GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR
(Established by State Legislature Act 17 of 1995)
'A+' Grade, NAAC Accredited State Govt. University

Acad./AC-III/BOS&R-1/2026/ 2878
Dated: 26/5/26

To

The Controller of Examinations
GJUS&T, Hisar.

Sub: Approval of scheme of examinations and syllabi of Integrated B.Sc. (Hons./Hons. with Research) – M.Sc. Food Technology (5th and 6th semester) under NEP-2020 w.e.f. academic session 2026-27 (batch 2024) being run in University Teaching Departments.

Sir,

I am directed to inform you that the Vice-Chancellor, on the recommendations of Dean, Faculty of Environmental and Bio Sciences & Technology on dated 18.05.2026, is pleased to approve the scheme of examinations and syllabi of Integrated B.Sc. (Hons./Hons. with Research) – M.Sc. Food Technology (5th and 6th semester) under NEP-2020 w.e.f. academic session 2026-27 (batch 2024) being run in University Teaching Departments, under Section 11(5) of the University Act, 1995 in anticipation of approval of the Academic Council.

A copy of the scheme of examinations and syllabi of above said programme is enclosed herewith. You are therefore, requested to take further necessary action accordingly.

Yours faithfully

DA: As above

26/5/26
Assistant Registrar (Academic)
for Dean Academic Affairs

Endst. No. Acad./AC-III/BOS&R-1/2026/ 2879-82 Dated: 26/5/26

A copy of the above is forwarded to the following for information and necessary action:-

1. Dean, Faculty of Engineering & Technology, GJUST, Hisar.
2. Chairperson, Department of Food Technology, GJUST, Hisar. She is requested to get upload the scheme of examinations and syllabi of above said programme being run in University Teaching Departments on the website of the University on the priority basis.
3. OSD to Vice-Chancellor (for kind information of the Vice-Chancellor), GJUST, Hisar.
4. P.A. to Registrar (for kind information of the Registrar), GJUST, Hisar.

26/5/26
Assistant Registrar (Academic)

Scheme of Examination for Under Graduate Programme

5th and 6th Semester

Integrated B.Sc. (Hons./Hons. with Research) -MSc in Food Technology (Semester System)

As Per NEP, 2020

(Multiple Entry-Exit, Internship and Choice Based Credit System)

To be implemented w.e.f. Academic Session 2024-25

Department of Food Technology

Guru Jambheshwar University of Science and Technology, Hisar-125001

Haryana (A+ NAAC Accredited State Govt. University)

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

SEMESTER – V

Type of Course		Course Code	Nomenclature of Paper/Course	Credits	Contact Hours	L	T	P	Internal Marks	External Marks	Total Marks	Duration of Exam (Hr)
Discipline Specific Course	DSC-A11	24BFT0501T	Food Laws and Regulations	4	4	4	0	0	30	70	100	3 Hr.
	DSC-A12	24BFT0502T	Baking and Confectionary Technology	2	2	2	0	0	15	35	50	2 Hr.
		24BFT0502P	Baking and Confectionary Technology Lab	2	4	0	0	2	15	35	50	3 Hr.
Discipline Specific Course Elective	DSC-A13 (E)	24BFT0503T	Meat, Fish and Poultry Processing	4	4	4	0	0	30	70	100	3 Hr.
	DSC-A14 (E)	24BFT0504T	Technology of Snack Foods	4	4	4	0	0	30	70	100	3 Hr.
Vocational Course (VOC)	VOC-2	To be opted by the students from VOC pool		2	2	2	0	0	15	35	50	2 Hr.
				2	4	0	0	2	15	35	50	3 Hr.
	Internship*		Internship	4							100	
			Total Credits	20+4	24+120	16	0	4	150	350	500+100	

 # MIC, MDC & VAC Subjects offered by the parent department shall not be opted by the students of the same department

Chairperson
Department of Food Technology
Guru Jambheshwar University of Science & Technology, Hisar

SEMESTER -VI

Type of Course		Course Code	Nomenclature of Paper/Course	Credits	Contact Hours	L	T	P	Internal Marks	External Marks	Total Marks	Duration of Exam (Hr)
Discipline Specific Course	DSC-A15	24BFT0601T	Agribusiness Management	4	4	4	0	0	30	70	100	3 Hr.
	DSC-A16	24BFT0602T	Statistical Quality Control in Food Industry	4	4	4	0	0	30	70	100	3 Hr.
Discipline Specific Course (Elective)	DSC-A17(E)	24BFT0603T	By Product Utilization of Food Industries	2	2	2	0	0	15	35	50	2 Hr.
		24BFT0603P	By Product Utilization of Food Industries Lab	2	4	0	0	2	15	35	50	3 Hr.
	DSC-A18 (E)	24BFT0604T	Bioprocess Technology	3	3	3	0	0	20	50	70	2.5 Hr.
		24BFT0604P	Bioprocess Technology Lab	1	2	0	0	1	10	20	30	3 Hr.
Vocational Course (VOC)	VOC-3	To be opted by the students from VOC pool		2	2	2	0	0	15	35	50	2 Hr.
				2	4	0	0	2	15	35	50	3 Hr.
Skill Enhancement Course (SEC)	SEC-4	To be opted by the students from SEC pool		2	4	0	0	2	15	35	50	3 Hr.
			Total Credits	22	29	15		7	165	385	550	

Note: # Four credits of internship, earned by a student during summer internship after 2nd semester or 4th semester, will be taken into account in 5th semester of a student who pursue 3 years UG Programme without taking exit.

MIC, MDC & VAC Subjects offered by the parent department shall not be opted by the students of the same department

Exit Option: Semester V&VI : Bachelor in Food Technology with 136 credits

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

Department of Food Technology
Courses offered for the Pools of UTD (MIC, VOC, MDC, SEC, VAC)

SEMESTER – V

Type of Course		Course Code	Nomenclature of Paper/Course	Credits	Contact Hours	L	T	P	Internal Marks	External Marks	Total Marks	Duration of Exam (Hr)
Vocational Course (VOC)	VOC-2	24VOC0524T	Baking and Confectionary Technology	2	2	2	0	0	15	35	50	2 Hr.
		24VOC0524P	Baking and Confectionary Technology Lab	2	4	0	0	2	15	35	50	3 Hr.

