment-10+theory-30practical-30	6	

			12. Karl-Fischer' titration- application.				
	BVFPS305T&P	INSTRUMENTATION AND PROCESS CONTROL IN FOOD INDUSTRY	**THEORY** **UNIT I** Introduction, definitions, characteristics of instruments, static and dynamic characteristics **UNIT II** Temperature and temperature scales; Various types of thermometers; thermocouples, resistance thermometers andpyrometers **UNIT III** Pressure and pressure scales, manometers, pressure elements differential pressure **UNIT IV** Liquid level measurement, different methods of liquid level measurement, flow measurement, differentialpressure meters, variable area meters **UNIT V** Weight measurement: Mechanical scale, electronic tank scale, conveyor scale **UNIT VI** Transmission: Pneumatic and electrical, Control elements: control actions, pneumatic and electrical controlsystems **UNIT VII** Process control: Definition, simple system analysis, dynamic behavior of simple process, Laplace transform,process control hardware **UNIT VIII** Frequency response analysis, characteristics, Bode diagram and Nyquist plots and stability analysis **UNIT IX** Controllers and indicators: Temperature control, electronic controllers, timers and indicators, discrete controllers,adaptive and intelligent controllers **UNIT X** Computer-based monitoring and control: Importance, hardware features of data acquisition and control computer,signal interfacing, examples in food processing **UNIT XI** Introduction of 8051/8085 based system and applications in processing **PRACTICALS:** 1. Study on instrumentation symbols; 2. Study of P&I diagram and flow sheet diagrams in instrumentation. 3. Study of characteristics of Pressure transducers 4. Real-time study of Pressure transducers characteristics with PC 5. Study of Pressure Control by s On/Off Controller 6. Study of characteristics of IC temperature sensor 7. Study of characteristics of Thermocouple. 8. Study of characteristics of Platinum RTD 9. Study of Temperature controlled alarm system 10. Study of Data logger 11. Study of 8051 based programming examples. 12. Study of Programmable Logic Controllers (PLC) Hardware 13. Study of Programmable Logic Controllers (PLC) Ladder programming, 14. To study PLC based control of Multiprocess system 15. Study of various transducers for measurement of pressure ,temperature, flow, combinely 16. Visit to food processing plant and dairy industry.	Sayan Das	4(Class test-30+attendence +assignment-10+theory-30practical-30	6	6x15=90

SEM 4	BVFPS401T&P	FOOD LAWS AND STANDARD AND REGULATION	**THEORY** **UNIT-I** Introduction, concept of total quality control and quality assurance, concept of food safety and standards (FSSAI), food safety strategies. Food hazards and contaminations - biological (bacteria, viruses and parasites), chemical (toxic constituents / hazardous materials) pesticides residues / environmental pollution / chemicals) and physical factors. Preventive food safety systems - monitoring of safety, wholesomeness and nutritional quality of food. Prevention and control of microbiological and chemical hazards. Food safety aspects of novel methods of food processing such as PEF, high pressure processing, thermal and non thermal processing, irradiation of foods. **UNIT-II** Indian and Food Regulatory Regime (Existing and old), PFA Act and Rules, Food Safety and Quality Requirements, Additives, Contaminants and Pesticide Residue. Food Safety and Standards Act, 2006, Essential Commodities Act, 1955, Global Scenario, Codex Alimentarius, WHO/FAO Expert Bodies (JECFA/JEMRA/JMPR) WHO/FAO Expert Bodies (JECFA/ JEMRA/JMPR). Food safety inspection services (FSIS) and their utilization. Legal Metrology act, Weight and Measurement act, Introduction to Factory Act. **UNIT-III** Introduction to OIE and IPPC, Other International Food Standards (e.g. European Commission, USFDA etc). WTO: Introduction to WTO Agreements: SPS and TBT Agreement, Export and Import Laws and Regulations, Export (Quality Control and Inspection) Act, 1963. Customs Act and Import Control Regulations, Other Voluntary and mandatory product specific regulations, Other Voluntary National Food Standards: BIS Other product specific standards; AGMARK. Nutritional Labeling,Health claims. **UNIT-IV** Risk assessment studies: Risk management, risk characterization and communication. **UNIT-V** Voluntary Quality Standards and Certification GMP, GHP, HACCP, GAP, Good Animal Husbandry Practices,Good Aquaculture Practices ISO 9000, ISO 22000, ISO 14000, ISO 17025, PAS 22000, FSSC 22000, BRC, BRCIOP, IFS, SQF 1000, SQF 2000. Role of NABL, CFLS. Halal & Kosher Standard. **UNIT-VI** Food Adulteration: Laws governing food standards, significance – PFA, FPO, ISI, Agmark, Meat Products order, Codex Alimentations. Common adulterants in food and their effects on health, common adulterants in food and their effects on health, common household methods to detect adulterants in food. PRACTICAL 1. Licensing and registration process 2. Examination of Cereals as per specifications 3. Examination of milk and milk products as per specifications 4. Examination of Oil and Oil products as per specifications 5. Examination of fruits and vegetable products as per regulations Visit to FDA department	Monalisa Roy	4(Class test-30+attendence +assignment-10+theory-30practical-30)	5	5x15=75
	BVFPS402T&P	BAKERY ,CONFECTIONERY,	**THEORY** **UNIT-1**	Sruti Manda	5(Class test-	6	6x15=90

