

GANPAT UNIVERSITY

FACULTY OF SCIENCE

TEACHING AND EXAMINATION SCHEME

Program		B.Sc. – Food Technology	Branch	Food Technology	Semester	IV	Version	1.0.0.0										
Effective from		2019-20	Effective for batches admitted onwards		July 2018													
S. N	Subject Code	Subject Name	Theory / Practical	Teaching Scheme								Examination Scheme						
				Credit				Hours Per Week				Theory Marks			Practical Marks			Total Marks
				Th	Tu	Pr	Total	Th	Tu	Pr	Total	CE	SE	ES	CE	SE	ES	
1	BFT401	Food processing technology	Theory / Practical	3	1	2	6	3	1	4	8	20	20	60	20	20	60	200
2	BFT402	Technology of Dairy products	Theory / Practical	3	1	2	6	3	1	4	8	20	20	60	20	20	60	200
3	BFT403	Technology of Cereals, Pulses and Oilseeds	Theory / Practical	3	1	2	6	3	1	4	8	20	20	60	20	20	60	200
4	BFT404	Food Additives	Theory	3	-	-	3	3	-	-	3	20	20	60	-	-	-	100
5	BFT405	Waste management of food industries	Theory	3	-	-	3	3	-	-	3	20	20	60	-	-	-	100
		Total		15	3	6	24	15	3	12	30	100	100	300	60	60	180	800

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Semester	IV				Version	1.0.0.0						
Effective from Academic Year				2019-20	Effective for the batches Admitted onwards						July 2018	
Subject code	BFT401			Subject Name	Food Processing Technology							
Teaching scheme					Examination scheme							
	Th	Tu	Pr	Total	Marks	CE	SE	ES	Total	Duration	SE	ES
Hours	3	1	4	8	Theory	20	20	60	100	Theory	1 hr.	3 hr.
Credit	3	1	2	6	Practical	20	20	60	100	Practical	4 hr.	4 hr.
Pre-requisites												
Nil												
Scope and Objectives:												
To impart the knowledge about various preservation method.												
To impart basic knowledge of Cold Preservation and freezers, Dehydration, Irradiation, Food Packaging and Thermal Processing of food.												
Learning Outcome:												
After completion of the course, the students will be able to:												
Student will learn different types of preservation techniques used in food industry.												
Student will learn the role of various preservation method on the food quality.												
Syllabus- Theory												
Unit	Content											Hrs
1	Cold preservation Freezing: requirements of refrigerated storage - controlled low temperature, air circulation and humidity, changes in food during refrigerated storage, progressive freezing, changes during freezing –concentration effect and ice crystal damage, freezer burn. Refrigeration load, factors determining freezing rate-food composition and non compositional influences											7
2	Freezing- Mechanism and freezers Freezing methods -direct and indirect, still air sharp freezer, blast freezer, fluidized freezer, plate freezer, spiral freezer and cryogenic freezing.											7
3	Dehydration Normal drying curve , effect of food properties on dehydration , change in food during drying drying methods and equipments air convection dryer, tray dryer, tunnel dryer ,continuous belt dryer , fluidized bed dryer, spray dryer, drum dryer, vacuum dryer ,freeze drying ,foam mat drying.											10
4	Food Irradiation and Microwave Heating Ionizing radiation and sources, unit of radiations, direct and indirect radiation effects, safety and wholesomeness of irradiated food. Microwave heating and application.											7
5	Thermal processing Introduction, classification of Thermal Processes, Principles of thermal processing, Thermal resistance of microorganisms, Thermal Death Time, Lethality concept, characterization of heat penetration data, Thermal process Calculations											7
6	Separation processes Principles and methods of: distillation, extraction, washing, filtration, sedimentation, sieving and centrifugation											7
Syllabus Practical												
1	Comparison of conventional and microwave processing of food.											

2	Preservation of food by the process of freezing.
3	Preservation of food by canning (Fruit/Vegetable/meat).
4	Demonstration of various perishable food items and degree of spoilage. Preservation of food by high concentration of sugar.
5	Preservation of food by using salt.
6	Preservation of food by heat treatment- pasteurization.
7	Demonstration of preserving foods under cold vs. freezing process.
8	Drying of fruit slices pineapple slices, apple slices in cabinet drier
9	Effect of irradiation on sprouting of potatoes and onions.
10	Preservation of food by using acidulants i.e. pickling by acid, vinegar or acetic acid.
11	Preservation of food by using chemical preservatives.
12	Preservation of bread, cake using mold inhibitors.
13	Study on ohmic heating system .
14	Study on effect of high pressure on microbe.
15	To study IQF processing of fruits/ vegetable.
Text books	
1	Desrosier NW and Desrosier JN, The Technology of Food Preservation, CBS Publication, New Delhi, 1998.
2	Paine FA and Paine HY, Handbook of Food Packaging, Thomson Press India Pvt Ltd, New Delhi-1992.
3	Potter NH, Food Science, CBS Publication, New Delhi, 1998.
4	Ramaswamy H and Marcott M, Food Processing Principles and Applications CRC Press,2006.
5	Rao PG, Fundamentals of Food Engineering, PHI Learning Pvt Ltd, New Delhi, 2010.
6	Toledo Romeo T, Fundamentals of Food Process Engineering, Aspen Publishers, 1999.