SEMESTER – VI

Type of Course		Course Code	Nomenclature of Paper/Course	Credits	Contact Hours	L	T	P	Internal Marks	External Marks	Total Marks	Duration of Exam (Hr)
Vocational Course (VOC)	VOC-3	24VOC0624T	By Product Utilization of Food Industries	2	2	2	0	0	15	35	50	2 Hr.
		24VOC0624P	By Product Utilization of Food Industries Lab	2	4	0	0	2	15	35	50	3 Hr.
Skill Enhancement Course (SEC)	SEC-4	24SEC0616P	New Product Development and Sensory Evaluation	2	4	0	0	2	15	35	50	3 Hr.

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

Scheme of Examination for Under Graduate Programme

Integrated B.Sc. (Hons./Hons. with Research) -M.Sc.

in

Food Technology

(Semester System)

3rd Year (Semester –V & VI) as per NEP, 2020

(Multiple Entry-Exit, Internship and Choice Based Credit System)

Under Scheme 'C' for UTD

Subject: Food Technology

to be implemented w.e.f. Academic Session 2024-25

Department of Food Technology

Guru Jambheshwar University of Science and Technology, Hisar-125001

Haryana (A+ NAAC Accredited State Govt. University)

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

SEMESTER V Food Technology **Course Type: Discipline Specific course (DSC-A11)** **Course Code: 24BFT0501T** **Course Title: Food Laws and Regulations** **Category: Theory** **Mode: Lectures (L)** **Hours per week:4** **Credits: 4** **Examination Duration: 3 Hours**	**Course Assessment Methods:** ***Note for Paper Setters:*** **Max. Marks: 100 (Internal: 30; External: 70)** Two mid-term exams each of 15 marks will be conducted for the internal assessment and marks of the best one will be considered. Weightage for assignment and class participation will be 10 and 05 marks, respectively. ***Note:*** The end semester examination will be of 70 marks. The examiner is required to set nine questions in all. The first question will be compulsory consisting of seven short questions covering the entire syllabus consisting of 2 marks each. In addition to that eight more questions will be set, two questions from each unit. The students shall be required to attempt five questions in all selecting one question from each unit in addition to compulsory Question No. 01. All question shall carry equal marks i.e. 14 marks.

RBT Level	Course Outcomes: After the completion of the course, the students will be able to:	
L1	CO1	Remember the concepts of all laws and related to food quality and safety
L2	CO2	Describe the role of the various agencies with regulatory roles regarding food such as FSSAI, Codex and USFDA
L3	CO3	Apply key principles of food laws to the food industry
L4	CO4	Assess the critical role laws and regulation play in protecting food safety and in fostering a healthy food industry

Unit-I

Introduction to Food Laws and Regulations: need for food standards and their enforcement, various types of laws (mandatory/regulatory and voluntary/optional); Food Safety and Standards Authority of India (FSSAI); Food Safety and Standards Act, 2006 (FSSA) - inception, importance and significance, discussion on important sections; FSS Regulations: Regulations on Licensing and Registration, Regulations on Food Recall Procedure, FSS Regulations on Laboratory and sampling analysis

Unit-II

Food Acts and Laws: Prevention of Food Adulteration Act, 1954, Essential Commodities Act, 1955, The Insecticides Act, 1968, Consumer Protection Act, 1986. Introduction to various food laws (Voluntary) - Agmark Standards (AGMARK), BIS Standards and Specifications.

Unit -III

Codex Alimentarius Commission (CAC): Structure of Codex, Scientific Basis, Harmonization of National Standard with Codex, WTO Implications: SPS and TBT agreement, other International standard setting bodies: ISO, OIE, IPPC, AOAC, ASTM, EU and USFDA

Unit-IV

Export and Import Laws and Regulations: Foreign Trade Policy, export (Quality Control and Inspection) Act, 1963, promotion bodies, plant and animal quarantine, Customs Act and Import Control Regulations

Recommended Readings:

- Singh, S. P. (2009). Food Safety, Quality Assurance and Global Trade: Concerns and Strategies: International Book Distributing Co. Lucknow.
- Food Safety and Standards Act 2006 and Regulations 2011.
- https://www.fssai.gov.in/home and Custom Act
- Codex e-Learning Centre (http://www.fao.org/ag/agn/agns/capacity_elearning_codex_ en.asp)

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

SEMESTER V Food Technology **Course Type: Discipline Specific Course (DSC-A12)** **Course Code: 24BFT0502T** **Course Title: Baking and Confectionary Technology** **Category: Theory** **Mode: Lectures (L)** **Hours/week: 2** **Credits: 2** **Examination Duration: 2 Hours**	**Course Assessment Methods:** **Max. Marks: 50 (Internal: 15; External: 35)** ***Note for Paper Setters:*** Two mid-term exams each of 10 marks will be conducted for the internal assessment and marks of the best one will be considered. Weightage for class participation will be 05 marks. *Note:* The end semester examination will be of 35 marks. The examiner is required to set five questions in all. The first question will be compulsory consisting of five short question covering the entire syllabus consisting of 3 marks each. In addition to that four more questions will be set with two questions from each unit. The students shall be required to attempt three questions in all selecting one question from each unit consisting of 10 marks each in addition to compulsory Question No. 1 consisting of 15 marks.

RBT Level	**Course Outcomes:** After the completion of the course, the students will be able to:	
L1	CO1	Describe various raw materials used for preparation of bakery and confectionary products
L3	CO2	Examine functionalities of different ingredients used in bakery and confectionary industry
L5	CO3	Assess different processes used in product preparation and product quality
L6	CO4	Develop new bakery and confectionary products

UNIT-I

Status of bakery and confectionery industries in India; raw materials for bakery and confectionery products- essential and optional ingredients; functionality of bakery ingredients; rheological characteristics of flour, technology of bread, biscuit and cake preparation and their quality evaluation.

UNIT-II

Confectionery- raw materials, types, process and machinery; types of candies: boiled sweets, hard candy, brittle; chocolates: manufacturing process, quality consideration and parameters; manufacturing process of toffees, caramels, lozenges, chewing gum, bars; sugar free confectionary.