		AND SUGAR PROCESSING TECHNOLOGY	Global Status of bakery and confectionery industry. Review of raw materials and quality parameters of wheat flour, flour standards; dough development; methods of dough mixing; dough chemistry, rheological testing of dough-Farinograph, mixograph. Extensograph, Amylograph/ Rapid- visco analyzer, Falling number, Hosney's dough stickiness tester and interpretation of data. **UNIT-2** Bread: various methods of production and effect of various formulations and process parameters on quality. Staling of bread, losses during manufacture and methods to control them; machinery used in bakery industry, multigrain bread, gluten free products, traditional bakery products, shelf life. Biscuits and Cookies: Ingredients and flour specification; types of biscuits, doughs - developed doughs, short doughs, semi-sweet, enzyme modified doughs and batters importance of the consistency of the dough. **UNIT-3** Cakes: Flour specifications-, ingredients, manufacturing process and quality evaluation. Preparation of other bakery products - rusks, crackers, buns, muffins, pizza; raw materials, methods of production, quality parameters. Confectionery manufacture: Raw materials used in the confectionery manufacturing and processing industry - including quality control methods. Cocoa, Sugar, Dried milk products, Special fats, Emulsifiers, Nut kernels. Production of cocoa liqueur from the cocoa bean, Dark, milk and white chocolate, manufacturing processes. **UNIT-4** Chocolate Processing Technology : Compound coatings and candy bars; tempering technology, chocolate hollow figures, chocolate shells, enrobing technology, manufacture of candy bars, Presentation and application of vegetable fats; production of chocolate mass. **UNIT-5** Sugar Confectionery manufacture: General technical aspects of industrial sugar confectionery manufacture, Manufacture of high boiled sweets-Ingredients, Methods of manufacture- Types-Center-filled, lollipops, coextruded products. Manufacture of gums and jellies-Quality aspects Manufacture of Miscellaneous Products: Caramel, Toffee and fudge-Liquorice paste and aerated confectionery, Lozenges, sugar panning and Chewing gum, Countlines-Quality aspects **UNIT 6** Equipment used in bakery and confectionary industry: Construction and working of various equipments like Mixers, proofing chambers, dough dividers, moulder and sheeter, baking ovens, cooling chamber, sealing andpackaging machines, Rolling and cutting machines. **UNIT 7** Bakery Plant - Layout, setting up of units and hygienic conditions, operation and maintenance. **UNIT 8** Sugarcane and sugarbeet as sugar raw materials. Flow charts for manufacture of Granulated sugar and Liquid sugars. Properties of Granulated sucrose and Liquid Sugars. Invert sugar and their characteristics. Speciality products of Sugar Industry. Back strap Molasses and its uses. Applications in animal feed **UNIT 9** Sugar production processes: Extraction of juice, extraction yields,	I	30+attendence +assignment-10+theory-30practical-30		