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Semester	IV				Version	1.0.0.0						
Effective from Academic Year				2019-20	Effective for the batches Admitted onwards							July 2018
Subject code	BFT402			Subject Name	Technology of Milk and Milk Products							
Teaching scheme					Examination scheme							
	Th	Tu	Pr	Total	Marks	CE	SE	ES	Total	Duration	SE	ES
Hours	3	1	4	8	Theory	20	20	60	100	Theory	1 hr.	3 hr.
Credit	3	1	2	6	Practical	20	20	60	100	Practical	4 hr.	4 hr.
Pre-requisites												
Nil												
Scope and Objectives:												
	To provide basic knowledge on milk composition and its various properties.											
	To familiarize students about various unit operations involved in the processing of milk.											
	To impart knowledge about the process of manufacturing of various milk products.											
	To explain about cleaning and sanitation of dairy industry.											
Learning Outcome:												
	After the completion of the course, the students will be able to:											
	Understand the various properties and composition of milk.											
	Understand the technology of manufacturing of dried milk, cream, butter, ice cream, cheese and traditional dairy products will be understood various milk products.											
	Develop understanding of by-product utilization of dairy industry.											
	Apprehend the importance of cleaning, sanitation and CIP in dairy industry.											
Syllabus- Theory												
Unit	Content											Hrs
1	Introduction Status of dairy industry, Technology of milk and dairy products, Pasteurization sterilization, HTST and UHT processes.											6
2	Manufacture of condensed milk , milk powder, cheese, ice-cream, butter, ghee, malted products, evaporated and dried products, their evaluation and quality parameters, defects encountered during production, packaging and storage.											18
3	Substitutes for milk and milk products Casein and caseinates, lactose, whey protein concentrates and isolates, milk coprecipitates, and other by-products.											9
4	Technology of baby foods , weaning foods, therapeutic foods. Fortification and enrichment.											5
5	Traditional dairy products Milk confections such as yoghurt, dahi, khoa, burfi, kalakand, gulabjamun, rosogolla, srikhand, chhana, paneer, ghee, lassi etc. Probiotic milk products.											7
Syllabus Practical												
1	Sampling of milk and milk products.											
2	Platform tests of raw milk (clot on boiling (COB) test, alcohol test, MBRT test etc.).											
3	Determination of physical properties of milk.											
4	Determination of proximate composition and biochemical properties of milk.											
5	Determination of microbiological properties of milk.											
6	Detection of adulterants in milk.											

7	Identification and demonstration of liquid milk processing equipment, pipes and fittings.
8	Preparing standardized milk as per requirement.
9	Separation of fat from milk.
10	Pasteurization and homogenization of milk.
11	Packaging of liquid milk.
12	Preparation of sterilized flavored milk.
13	Preparation of reconstituted milk/rehydrated milk.
14	Preparation of cream.
15	Preparation of buttermilk.
Text books	
1	Vaclavik V. A. & Christian E. W. (2003) Essentials of food science. 2nd edition, Springer International.
2	Spreer E. (1998) Milk and dairy product technology, Marcel Dekker Inc.
3	Smit G. (2003) Dairy processing -improving quality, Woodhead Publishing.
4	Hohnson M. & Alford (1987) Fundamentals of dairy chemistry. 2nd edition, CBS Publishers.
5	Rajagopal, Roy, S.K. (2014) Milk & milk products technology, BS Publishers.
6	Early R. (2010) Technology of dairy product, Springer Publishers.