Recommended Readings:

- Khatkar B. S. (2011) Baking Science and Technology, Arihant Publication.
- Dubey S. C. (2002) Basic Baking, The Society of Indian Bakers.
- Edwards W.P. (2007) The Science of bakery products, RSC Publications.
- Mohos F. (2010) Confectionery & chocolate engineering, principles & applicatlons, Wiley Blackwell Publishing Ltd.

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

SEMESTER V Food Technology **Course Type: Discipline Specific Course (DSC-A12)** **Course Code: 24BFT0502P** **Course Title: Baking and Confectionary Technology Lab** **Category: Practical** **Mode: Lab Practical and Assignments** **Hours/week: 4** **Credits: 2** **Examination Duration: 3 Hours**	**Course Assessment Methods:** ***Note for Paper Setters:*** **Max. Marks: 50 (Internal: 15; External: 35)** The internal assessment will be based on assignment/quiz/class test etc. and class participation of 10 marks and 05 Marks, respectively. External evaluation will be based on submission of practical records (05 Marks), viva-voce (10 Marks) and written exam with lab performance (20 Marks). The internal examination will be conducted by the course coordinator. The external examination will be conducted by external examiner appointed by the Controller of Examinationin association with the internal examiner appointed by the Chairperson of the Department.

RBT Level	**Course Outcomes:** After the completion of the course, the students will be able to:	
L1	CO1	Organize raw materials and equipments as per the production schedule
L3	CO2	Demonstrate how to plan the production process
L5	CO3	Infer the calculation of raw material required for the desired quantity of different bakery products
L6	CO4	Create good quality innovative value-added bakery products

List of Practicals

- Familiarize about different equipments used in making bakery products.
- Determination of wet and dry gluten in wheat flour.
- Determination of dough raising capacity.
- Demonstrate the calculation of raw material required for the desired quantity of finished products.
- Handling and maintenance of mixers, proofer and ovens.
- Preparation and evaluation of bread, biscuit and cookies.
- Determination of effects of major and minor ingredients on bread quality.
- Preparation of bakery products using unconventional flours other than wheat.
- Preparation of gluten-free bread and cookies.
- Preparation of variety bakery products-Buns, Rusk, Rolls, Doughnuts, Pizza, Puff Pastry etc.
- Preparation of jaggery-based traditional food products.
- To prepare various types of candies.
- To prepare low-sugar or sugar-free confectionary.
- To develop chocolate-based confectionary food.
- To prepare protein-rich bars.
- To prepare confectionary food using natural sweeteners and colors.

Recommended books:

- FICSI, Practical Guide, Baking Technician/Operative
- Practical Manual, Diploma in Production of Value-Added products from .Cereals, Pulses' and Oilseeds, IGNOU
- Khatkar B. S. (2011) Baking Science and Technology, Arihant Publication.
- Amendola J. & Rees N. (2003) Understanding Baking: The Art and Science of Baking, Wiley

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

SEMESTER V Food Technology **Course Type: Discipline Specific course Elective DSC-A13 (E)** **Course Code: 24BFT0503T** **Course Title: Meat, Fish and Poultry Processing** **Category: Theory** **Mode: Lectures (L)** **Hours per week: 4** **Credits: 4** **Examination Duration: 3 Hours**	**Course Assessment Methods:** ***Note for Paper Setters:*** **Max. Marks: 100 (Internal: 30; External: 70)** Two mid-term exams each of 15 marks will be conducted for the internal assessment and marks of the best one will be considered. Weightage for assignment and class participation will be 10 and 05 marks, respectively. ***Note:*** The end semester examination will be of 70 marks. The examiner is required to set nine questions in all. The first question will be compulsory consisting of seven short questions covering the entire syllabus consisting of 2 marks each. In addition to that eight more questions will be set, two questions from each unit. The students shall be required to attempt five questions in all selecting one question from each unit in addition to compulsory Question No. 01. All question shall carry equal marks i.e. 14 marks.

RBT Level	Course Outcomes: After the completion of the course, the students will be able to:	
L1	CO1	Understand the basic concepts, terminology, status and scope of meat science
L2	CO2	Explain various preservation techniques of meat, poultry and fish
L3	CO3	Recognize and apply different meat preservation and processing techniques
L4	CO4	Prescribe suitable processing conditions and quality assessment meat, fish and poultry products

UNIT-I

Status and scope of meat and poultry industry in India, muscle- structure, chemical composition and physicochemical properties of meat muscle, conversion of muscle into meat. Slaughtering methods of animals and poultry, factors affecting post-mortem changes, properties and shelf life of meat. Meat quality attributes. meat tenderization - natural and artificial methods.

UNIT-II

Preservation of meat and poultry- chilling, freezing, curing, smoking, dehydration, freeze drying, irradiation, canning and glazing of fish. Ageing of meat. Processing of meat & poultry products– different cooking methods, comminuted, restructured meat products, sausages, meat emulsions, intermediate moisture meats, ready to eat (RTE) meat products.

UNIT-III

Egg: structure, composition and nutritive value, grading of eggs, storage, and preservation. Functional properties of eggs, factors affecting functional properties of Egg based products: egg powder, liquid egg products, value added egg products. Packaging of egg and egg products.

UNIT-IV

Fish processing: fresh fish handling, quality evaluation and storage. Fish products - fish meal, fish protein concentrate, fish liver oil, fish paste, fish sauce. Meat plant sanitation and waste disposal. Utilization of meat, fish and egg industry by-products: importance, food and non-food applications. Regulations associated with reference to meat, fish and poultry.