			drying and uses of Bagasse, Purification of juices-Juice filtration and chemical purification, Clarification stages, Lime addition, pH control, Treatment of clarified juice, evaporation –multiple effect evaporators, Vacuum pans, Crystallization, Washing of sugar crystalsand centrifugal separation/dewatering of sugar and other related processes. Sugar Refining, Sugar analysis, Sugarrecovery –improvement, Sugar balance, energy conservation, Sugar plant sanitation PRACTICALS 1. Quality assessment: Flour (Maltose Number, Water Absorption, Sedimentation value, Alcohol Acidity),yeast, water, leavening agents. 2. Dough characteristics - determination of gluten. 3. Manufacturing of bread (sandwich bread, milk bread) and its sensory evaluation. 4. Preparation and quality evaluation of nan khatai 5. Manufacturing of Cookies and its sensory evaluation. 6. Manufacturing and sensory evaluation of Rusk. 7. Manufacturing and sensory evaluation of cakes and pastries. 8. Preparation of melting marvels 9. Preparation of sweet and salt biscuits 10. Preparation of pizza 11. Manufacturing of milk and dark chocolate and its sensory evaluation. 12. Preparation of different varieties of candies and its sensory evaluation. 13. Preparation of Fudge, Caramel, Fondant Jellies and its sensory evaluation. 14. Farinographic and Extensographic studies 15. Identification of types of confectioneries, sugar cookery. 16. Effect of syrup consistency and temperature on the quality characteristics of hardboiled sweets 17. Manufacture of chocolate, toffee, fruit drops, fruit toffees, candies and preservers. 18. Visit to bakery and confectionery plants. Determination of sugar content in juice. 19. Determination of reducing and non reducing sugars in sugar product. 20. To study the equipments related to sugar manufacturing. 21. To determine ash content of sugar product. 22. To determine moisture content of sugar product. 23. To estimate acidity and TSS of sugar product				
	BVFPS403T&P	FOOD BEVERAGE TECHNOLOGY	**THEORY** **UNIT I** Introduction to beverages: Types of beverages and their importance, status of beverage industry in India, Manufacturing technology for juice-based beverages, synthetic beverages; technology of still, carbonated, low- calorie and dry beverages, isotonic and sports drinks; role of various ingredients of soft drinks, carbonation of soft drinks **UNIT II** Manufacturing process of beverages: Beverages based on tea, coffee, cocoa, spices, plant extracts, herbs, nuts, Dairy-based beverages. **UNIT III** Types of coffee and tea: Chemical composition and processing of tea and coffee and their quality assessment. Types of tea: black tea, green tea, oolong tea. Types of coffee: Vaccum coffee, drip coffee,	Suchet a Sahoo	3(Class test-30+attende nce +assign ment-10+theory-30practical-30	5	5x15=75

			iced coffee. Espresso coffee, instant coffee. Decaffeination of Coffee types of decaffeination: Roselius method, swiss water process, direct and indirect method, triglyceride method, carbon dioxide method. **UNIT IV** Alcoholic beverages: Types, manufacture and quality evaluation; the role of yeast in beer and other alcoholic beverages, ale type beer, lager type beer, technology of brewing process, equipments used for brewing and distillation, wine and related beverages, distilled spirits. **UNIT V** Packaged drinking water: Definition, types, manufacturing processes, quality evaluation and raw and processed water, methods of water treatment, BIS quality standards of bottled water; mineral water, natural spring water, flavoured water, carbonated water. **PRACTICAL** 1. Chemical and microbiological analysis of raw water quality; 2. Preparation of regional fruit juices; 3. Preparation of whey-based beverages; 4. Preparation of crush, nectar, blended juice 5. Preparation of soy milk, fruit milkshakes, herbal beverages; Visit to relevant processing units.				
	BVFPS404T&P	FOOD PLANT UTILITIES AND SERVICE	**THEORY** **UNIT I** Introduction**:** Classification of Various Utilities and Services in food Plant/ industry. Commercial energy Pricing **UNIT II** Electrical System: Introduction to electric power supply systems, electrical billing, electrical load management & maximum demand control, power factor improvement & benefits, transformers, system distribution losses, harmonics, trouble shooting of electrical power system **UNIT III** Electrical Motors: Types, losses in Introduction motor, motor efficiency, factors affecting motor performers, performance, rewinding and motor replacement issues, energy saving opportunities with energy efficient motors **UNIT IV** Compressed air system: Requirement, types, compressor efficiency, efficient compressor operation, compressed air system components, capacity assessment, leakage test, factors affecting the performance & efficiency **UNIT V** HV AC & Refrigeration system: Requirement, vapor compression refrigeration cycle, refrigerants, coefficient of performance, capacity, factors affecting refrigeration & air conditioning system performance & saving opportunities. Vapor absorption refrigeration system: Working principle, types & comparison **UNIT VI** Fans and blowers: Requirement, types, performance evaluation, efficient system operation, flow control strategies and energy conservation opportunities **UNIT VII** Pumps and pumping systems: Requirement, types, performance evaluation, efficient system operation, flowcontrol strategies and energy conservation opportunities **UNIT VIII** DG set system: Requirement, introduction, factors affecting selection **UNIT IX** Fuels and combustion: Introduction to fuels; properties offuel oil, coal & gas; storage; handling & preparation offuels; principles of combustion, combustion of oil, coal & gas; draft system **UNIT X** Boilers: Boiler specification, Indian boiler regulation, system components, types, combustion in boilers,performance terms, analysis of losses, feed water treatment, blow down, energy	Sayan Das	4(Class test-30+attendence +assignment-10+theory-30practical-30	5	5x15=75