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Semester	IV				Version	1.0.0.0						
Effective from Academic Year				2019-20	Effective for the batches Admitted onwards						July 2018	
Subject code	BFT403			Subject Name	Technology of Cereals, Pulses and Oilseeds							
Teaching scheme				Examination scheme								
	Th	Tu	Pr	Total	Marks	CE	SE	ES	Total	Duration	SE	ES
Hours	3	1	4	8	Theory	20	20	60	100	Theory	1 hr.	3 hr.
Credit	3	1	2	6	Practical	20	20	60	100	Practical	4 hr.	4 hr.
Pre-requisites												
Nil												
Scope and Objectives:												
	To impart basic understanding of structure and composition of major cereals.											
	To elucidate the various equipments used in cereal processing.											
	To make student aware on various products and by-products of various cereals.											
	To make students aware of the detailed manufacturing technologies of cereals consumed in daily life in food industries.											
Learning Outcome:												
	After completion of the course, the students will be able to:											
	Comprehend the structure and composition of cereals.											
	Understand the processes for the preparation of various types of products from cereals.											
	Identify suitable equipments required for processing of cereals.											
	Comprehend the detailed manufacturing technologies of cereals consumed in daily life in food industries.											
Syllabus- Theory												
Unit	Content										Hrs	
1	Introduction Introduction										3	
	Wheat- Types, milling, flour grade, flour treatments (bleaching, maturing), flour for various purposes, Technology of dough development, Products and By-products.										7	
	Rice- Physicochemical properties , milling (mechanical & solvent extraction), parboiling, ageing of rice, utilization of byproducts.										6	
	Corn- Milling (wet & dry), cornflakes.										4	
	Barley- Milling (pearl barley, barley flakes & flour), Beer preparation.										4	
	Oats- Milling (oatmeal, oat flour & oat flakes)										4	
	Sorghum, rye, triticale and millets – Traditional & commercial milling(dry and wet).										4	
2	Technology of Pulses Milling of pulses, Dry milling, Wet milling, and Improved milling method.										4	
3	Technology of Oilseeds Introduction, Extraction of oil and refining, Sources of protein (defatted flour, protein concentrates and isolates), properties and uses, protein texturization, fiber spinning.										9	
Syllabus Practical												
1	Morphological characteristics of cereals.											
2	Physical properties of cereals.											
3	Chemical properties of cereals.											

4	Parboiling of paddy.
5	Effect of various factor on parboiling of paddy.
6	Determination of physical properties of legumes and oil seeds.
7	Removal of anti-nutritional compounds from selected pulses and oilseeds.
8	Processing of soy milk and value added products.
9	Determination of nutritional quality of selected pulses and oilseeds.
10	Determination of proximate composition of selected pulses and oilseeds.
11	Study of mini dhal mill.
12	Study of mini oil mill.
13	Conditioning and milling of wheat.
14	Quantitative analysis of various fractions of milled wheat.
15	Determination of sedimentation power of flour.
Text books	
1	Kent, N.L. 2003. Technology of Cereal, 5th Ed. Pergamon Press.
2	Chakraverty. 1988. Post Harvest Technology of Cereals, Pulses and Oilseeds, revised Ed., Oxford & IBH Publishing Co. Pvt Ltd.
3	Marshall, Rice Science and Technology. 1994. Wadsworth Ed., Marcel Dekker, New York.
4	Manay, S. and Sharaswamy, M. 1987. Food Facts and Principles. Wiley Eastern Limited.
5	David A.V. Dendy and Bogdan J. Dobraszczyk. 2001. Cereal and Cereal Products: Technology and Chemistry. Springer-Verlag, US.
6	Chakraverty, A. and Singh, R. P. 2014. Post Harvest Technology and Food Process Engineering. CRC Press, Boca Raton, FL, USA.

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Semester	IV				Version	1.0.0.0						
Effective from Academic Year				2019-20	Effective for the batches Admitted onwards						July 2018	
Subject code	BFT404			Subject Name	Food Additives							
Teaching scheme				Examination scheme								
	Th	Tu	Pr	Total	Marks	CE	SE	ES	Total	Duration	SE	ES
Hours	3	-	-	4	Theory	20	20	60	100	Theory	1 hr.	3 hr.
Credit	3	-	-	3	Practical	-	-	-	-	Practical	-	-
Pre-requisites												
Nil												
Scope and Objectives:												
	To get an insight into additives that are relevant to processed food industry for shelf life extension, processing aids and sensory appeal.											
	To explain about role of food additives in food quality control.											
	To explain the techniques of best use of food additives.											
	To describe the role of food additives in health maintenance and cure of diseases.											
Learning Outcome:												
	After the completion of the course, the students will be able to:											
	Understand about the use of food additives in food formulations.											
	Apprehend the suitable application of food ingredients in health foods and convenience food Preparation.											
	Grasp the techniques of food additives stability and use level.											
	Understand the role of food additives in health maintenance and cure of diseases.											
Syllabus- Theory												
Unit	Content											Hrs
1	Food Additives Definitions, classification and applications, food preservatives- classifications, antimicrobial agents, types and their action, safety concerns, regulatory issues in India, international legal issues; Antioxidants (synthetic and natural, mechanism of oxidation inhibition); Chelating agents: types, uses and mode of action; Coloring agents: color retention agents, applications and natural colorants, sources of natural color, misbranded colors, color extraction techniques, color stabilization.											10
2	Flavoring Agents Flavors (natural and synthetic flavors), flavor enhancers, flavor stabilization, flavor encapsulation; Flour improvers: leavening agents, humectants and sequesterant, hydrocolloids, acidulants, pH control agents buffering salts, anticaking agents.											8
3	Sweeteners Natural and artificial sweeteners, nutritive and non-nutritive sweeteners, properties and uses of saccharin, acesulfame-K, aspartame, corn sweeteners, invert sugar sucrose and sugar alcohols (polyols) as sweeteners in food products; Emulsifiers: types, selection of emulsifiers, emulsion stability, functions and mechanism of action.											10
4	Nutrient supplements & thickeners Polysaccharides, bulking agents, antifoaming agents, synergists, antagonists; additives food uses and functions in formulations, permitted dosages, indirect food additives; harmful effects/side effects associated with various additives (various diseases).											7