Recommended Readings:

- Varnam, A. H. & Sutherland, J. P. (1995). Meat and Meat Products: Technology, Chemistry and Microbiology: Champan & Hill, London.
- Lawrie, R. A. (1998). Lawrie's Meat Science (6th ed.): Woodhead, Cambridge.
- Kerry, J., Kerry, J. & Ledward, D. (2002). Meat Processing Improving Quality: CRC Press, USA.
- Hui, Y. H. (2010). Handbook of Poultry Science and Technology

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

SEMESTER –V Food Technology **Course Type: Discipline Specific course Elective DSC-A14 (E)** **Course Code: 24BFT0504T** **Course Title: Technology of Snack Foods** **Category: Theory** **Mode: Lectures (L)** **Hours per week: 4** **Credits: 4** **Examination Duration: 3 Hours**	**Course Assessment Methods:** ***Note for Paper Setters:*** **Max. Marks: 100 (Internal: 30; External: 70)** Two mid-term exams each of 15 marks will be conducted for the internal assessment and marks of the best one will be considered. Weightage for assignment and class participation will be 10 and 05 marks, respectively. ***Note:*** The end semester examination will be of 70 marks. The examiner is required to set nine questions in all. The first question will be compulsory consisting of seven short questions covering the entire syllabus consisting of 2 marks each. In addition to that eight more questions will be set, two questions from each unit. The students shall be required to attempt five questions in all selecting one question from each unit in addition to compulsory Question No. 01. All question shall carry equal marks i.e. 14 marks.

RBT Level	Course Outcomes: After the completion of the course, the students will be able to:	
L1	CO1	Describe and understand extrusion technology, frying, baking coating,
L2	CO2	Compare the various technological aspects of traditional and modern snack foods
L3	CO3	Operate and manage various equipments used in value addition in snack food areas
L4	CO4	Develop the economically and nutritionally crucial procedures to manufacture snack foods

UNIT-I

Snack foods: definitions, introduction, importance and classification. Working principle of extruder, types of extruder, factors affecting extrusion process. Pre-conditioning of raw materials. Post-extrusion processes. Packaging of extruded snack foods.

UNIT-II

Breakfast cereals: introduction, classification and importance of breakfast cereals. Technology of manufacturing: breakfast cereals and texturized vegetable protein (TVP). Direct expanded (DX) and third generation (3G) snacks.

UNIT-III

Technology for grain-based snacks. Technology of nuts-based snacks. Technology of fried snacks. Technology of sugar-based snacks. Junk foods concept.

UNIT-IV

Technology of manufacturing of premixes for snack foods. Equipments for manufacturing of various snack foods, working principle and functions.

Recommended Readings:

- Booth, R. G. (1997). Snack Food: CBS, New Delhi.
- Raymond, W. L. & Rooney, L. W. (2001). Snack Foods Processing: CRC. London.
- Lusas, E. W. & Rooney, L. W. (2015). Snack Foods Processing: CRC. London.
- Guy, R. (2001). Extrusion Cooking: Technologies and Applications: Woodhead, USA.
- Riaz, M. N. (2000). Extruders in Food Applications: Technomic, Lanchester.

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

SEMESTER V Food Technology **Course Type: Vocational Course (VOC-2)** **Course Code: 24VOC0524T** **Course Title: Baking and Confectionary Technology** **Category: Theory** **Mode: Lectures (L)** **Hours/week: 2** **Credits: 2** **Examination Duration: 2 Hours**	**Course Assessment Methods:** **Max. Marks: 50 (Internal: 15; External: 35)** ***Note for Paper Setters:*** Two mid-term exams each of 10 marks will be conducted for the internal assessment and marks of the best one will be considered. Weightage for class participation will be 05 marks. ***Note:*** The end semester examination will be of 35 marks. The examiner is required to set five questions in all. The first question will be compulsory consisting of five short question covering the entire syllabus consisting of 3 marks each. In addition to that four more questions will be set with two questions from each unit. The students shall be required to attempt three questions in all selecting one question from each unit consisting of 10 marks each in addition to compulsory Question No. 1 consisting of 15 marks.

RBT Level	**Course Outcomes:** After the completion of the course, the students will be able to:	
L1	CO1	Describe various raw materials used for preparation of bakery and confectionary products
L3	CO2	Examine functionalities of different ingredients used in bakery and confectionary industry
L5	CO3	Assess different processes used in product preparation and product quality
L6	CO4	Develop new bakery and confectionary products

UNIT-I

Status of bakery and confectionery industries in India; raw materials for bakery and confectionery products- essential and optional ingredients; Functionality of bakery ingredients; rheological characteristics of flour, technology of bread, biscuit and cake preparation and their quality evaluation.

UNIT-II

Confectionery- raw materials, types, process and machinery; types of candies: boiled sweets, hard candy, brittle; chocolates: manufacturing process, quality consideration and parameters; manufacturing process of toffees, caramels, lozenges, chewing gum, bars; sugar free confectionary.

Recommended Readings:

- Khatkar B. S. (2011) Baking Science and Technology, Arihant Publication.
- Dubey S. C. (2002) Basic Baking, The Society of Indian Bakers.
- Edwards W.P. (2007) The Science of bakery products, RSC Publications.
- Mohos F. (2010) Confectionery & chocolate engineering, principles & applications, Wiley Blackwell Publishing Ltd.

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

SEMESTER V Food Technology **Course Type: Vocational Course (VOC-2)** **Course Code: 24VOC0524P** **Course Title: Baking and Confectionary Technology Lab** **Category: Practical** **Mode: Lab Practical and Assignments** **Hours/week: 4** **Credits: 2** **Examination Duration: 3 Hours**	**Course Assessment Methods:** ***Note for Paper Setters:*** **Max. Marks: 50 (Internal: 15; External: 35)** The internal assessment will be based on assignment/quiz/class test etc. and class participation of 10 marks and 05 Marks respectively. External evaluation will be based on submission of practical records (05 Marks), viva-voce (10 Marks) and written exam with lab performance (20 Marks). The internal examination will be conducted by the course coordinator. The external examination will be conducted by external examiner appointed by the Controller of Examinationin association with the internal examiner appointed by the Chairperson of the Department.