			conservation opportunities **UNIT XI** Steam system: Properties of steam, assessment of steam distribution losses, steam leakage, steam trapping,condensate and flash steam recovery system, opportunities for energy savings **UNIT XII** Waste heat recovery: Classification, advantages and application, commercially viable waste heat recovery:devices, saving potential **UNIT XIII** Other utilities & services**:** Lighting, CIP system, waste water/drainage, water treatment, dust removal, fireprotection and maintenance system **PRACTICAL** 1. Study on energy basic, types, forms, terms and measuring instruments used in food plant utilities. 2. Study on plant's electrical power supply system, billing and load estimation. 3. Motors and variable speed drives specification, selection, performance terms & definitions. 4. Study on compressed air system components and performance terms & definitions. 5. Study of refrigeration & HVAC system components, performance terms & definitions and loadestimation of a plant. 6. Study of fans and blowers, types, specification, performance terms & definitions. 7. Pumps types, specification, selection, performance terms & definitions. 8. Study on plant lighting system and their components. 9. Study on DG system their specification and selection. 10. Study on combustion of oil, gas & coal. 11. Study on fuel substitution. 12. Study on boiler performance terms and assessment. 13. Study on cost of steam 14. Study on waste heat recovery devices				
	BVFPS405P	EDUCATIONAL EXCURSION	Industry Visit	Sruti Mandal	2	1	
SEM 5	BVFPS501T&P	ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT	**THEORY** **UNIT-I** **Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise **UNIT-II** **Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2questions from each section. As far as possible the question will be of short answer type. **UNIT-III** **Entrepreneurship**: Definition of Entrepreneur, Internal and External Factors, Functions of an Entrepreneur, Entrepreneurial motivation and Barriers, Classification of Entrepreneurship, Theory of Entrepreneurship, Concept of Entrepreneurship, Development of entrepreneurship; Culture, stages in entrepreneurial process **UNIT-IV**	Monalisa Roy	4(Class test-30+attendence +assignment-10+theory-30practical-30	5	5x15=75

			Creativity and Entrepreneurial Plan: Idea Generation, Screening and Project Identification, Creative Performance, Feasibility Analysis: Economic, Marketing, Financial and Technical; Project Planning: Evaluation, Monitoring and Control segmentation. Creative Problem Solving: Brainstorming, Synectics, Value Analysis, Innovation. **UNIT-V** **Institutional support for new food ventures:** Supporting Organizations; Incentives and facilities; Financial Institutions and Small scale Industries, Govt. Policies for SSIs. **UNIT-VI** **Managerial aspects of small Business**: Principles of Management (Definition, Function of management viz planning, Organisms, coordination, and control Operational Aspects of Production. Basic principal of financial management. Marketing techniques. Personnel and Inventory Management. Importance of communication in business **UNIT-VII** **Production management**: plant location and layout, production planning and control. marketing challenges and approaches for new products and services.. Agricultural sector and food processing industry problems andopportunities, Standard related to food industry **UNIT-VIII** **Legal Aspects of small Business:** Elementary Knowledge income tax, sales tax, excise rules, factory act andpaymemt of wages act. **PRACTICALS** 1. Overview of present status of food industries in India 2. Overview of management databases 3. Market Survey, Consumer survey to identify new products 4. Layout for different types of food industries. 5. Methods for economic analysis and profitability analysis of food plant 6. Data collection of materials and processes. 7. To study the essential elements of TQM.				
	BVFPS502T&P	DOCUMENTATION AND FOOD PROCESSING	**THEORY** **UNIT-I** Introduction to documentation in food industry, documentation and inspection of raw material in food industry. Methods of documentation for raw material to finished product. **UNIT-II** Familiarization with the application of computer in some common food industries : milk plant & fruits vegetable plants, starting from the receiving of raw material up to the storage & dispatch of finished product. Statistical analysis in food industry- application of mean, median and standard deviation in food industry. **UNIT-III** Introduction and implementation of ERP, application of ERP in food industry, Essential guidelines of ERP in food processing industries. **UNIT-IV** Documentation of finished product detail - name of the product, batch number, time of packing, date of manufacture, date of expiry, other label detail, primary ,secondary and tertiary packing material for finished product, storage conditions. **PRACTICALS**	Sayan Das	2(Class test-30+attendence +assignment-10+theory-30practical-30	4	4x15=75