5	FSSAI Guidelines for food additives, types of additives in food, their permissible amount in any food product etc.	6
6	Information on spices and herbs Source, Description, identification, therapeutic and food value of Basil, Clove, Mint, Cinnamon, Turmeric, Garlic, Capsicum, Ginger and Black pepper.	4
Text books		
1	Branen A. L., Davidson P. M., and Salminen S. (2001) Food Additives. 2nd Ed. Marcel Dekker.	
2	George A. B., (1996) Encyclopedia of Food and Color Additives. Vol. III. CRC Press.	
3	George A. B., (2004) Fenaroli's Handbook of Flavor Ingredients 5th Ed. CRC Press.	
4	Morton I. D., and Macleod A. J., (1990) Food Flavours. Part A, B & C. Elsevier.	
5	Stephen A. M., (2006) Food Polysaccharides and Their Applications. Marcel Dekker.	

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Semester	IV				Version	1.0.0.0						
Effective from Academic Year				2019-20	Effective for the batches Admitted onwards						July 2018	
Subject code	BFT404			Subject Name	Waste Management in Food Industries							
Teaching scheme					Examination scheme							
	Th	Tu	Pr	Total	Marks	CE	SE	ES	Total	Duration	SE	ES
Hours	3	1	-	4	Theory	20	20	60	100	Theory	1 hr.	3 hr.
Credit	3	1	-	4	Practical	-	-	-	-	Practical	-	-
Pre-requisites												
Nil												
Scope and Objectives:												
	To make the students familiarize about waste generated in food industries.											
	To explain the concept of BOD and COD.											
	To describe the various unit operations involved in the treatment of wastes from food industries.											
	To explain the usage of microorganisms in the treatment of industrial waste.											
	To impart basic understanding of the utilization of the industrial waste.											
Learning Outcome:												
	After the completion of the course, the students will be able to:											
	Understand the types of food industry waste and its treatment.											
	Have practical knowledge about BOD as well as COD content of the waste water and its application in food industry.											
	Apprehend various methods employed for the treatment of industrial wastes.											
	Figure out methods for the utilization of industrial wastes and disposal of industrial wastes.											
Syllabus- Theory												
Unit	Content											Hrs
1	Introduction Water quality, treatment and recycle. BOD, COD and definitions, Discharge limits for effluents. Primary treatment, secondary and tertiary treatments by physical, chemical and biological methods.											10
2	Waste Utilization in Food Industry Effluent and solid waste utilization food processing industry by biological methods – for SCP, biogas and other products.											10
3	Value added products from of agro food processing industry.											5
4	Recovery of biological from dairy, meat, fish and poultry processing industry.											7
5	Case studies: Cane Sugar waste, molasses for alcohol, baggasse for paper pulp, chemicals, bioethanol, cogeneration. Other processes including vermi culture.Tertiary treatments											8
6	Equipment, Economics and Ethics											5
Text books												
1	Metcalf & Eddy (2013) Wastewater Engineering treatment and Resource recovery, 5th edition, McGraw Hill.											
2	Marriott N. G. (2006) Principles of Food Sanitation, 5th edition, CBS Publication.											
3	Lawrence K. W., Howard H. Y. & Yapijakis C. (2005) Waste Treatment in the Food Processing Industry, CRC Press.											
4	Wang & Lo H. (2006) Waste treatment in the food processing industry, CRC Press, Taylor & Francis Group.											
5	Loannis & Arvanitoyannis S. (2008) Waste management for the food industries, Elsevier publishers.											

6	Environmental Pollution Control Engineering – C.S. Rao.
7	Food Processing Waste Management – J.H.Green and A. Kramer.
8	Handbook of Waste management and co-product recovery in Food Processing – Vol.1- Keith Waldron.