RBT Level	**Course Outcomes:** After the completion of the course, the students will be able to:	
L1	CO1	Organize raw materials and equipments as per the production schedule
L3	CO2	Demonstrate how to plan the production process
L5	CO3	Infer the calculation of raw material required for the desired quantity of different bakery products
L6	CO4	Create good quality innovative value-added bakery products

List of Practicals

- Familiarize about different equipments used in making bakery products
- Determination of wet and dry gluten in wheat flour
- Determination of dough raising capacity
- Demonstrate the calculation of raw material required for the desired quantity of finished products
- Handling and maintenance of mixers, proofer and ovens
- Preparation and evaluation of bread, biscuit and cookies
- Determination of effects of major and minor ingredients on bread quality
- Preparation of bakery products using unconventional flours other than wheat
- Preparation of gluten-free bread and cookies
- Preparation of variety bakery products-Buns, Rusk, Rolls, Doughnuts, Pizza, Puff Pastry etc.
- Preparation of jaggery-based traditional food products
- To prepare various types of candies
- To prepare low-sugar or sugar-free confectionary
- To develop chocolate-based confectionary food
- To prepare protein-rich bars
- To prepare confectionary food using natural sweeteners and colors

Recommended books:

- FICSI, Practical Guide, Baking Technician/Operative.
- Practical Manual, Diploma in Production of Value Added roducts from .Cereals, Pulses' and Oilseeds, IGNOU.
- Khatkar B. S. (2011) Baking Science and Technology, Arihant Publication.
- AmendolaJ. & Rees N. (2003) Understanding Baking: The Art and Science of Baking, Wiley

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

SEMESTER –VI Food Technology **Course Type: Discipline Specific course (DSC-A15)** **Course Code: 24BFT0601T** **Course Title: Agribusiness Management** **Category: Theory** **Mode: Lectures (L)** **Hours per week:4** **Credits: 4** **Examination Duration: 3 Hours**	**Course Assessment Methods:** ***Note for Paper Setters:*** **Max. Marks: 100 (Internal: 30; External: 70)** Two mid-term exams each of 15 marks will be conducted for the internal assessment and marks of the best one will be considered. Weightage for assignment and class participation will be 10 and 05 marks, respectively. *Note:* The end semester examination will be of 70 marks. The examiner is required to set nine questions in all. The first question will be compulsory consisting of seven short questions covering the entire syllabus consisting of 2 marks each. In addition to that eight more questions will be set, two questions from each unit. The students shall be required to attempt five questions in all selecting one question from each unit In addition to compulsory Question No. 01. All question shall carry equal marks i.e. 14 marks.

RBT Level	Course Outcomes: After the completion of the course, the students will be able to:	
L1	CO1	Understand the basic knowledge of Agri-business management, marketing, new product development
L2	CO2	Describe all policies and responsibilities related to food business management
L3	CO3	Demonstrate EDPs and surveys with respect to current and future perspective
L4	CO4	Examine the role of various type of management in agri business

UNIT-I

Introduction to agribusiness management: objectives, importance with respect to Indian economy and globalization. Management of agri-business, Agricultural and food policy, rural management. New product development and value analysis.

UNIT-II

Entrepreneurship development programs (EDP). Entrepreneur: characteristics classification and functions. Government schemes, policies and incentives for promotion ofentrepreneurship. SWOT analysis. Elementary knowledge of sales tax, excise rules, factory act and payment of wages act. Financing and risk management in agri-business

UNIT-III

Agricultural marketing: nature and scope, attributes and responsibility of manager. Market research. Marketing strategy: meaning, significance and formulation. Different types of management in agri-business: production, retail and supply chain and inventory management (introduction, need, attributes and function).

UNIT-IV

World trade agreements related with agribusiness. Govt. institutions related to international trade; APEDA and MOFPI. Consumer behaviour towards food consumption, consumer surveys by various institutes and agencies. Export and Import prospects of food products in India.

Recommended Readings:

- Greg, A.B., Orlen, G. and Gorman, D. (2002). Introduction to Food and AgribusinessManagement: Prentice Hall of India, New Delhi.
- Khanks, S.S. (1999). Entrepreneurial Development. S. Chand and Company, New Delhi.
- Acharya, S.S. and Aggarwal, N. L. (1987). Agricultural Marketing in India. Oxford &ISH Publishing CO., New Delhi.
- Edward, W.C. (1993). Marketing in the International Environment. Prentice Hall of India,New Delhi.
- Kotler, P. (1994). Marketing Management. Prentice Hall of India, New Delhi.

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

SEMESTER VI Food Technology **Course Type: Discipline Specific Course (DSC-A16)** **Course Code: 24BFT0602T** **Course Title: Statistical Quality Control in Food Industry** **Category: Theory** **Hours/week: 4** **Credits: 4** **Examination Duration: 3 Hours**	**Course Assessment Methods:** ***Note for Paper Setters:*** **Max. Marks: 100 (Internal: 30; External: 70)** Two mid-term exams each of 15 marks will be conducted for the internal assessment and marks of the best one will be considered. Weightage for assignment and class participation will be 10 and 05 marks, respectively. *Note:* The end semester examination will be of 70 marks. The examiner is required to set nine questions in all. The first question will be compulsory consisting of seven short questions covering the entire syllabus consisting of 2 marks each. In addition to that eight more questions will be set, two questions from each unit. The students shall be required to attempt five questions in all selecting one question from each unit in addition to compulsory Question No. 01. All question shall carry equal marks i.e. 14 marks.

RBT Level	**Course Outcomes:** After the completion of the course, the students will be able to:	
L1	CO1	Define basic concepts related to application of statistical methods
L3	CO2	Describe qualitative and quantitative statistical techniques
L5	CO3	Solve the problems regarding descriptive and inferential statistics in the domain of food
L6	CO4	Apply statistical techniques for data exploration, visualization and analysis
L3	CO5	Design of experiments to solve problems related to food processing

UNIT-I

Statistical terms and notations, frequency distribution, frequency curve, measures of central tendency and dispersion, Binomial and poission distribution; Introduction to sampling.

UNIT-II

Statistical Methods: normal distribution, test of significance, null hypothesis, types of error, level of significance and degree of freedom, steps involved in testing of hypothesis, z-test, test for testing sample mean and difference between two means, paired t- test, chi-square test for testing goodness of fit, F-test.

UNIT-III

Statistical quality control: Introduction, advantages and limitations; techniques of statistical quality control, control charts for variations, X and R chart, control chart for attribution, c chart, p chart, np chart; consumer risk, producer risk; acceptance quality level (AQL); lot tolerance percentage quality level (LTPD), process average fraction defective.