			1. Problem solving using spread sheet and word. 2. Use of statistical package for analysis of data 3. Application of ERP demonstrated with suitable food product. 4. Familiarization with software related to food industry. 5. Visit to industries and Knowledge of computer application in food industry. 6. Actual presentation of report in seminar. 7. Documentation of any food product along with relevant labeling. 8.				
	BVFPS503T&P	FOOD INDUSTRY WASTE AND BY PRODUCT MANAGEMENT	**THEORY** **UNIT-I** Introduction : Sources of waste and pollutants, Classification and characterization of Solid, Liquid and Gaseous wastes, such as wastes from fruit and vegetable and treatment of solid wastes from agro wastes. India -nature of different waste - Waste utilization from rice mill- Thermal and biotechnological use rice husk-cement preparation and different thermal application - utilization of rice ban-stabilization-defatted bran utilization. **UNIT-II** Utilization of Fruit and Vegetable Wastes: Types Of Waste And 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. Processes for waste utilization from fruit and vegetable industries - Distillation for production of alcohol - oil extraction from waste - waste management in sugar mills - citric acid production from fruit waste, extraction of active ingredients from fruit waste. **UNIT-III** Fish, Meat and Poultry And Tuber Crops Waste Utilization: Fish Industry by products and Waste utilization-meat and poultry waste recycling. Waste from tuber crops - effluent safe disposal- effluent treatment plant - waste recycling plant - feasibility report for food industries using food waste and by products. **UNIT-IV** By-Products Utilization of Wheat and Pulse Mill: By products of wheat milling- germs and bran - by products of pulses milling - husk, germs and broken. Coconut processing - by-product utilization - fuel briquette. **UNIT-V** Biodegradability : Concept of biodegradability, Criteria of Pollution, Physical Chemical and Biological properties, Soluble, suspended and volatile solids. Ammonia Nitrogen and Biological indicator. BOD Dilution test and mathematical model for BOD curve. Typical Case Studies: Characterization and treatment of liquid wastes from Dairy, Slaughter house etc. Process of anaerobic bio-methanation, Conventional aerobic process, Aerated lagoon, Strategies for utilization of Biomass residues after fruit/food processing. Animal and community waste. Landfill and composting. Environmental protection act and specifications for effluent of different food industries, waste Utilization, Effluent treatment, 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. PRACTICAL	Sruti Mandal	4(Class test-30+attendence +assignment-10+theory-30practical-30	5	5x15=75