UNIT-IV

Operative characteristic curve, simple and double sampling plans for prepackaged foods. Correlation and regression, analysis of variance (ANOVA), applications of excel; computer aided statistical tools designs.

Recommended Readings:

- Nath, Pran. (1984) Statistics and Reliability for Engineering", Tara Printing works Varanasi.
- Hubbard M. R. (2005) Statistical quality control for food industry, Springer Publishers.
- Hald A. (1984) Statistical theory with Engineering applications. John and Sons. Inc.
- Savage. Leonard, (1954). Foundation of Statistics. John Willey & Sons. Inc.
- Gupta S. C. & Kapoor V. K. (2023) Fundamentals of Applied Statistics.
- Sharma J. K. (2005) Business Statistics.

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

SEMESTER VI Food Technology **Course Type: Discipline Specific Course Elective DSC-A17(E)** **Course Code: 24BFT0603T** **Course Title: By Product Utilization of Food Industries** **Category: Theory** **Mode: Lectures (L)** **Hours per week:2** **Credits: 2** **Examination Duration: 2 Hours**	**Course Assessment Methods:** **Max. Marks: 50 (Internal: 15; External: 35)** ***Note for Paper Setters:*** Two mid-term exams each of 10 marks will be conducted for the internal assessment and marks of the best one will be considered. Weightage for class participation will be 05 marks. *Note:* The end semester examination will be of 35 marks. The examiner is required to set five questions in all. The first question will be compulsory consisting of five short question covering the entire syllabus consisting of 3 marks each. In addition to that four more questions will be set with two questions from each unit. The students shall be required to attempt three questions in all selecting one question from each unit consisting of 10 marks each in addition to compulsory Question No. 1 consisting of 15 marks

RBT Level	Course Outcomes: After the completion of the course, the students will be able to:	
L1	CO1	Identify various waste from food industries and understand their characteristics
L2	CO2	Understand various methods of waste treatment and disposal
L3	CO3	Understand various by products from food industry waste
L4	CO4	Design and develop a functional ETP plant to suit requirement

UNIT-I

Waste generation in food processing industries; concept, scope, health and environmental concern in waste management and effluent treatment; Physicochemical quality of wastewater from different food processing industries- temperature, pH, dissolved oxygen, biological oxygen demand, chemical oxygen demand; grease content, metal content, forms of phosphorus and sulphur in waste waters and other ingredients like insecticide, herbicides and fungicides residues.

UNIT-II

Physicochemical unit operations- screening, grit chamber, equalization, sedimentation, floatation, coagulation, flocculation, filtration, disinfection; adsorption and ion exchange; aeration and gas transfer; Membrane separation processes. Secondary treatment: aerobic and anaerobic biological treatment processes, biological treatment. Tertiary treatments: advanced wastewater treatment process, environmental protection act and specifications for effluent of different food industries, treatment, reuse and disposal of solids and biosolids.

Recommended books:

- Metcalf & Eddy (2013) Wastewater Engineering treatment and Resource recovery, 5th edition, McGraw Hill.
- Marriott N. G. (2006) Principles of Food Sanitation, 5th edition, CBS Publication.
- Lawrence K. W., Howard H. Y. & Yapijakis C. (2005) Waste Treatment in the Food Processing Industry, CRC Press.
- Wang & Lo H. (2006) Waste treatment in the food processing industry, CRC Press, Taylor & Francis Group.
- Loannis & Arvanitoyannis S. (2008) Waste management for the food industries, Elsevier publishers.

Chairperson
Department of Food Technology
Guru Jambheshwar University of Science & Technology, Hisar

SEMESTER VI Food Technology **Course Type: Discipline Specific** **Course Elective DSC-A17 (E)** **Course Code: 24BFT0603P** **Course Title: By Product Utilization of Food Industries Lab** **Category: Practical** **Mode: Lab Practical and Assignments** **Hours per week:4** **Credits: 2** **Examination Duration: 3 Hours**	**Course Assessment Methods:** ***Note for Paper Setters:*** **Max. Marks: 50 (Internal: 15; External: 35)** The internal assessment will be based on assignment/quiz/class test etc. and class participation of 10 marks and 05 Marks respectively. External evaluation will be based on submission of practical records (05 Marks), viva-voce (10 Marks) and written exam with lab performance (20 Marks). The internal examination will be conducted by the course coordinator. The external examination will be conducted by external examiner appointed by the Controller of Examination in association with the internal examiner appointed bythe Chairperson of the Department.

RBT Level	Course Outcomes: After the completion of the course, the students will be able to:	
L1	CO1	Estimate different physical and chemical characteristics in food waste
L2	CO2	Examine food waste and its utilisation
L3	CO3	Identify various methods employed for the treatment of industrial wastes
L4	CO4	Compare different waste produced in the industries

List of Practicals:

- Demonstration of different water sewage system
- Water and effluent treatment plant in various industries
- Determination of pH of different samples by pH meter. (Electrometric Method)
- Determination of total solids in waste sample
- Determination of total dissolved solids in waste water sample by Gravimetric Method
- Determination of total suspended solids in waste water sample
- Determination of fixed & volatile solids in waste water sample
- Determination of total organic matter in a given waste water
- To evaluate effectiveness of coagulants & flocculants for water treatment using jar test method
- Determination of BOD of waste water sample
- Determination of COD of waste water sample

Recommended books:

- Metcalf & Eddy (2013) Wastewater Engineering treatment and Resource recovery, 5th edition, McGraw Hill.
- Marriott N. G. (2006) Principles of Food Sanitation, 5th edition, CBS Publication.
- Lawrence K. W., Howard H. Y. &Yapijakis C. (2005) Waste Treatment in the Food Processing Industry, CRC Press.
- Wang & Lo H. (2006) Waste treatment in the food processing industry, CRC Press, Taylor & Francis Group.

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

SEMESTER VI Food Technology **Course Type: Discipline Specific course (DSC) DSC-A18 (E)** **Course Code: 24BFT0604T** **Course Title: Bioprocess Technology** **Category: Theory** **Mode: Lectures (L)** **Hours per week: 3** **Credits: 3** **Examination Duration: 2.5 Hours**	**Course Assessment Methods:** ***Note for Paper Setters:*** **Max. Marks: 70 (Internal: 20; External: 50)** Two mid-term exams each of 10 marks will be conducted for the internal assessment and marks of the best one will be considered. Weightage for assignment and attendance will be 05 marks each. *Note:* The end semester examination will be of 50 marks. The examiner is required to set seven questions in all. The first question will be compulsory consisting of consisting of five short questions covering the entire syllabus consisting of 2.5 marks each. In addition to that six more questions will be set, two questions from each unit. The students shall be required to attempt four questions in all selecting one question from each unit in addition to compulsory Question No. 01. All question shall carry equal marks i.e. 12.5 marks.

RBT Level	**Course Outcomes: After the completion of the course, the students will be able to:**	
L1	CO1	Understand the basic concepts, terminologies, stages, their functional role related to bioprocess technology
L2	CO2	Evaluate and describe the different processes involved in up streaming, fermentation and downstream processing
L3	CO3	Apply different techniques to produce primary and secondary metabolites of commercial value using bioprocess techniques
L4	CO4	Design the fermenter, fermentation process and select appropriate purification to achieve bioprocess industries requirements

UNIT-I

Introduction to bioprocess technology: definition, its stages, importance and applications. Upstream processing: biology of industrial micro-organisms- isolation, screening and genetic improvement of industrially important micro-organisms.

UNIT-II

Fermentation: ancient art and modern concept. Fermentation systems: batch and continuous systems, fed-batch culture, solid substrate and submerged fermentation. Fermentation raw materials- types, functional role and criteria used in media formulation. Fermenter design- diagram, parts and their functionality. Instrumentation and control.

UNIT-III

Downstream Processing: objectives, steps, different processes. Microbial production of various primary and secondary metabolites- alcohol, amino-acids, organic acids (citric acid and acetic acid), antibiotics (penicillin), SCP, wine, beer. Waste management in bioprocess industries.

Recommended books:

- Kalaichelva P. T., and Pandi I. A., (2021) Bioprocess Technology 1st edition, MJP Publication, Chennai.
- Modi H. A. (2010) Bioprocess Technology 1st edition, Pointer Publisher, Jaipur.
- Anton Moser (1988) Bioprocess Technology Kinetics and Reactors, 1st edition, Springer New York, NY.
- Michael L. Silver and Fikret Kargi (2015) Bioprocess Engineering Basic Concept, 2nd edition, Pearson Education India, UP.

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

SEMESTER VI Food Technology **Course Type: Discipline Specific course (DSC)** **DSC-A18 (E)** **Course Code: 24BFT0604P** **Course Title: Bioprocess Technology Lab** **Category: Practical** **Mode: Lab Practical and Assignments** **Hours per week: 2** **Credit: 1** **Examination Duration: 3 Hours**	**Course Assessment Methods:** ***Note for Paper Setters:*** **Max. Marks: 30 (Internal: 10; External: 20)** The internal assessment will be based on assignment/quiz/class test etc. and class participation of 05 Marks each. External evaluation will be based on submission of practical records (05 Marks), viva-voce (05 Marks) and lab performance (10 Marks). The internal examination will be conducted by the course coordinator. The external examination will be conducted by external examiner appointed by the Controller of Examination in association with the internal examiner appointed by the Chairperson of the Department.

RBT Level	Course Outcomes: After the completion of the course, the students will be able to:	
L1	CO1	Understand the different types of fermenters and its design
L2	CO2	Evaluate and describe the different methods for isolation and screening of industrially important microorganism
L3	CO3	Select and design the best conditions to derive high yield and best quality product employing bioprocess technologies
L4	CO4	Apply different techniques to produce primary and secondary metabolites of commercial value using bioprocess techniques

List of Experiments:

- To study and demonstrate different types of fermenters
- To study the design, construction and control systems of a bioreactor
- To estimate the glucose concentration in fermentation medium using DNS method
- To study bacterial growth curve
- To carry out of composting of kitchen waste in different conditions
- To prepare and evaluate the fruit wine with varying processing conditions
- To carry out solid substrate fermenter (mushroom cultivation)
- To isolate the lactic acid bacteria from curd sample
- To carry out screening process using streak plate method
- To carry out isolation and preservation of pure culture
- To perform pectinase production using *Aspergillus niger*
- To go for industrial visit

Recommended books

- https://webstor.srmist.edu.in/web_assets/downloads/2021/18BTC107J-lab-manual.pdf
- https://www.avit.ac.in/lab/immunology_bioprocess_engineering_lab/download/17BTCC91/lab_manual.pdf
- https://www.scribd.com/document/100233933/Bioprocess-Engg-Practical-Manual
- https://mis.alagappauniversity.ac.in/siteAdmin/dde-admin/uploads/4/PG_M.Sc._Microbiology_364%2041_Bioprocess%20Technology-English_9699.pdf

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

SEMESTER VI Food Technology **Course Type: Vocational Course (VOC-3)** **Course Code: 24VOC0624T** **Course Title: By Product Utilization of Food Industries** **Category: Theory** **Mode: Lectures (L)** **Hours per week: 2** **Credits: 2** **Examination Duration: 2 Hours**	**Course Assessment Methods:** **Max. Marks: 50 (Internal: 15; External: 35)** ***Note for Paper Setters:*** Two mid-term exams each of 10 marks will be conducted for the internal assessment and marks of the best one will be considered. Weightage for class participation will be 05 marks. ***Note:*** The end semester examination will be of 35 marks. The examiner is required to set five questions in all. The first question will be compulsory consisting of five short question covering the entire syllabus consisting of 3 marks each. In addition to that four more questions will be set with two questions from each unit. The students shall be required to attempt three questions in all selecting one question from each unit consisting of 10 marks each in addition to compulsory Question No. 1 consisting of 15 marks.

RBT Level	Course Outcomes: After the completion of the course, the students will be able to:	
L1	CO1	Identify various waste from food industries and understand their characteristics
L2	CO2	Understand various methods of waste treatment and disposal
L3	CO3	Understand various by products from food industry waste
L4	CO4	Design and develop a functional ETP plant to suit requirement

UNIT-I

Waste generation in food processing industries; concept, scope, health and environmental concern in waste management and effluent treatment; Physicochemical quality of wastewater from different food processing industries- temperature, pH, dissolved oxygen, biological oxygen demand, chemical oxygen demand; grease content, metal content, forms of phosphorus and sulphur in waste waters and other ingredients like insecticide, herbicides and fungicides residues.