			1. Waste characterization : Temperature, pH, thermal conductivity, solids content, turbidity, BOD, COD, estimation of break point chlorination, ammonia removal from waste, effect of lime treatment on waste water in respects of BOD, COD, solids content, phosphate content, demonstration of waste utilization in various industries. 2. Identification of useful products from food and agricultural waste 3. Extraction of leaf proteins 4. Alcohol production from molasses 5. Extraction of banana fiber 6. Use of crop residues for the production of cellulose 7. Use of mango kernels for starch manufacture 8. Pectin from organic waste 9. Rice bran utilization for edible grade oil extraction 10. Extraction of volatile oils from organic waste 11. By-Products utilization of poultry, fish, meat milk, cereals, pulses and seed wastes from agro processingindustries. 12. Estimation of Water portability and acceptable parameters 13. Characterization of industrial effluents for pH, TS, TDS, TSS, alkalinity and hardness parameters. 14. Evaluation of population potential of waste materials as Biochemical Oxygen Demand (BOD). 15. Determination of chemical oxygen demand (COD) in various effluents. 16. Water treatment using microbes				
	BVFPS504T	INDUSTRIAL SAFETY AND HAZARDS	**THEORY** **UNIT-I** Origin of process hazards, Laws Codes, Standards, Case Histories, Properties of Chemicals, and Healthhazards of industrial substances. **UNIT-II** Toxicology :Toxic materials and their properties, effect of dose and exposure time, relationship and predictivemodels for response, Threshold value and its definitions, material safety data sheets, industrial hygiene evaluation. **UNIT-III** Fire & explosion: Fire and explosion hazards, causes of fire and preventive methods. Flammabilitycharacteristics of chemical, fire and explosion hazard, ration of process plant. **UNIT-IV** Propagation of fire and effect of environmental factors, ventilation, dispersion, purifying and sprinkling, safetyand relief valves. **UNIT-V** Other Energy Hazards: Electrical hazards, noise hazard, radiation hazard in process operations, hazardscommunication to employees, plant management and maintenance to reduce energy hazards.	Suchet a Sahoo	3(Class test-30+attende nce +assign ment-10+theory-60)	4	4x15=60
	BVFPS505P	IN PLANT TRAINING	Industry Training	Sruti Manda l	5	1	
SEM 6	BVFPS601T	FOOD BUSINESS MANAGEMENT	**THEORY** **UNIT** I Business Management: introduction, theories and functions, food industry management, marketing management and human resource development, personal management. Sectors in food industry and scale of operations in India. **UNIT II** Human Resource Management: Study the basics about HR and	Monali sa Roy	3(Class test-30+attende nce +assign ment-10+theory-60)	4	4x15=60

			related policies and capacity mapping approaches for better management. **UNIT III** Consumer behavior towards food consumption, Consumer Surveys by various Institutes and Agencies, various journals on consumer behavior and market research, internet based data search. **UNIT IV** International trade: basics, classical theory, theory of absolute advantage, theory of comparative modern theory, free trade-protection, methods of protection, quotas, bounties, exchange control, devaluation, commercial treaties, terms of trade, balance of payments, Exim policy, foreign exchange, mechanics of foreign exchange, GATT, WTO, role of WTO. International trade in agriculture. World trade agreements related with food business, export trends and prospects of food products in India. **UNIT V** World consumption of Food: patterns and types of food consumption across the globe. Ethnic food habits of different regions. Govet. Institutions related to international ad trade; APEDA, Tea board, spice board, wine board, MoFPI etc. management of export import organization, regristration, documentation, export import logistics, case studies. Export and import policies relevant to horticultural sector.				
	BVFPS602T&P	FOOD PLANT LAYOUT AND DESIGN	**THEORY** **UNIT I** Introduction: Definition, Basic concepts of plant layout and design with special reference to food process industries. Application of HACCP concept, ISO, FPO & MPO requirements in food plant layout and design. **UNIT II** Plant Location: Influence of location on plant layout, location factors, location theory and models, Economicplant size, types of manufacturing processes like continuous, repetitive and intermittent processes. **UNIT III** Plant Layout: Preparation of a Plant Layout, Plant Layout problem, importance, objectives, classical types of layouts. Evaluation of layout. Advantages of good layout **UNIT IV** Plant Building: Considerations in building design, type of factory buildings, choice of building construction, material for floors, foundation, walls, doors, windows, drains etc, ventilation, fly control, mold prevention and illumination in food processing industries. **UNIT V** Plant layout & Equipment Layout: Plant layout and design of bakery and biscuit industries; fruits and vegetables processing industries including beverages; milk and milk products; meat, poultry and fish processing industries. **PRACTICAL** 1. Preparation of project report 2. Preparation of feasibility report Layout of food storage wares and godowns 3. Visit to food storage wares and godowns 4. Layout and design of cold storage 5. Visit to cold storage plant 6. Layout of preprocessing house 7. Layout of milk and milk product plant 8. Visit of milk processing plant Layout and design of bakery and related product plant 9. Visit to bakery unit 10. Layout and design of fruit processing plant 11. Layout and design of vegetable processing plant	Sruti Mandal	4(Class test-30+attendence +assignment-10+theory-30practical-30)	6	6x15=90