UNIT-II

Physicochemical unit operations- screening, grit chamber, equalization, sedimentation, floatation, coagulation, flocculation, filtration, disinfection; Adsorption and ion exchange; Aeration and gas transfer; membrane separation processes. Secondary treatment: aerobic and anaerobic biological treatment processes, biological treatment. Tertiary treatments: advanced wastewater treatment process, environmental protection act and specifications for effluent of different food industries, treatment, reuse and disposal of solids and biosolids.

Recommended books:

- Metcalf & Eddy (2013) Wastewater Engineering treatment and Resource recovery, 5th edition, McGraw Hill.
- Marriott N. G. (2006) Principles of Food Sanitation, 5th edition, CBS Publication.
- Lawrence K. W., Howard H. Y. &Yapijakis C. (2005) Waste Treatment in the Food Processing Industry, CRC Press.
- Wang & Lo H. (2006) Waste treatment in the food processing industry, CRC Press, Taylor & Francis Group.
- Loannis & Arvanitoyannis S. (2008) Waste management for the food industries, Elsevier publishers.

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

SEMESTER VI Food Technology **Course Type: Vocational Course (VOC-3)** **Course Code: 24VOC0624P** **Course Title: By Product Utilization of Food Industries Lab** **Category: Practical** **Mode: Lab Practical and Assignments** **Hours per week: 4** **Credits: 2** **Examination Duration: 3 Hours**	**Course Assessment Methods:** *Note for Paper Setters:* **Max. Marks: 50 (Internal: 15; External: 35)** The internal assessment will be based on assignment/quiz/class test etc. and class participation of 10 marks and 05 Marks respectively. External evaluation will be based on submission of practical records (05 Marks), viva-voce (10 Marks) and written exam with lab performance (20 Marks). The internal examination will be conducted by the course coordinator. The external examination will be conducted by external examiner appointed by the Controller of Examination in association with the internal examiner appointed by the Chairperson of the Department.

RBT Level	Course Outcomes: After the completion of the course, the students will be able to:	
L1	CO1	Estimate different physical and chemical characteristics in food waste
L2	CO2	Examine food waste and its utilisation
L3	CO3	Identify various methods employed for the treatment of industrial wastes
L4	CO4	Compare different waste produced in the industries

List of Practicals:

- Demonstration of different water sewage system
- water and effluent treatment plant in various industries
- Determination of pH of different samples by pH meter. (Electrometric Method)
- Determination of total solids in waste sample
- Determination of total dissolved solids in waste water sample by Gravimetric Method .
- Determination of total suspended solids in waste water sample
- Determination of fixed & volatile solids in waste water sample
- Determination of total organic matter in a given waste water
- To evaluate effectiveness of coagulants & flocculants foe water treatment using jar test method
- Determination of BOD of waste water sample
- Determination of COD of waste water sample

Recommended books:

- Metcalf & Eddy (2013) Wastewater Engineering treatment and Resource recovery, 5th edition, McGraw Hill.
- Marriott N. G. (2006) Principles of Food Sanitation, 5th edition, CBS Publication.
- Lawrence K. W., Howard H. Y. &Yapijakis C. (2005) Waste Treatment in the Food Processing Industry, CRC Press.
- Wang & Lo H. (2006) Waste treatment in the food processing industry, CRC Press, Taylor & Francis Group.

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar

SEMESTER VI Food Technology **Course Type: Skill Enhancement Course (SEC-4)** **Course Code: 24SEC0616P** **Course Title: New Product Development and Sensory Evaluation** **Category: Practical** **Mode: Lab Practical and Assignments** **Hours per week: 4** **Credits: 2** **Examination Duration: 3 Hours**	**Course Assessment Methods:** **Max. Marks: 50 (Internal: 15; External: 35)** *Note for Paper Setters:* The internal assessment will be based on assignment/quiz/class test etc. and class participation of 10 marks and 05 Marks respectively. External evaluation will be based on submission of practical records (05 Marks), viva-voce (10 Marks) and written exam with lab performance (20 Marks). The internal examination will be conducted by the course coordinator. The external examination will be conducted by external examiner appointed by the Controller of Examination in association with the internal examiner appointed by the Chairperson of the Department.

RBT Level	Course Outcomes: After the completion of the course, the students will be able to:	
L1	CO1	Explain how to plan a new product development
L2	CO2	Demonstrate the importance and significance of sensory evaluation
L3	CO3	Infer the need of continuous improvement
L4	CO4	Formulate regulatory requirements, design effective packaging, and create strategic marketing plans for successful product launches

List of Practicals

- To conduct market surveys for identifying knowledge, behaviour and needs of consumers
- To develop new food product targeting children
- To develop plant-based meat alternative
- To prepare probiotic food
- To develop new foods focusing diabetic population
- Development of gluten-free food products
- To prepare low-fat and low-sugar food product
- To develop food product for an altered physiological need
- To develop protein-rich food product
- To perform descriptive tests using scaling and profiling methods
- To perform various affective tests of sensory analysis
- To perform sensory analysis of food using hedonic scale and food action scale rating
- To assess the sensory characteristics of developed food using trained, semi-trained and un-trained panels
- To check developed product for compliance with relevant food safety, health, and labeling regulations

Recommended books:

- Saguy, I. S., & Graf, E. (1990). Food product development: from concept to the marketplace. Springer Science & Business Media.
- Fuller, G. W. (2016). New food product development: from concept to marketplace. CRC Press.
- Sensory Evaluation Guide for Testing of Food and Beverage Products (November 1981). By Sensory Evaluation Division, Institute of Food Technologists; Food Technology; 50-59.
- IS 8140 – 1976 (Reaffirmed 2002): Guide for Selection of Panel for Sensory Evaluation of Foods and Beverages.

Chairperson
Department of Food Technology
Guru Jambheshwar University of
Science & Technology, Hisar