			12. Visit to fruit and vegetable processing plant Design and layout of multiproduct and composite food plant 13. Waste treatment and management of food plant				
	BVFPS603T&P	FOOD PACKAGING TECHNOLOGY	**THEORY** **UNIT-I** Packaging Machineries, Systems and Regulations, Introduction to Food Packaging: History, Definitions, Importance and scope functions of packaging, package components. **UNIT-II** Packaging Materials and Properties: Manufacturing process, types, properties, advantages and disadvantages. Primary Packaging Materials. Paper and paper based packaging materials, Plastic as packaging materials: Brief history, processing, classification, mechanical, optical and barrier properties like WVTR, GTR, additives in plastics. **UNIT-III** Aluminium foil. Metal packaging materials. Manufacture of tin plate, TFS, fabrication, corrosion and remedial measures. Glass packaging materials: Composition, structure, properties, manufacture, design and closure. Plastic collapsible tube. Composite container. Secondary Packaging Material: Folding carton. Transport packaging materials-corrugated fiber board boxes, wooden boxes. Ancillary Packaging Materials: Printing inks, varnishes, lacquers and adhesives. Factors responsible for the selection of Packaging materials for fresh and processed food products. **UNIT-IV** Packaging requirements of different types of foods : fruits and vegetables, meat, fish, poultry, dairy products, edible oils and spice products, bakery products, confectioneries, Instant foods, extruded foods, snack foods, alcoholic and non alcoholic carbonated beverages, compatibility and estimation of shelf life. **UNIT-V** Packaging Machineries, Systems and Regulations: Packaging Machineries: Bottling, canning, capping, labeling, form- fill sealing, strapping, cartonning machineries. Packaging Systems: Vacuum and gas packaging, aseptic packaging, retort packaging, CAP and MAP, Intelligent/Smart/Active packaging systems and their food applications, active packaging, shrink packaging, lined cartonning system. Packaging Standards and Regulations: Laws, regulations, specifications and quality control, recycling of plastic packaging materials: Collection, separation and disposal. **UNIT-VI** Labelling requirements, methods of coding and regulation and standards of labelling of food packages **PRACTICALS** 1. Familiarization of different types of packaging materials. 2. Paper: Thickness, Grammage, weight, and water absorption capacity, Determination of wax weight, Determination of continuity of wax coating weight, grease resistance. 3. Plastics: Identification of different types of plastic packaging materials, thickness, density, Tensilestrength and elongation, dart impact, WVTR,GTR, Migration tests on plastics.	Suchet a Sahoo	4(Class test-30+attende nce +assign ment-10+theory-30practical-30)	6	6x15=90

			4. Metals: Determination of tin coating weight, headspace analysis of trace elements (Pb, Cr, Fe), lacquercoating, Can seaming. 5. Glass : Study on various defects in glass containers, To perform non-destructive tests for glass containers. 6. Transport package: Corrugated fibre board boxes Determination of bursting/strength properties, compression strength, cobb value, edge crush test, transport worthiness tests. 7. Estimation of shelf life of packaged food. 8. To perform vacuum packaging of food sample and carry out its storage study. 9. To perform modified atmospheric packaging of food sample and carry out its storage study. 10. To determine grease resistance of packaging materials. 11. Determination of water vapour transmission rate of various packaging materials. 12. To find out the porosity of tin plate. 13. To see the chemical resistance of packaging material. 14. Puncture resistance of corrugated boxes. 15. Visit to various industries, dealing with food packaging materials like / paper, board and metal cans. 16. Visit to packaging institute. 17. Tetra packing. 18. Labeling of packing.				
	BVFPS604P	PROJECT	Project on development of different food industry plant layout	Sayan Das	5(Total-100)	1	1x15=15
	BVFPS605P	SEMINAR	Different topics on food and nutrition, technolgyprocessing,safety,research etc.	Sayan Das	1(Total-100)	1	1x15=15
	BVFPS606P	COMPREHENSIVE VIVA			1		

Sucheta Sahoo 10.10.2020
Sucheta Sahoo
Programme In Charge

10.10.2020
Dr. Apurba Giri
Head Of Nutrition Dept.

Head
Dept. of Nutrition
Mugberia Gangadhar Mahavidyalaya

10.10.2020
Dr. Swapan Kumar Mishra
Principal
Mugbera Gangadhar mahavidyalaya

Principal
Mugberia Gangadhar Mahavidyalaya