Department of Food Technology

Scheme & Syllabi

for

Certificate/ Diploma Course

through

Open and Distance Learning

in

Food Quality Assurance

Under Credit Based System

(w. e. f. session 2023-24)

Guru Jambheshwar University

of

Science and Technology

Hisar Haryana-125001

(2023)

Distance Mode Course

Certificate in Food Quality Assurance/ Diploma in Food Quality Assurance

Scheme and Syllabus **Total Credits: 40**

First Semester:

Course Code	Course Nomenclature	Total Credits	Marks Distribution	
			Internal	External
IFQA01	Food Fundamentals	4	30	70
IFQA02	Introduction to Food Microbiology	4	30	70
IFQA03	Food Safety and Quality Assurance	4	30	70
IFQA04	Food Laws, Standards and Regulations	4	30	70
IFQA05	Food Plant Sanitation and Hygiene	4	30	70
	Total	20		

Second Semester:

Course Code	Course Nomenclature	Total Credits	Marks Distribution	
			Internal	External
IIFQA01	Introduction to Food Analysis	4	30	70
IIFQA02	Food Adulteration and Testing	4	30	70
IIFQA03	Food Packaging and Labeling	4	30	70
IIFQA04	Food Toxicants, Contaminants and Allergens	4	30	70
IIFQA05	HACCP in Food Industry	4	30	70
	Total	20		

Important notes:

1. Certificate/Diploma in Food Quality Assurance program has two exist options as Certificate in FQA after 1st sem and Diploma FQA after 2nd Sem.
2. Certificate/ Diploma in Food Quality Assurance program is as per credit- based system.
3. There are 20 credits in each semester.
4. Evaluation of courses will be based on 70:30 scheme as per existing university norms. Internal assessment will be of 30 marks in which students will need to submit 02 assignments of 15 marks each.

SEMESTER I **Course Code: IFQA01** **Course Title: Food Fundamentals** **Credits: 4**	*Note for Paper Setters:* *Nine questions are to be set by the examiner. Question number one (01) is compulsory and will be based on entire syllabus i.e. all four units. It will contain seven (07) short answer type questions of two (02) marks each. Out of remaining eight questions, a candidate is required to attempt four questions by selecting one from each unit. All questions including compulsory question i.e. question number one shall carry equal marks i.e. fourteen (14) marks each.*

Unit- I

Introduction to Food Science- Terms related to food science. Food basics: functions, classifications (on the basis of perishability, source, physiological functions). Food waste management- Types of food waste and its management.

Unit- II

Food Chemistry: Macronutrients-Carbohydrates, Proteins and enzymes, Lipids (Classification, properties and functional role) Micronutrients- Vitamins and Minerals (classification, properties and functional role) and water.

Unit-III

Introduction to Food Processing and Preservation- general principles of preservation, preservation by high temperature, low temperature, drying, concentration, fermentation, irradiation.

Unit-IV

Food Packaging- functions and classification. Food Additives - types, significance and their limitation. Food Adulteration. Newer concept in Food – Transgenic and Genetically modified food. Production and quality evaluation of food products- indigenous milk products and fruits and vegetables products.

Recommended Readings:

1. Norman N. P., and Joseph H. H., (1997) Food Science 5th edition, CBS Publication, New Delhi
2. Khatkar B. S. (2022) Food Science and Technology, Daya Publication.
3. Shakuntala Manay N. (2022) Food: Facts and Principles 5th edition, New Age International Publisher, New Delhi.

SEMESTER I **Course Code: IFQA02** **Course Title: Introduction to Food Microbiology** **Credits: 4**	***Note for Paper Setters:*** *Nine questions are to be set by the examiner. Question number one (01) is compulsory and will be based on entire syllabus i.e. all four units. It will contain seven (07) short answer type questions of two (02) marks each. Out of remaining eight questions, a candidate is required to attempt four questions by selecting one from each unit. All questions including compulsory question i.e. question number one shall carry equal marks i.e. fourteen (14) marks each.*

Unit-I

Basics of Cells: Cell and Cell theory, Cell Structure, Cell reproduction (Binary fission, Sporulation, Budding), Types of cells (eukaryotic & prokaryotic), Nutrition and growth of microorganisms. Factors affecting growth of microorganisms.

Unit-II

Fermented foods: from cereal and pulses meat (sausages, ham and bacon), fish, fruits (pickles), vegetables (sauerkraut, kimchi) and milk (Indian and western); Fermented beverages - beer, vinegar and wine

Unit-III

Microbial spoilage: spoilage of milk, meats, fish and various plant products. Control of Microorganisms & Food Preservation methods

Unit-IV

Foods microbiology and public health: Types of food poisonings, important features and control; Overview of algal, fungal and viral food borne illnesses.

Recommended Readings:

1. Bibek Ray (1996) Fundamental Food Microbiology, CRC Press.
2. William C Frazier (2017). Food Microbiology. McGraw Hill Education.
3. Adams, M.A. & Moss, M.O. (2007). Food Microbiology, New Age International.

SEMESTER I **Course Code: IFQA03** **Course Title: Food Safety and Quality Assurance** **Credits: 4**	*Note for Paper Setters:* *Nine questions are to be set by the examiner. Question number one (01) is compulsory and will be based on entire syllabus i.e. all four units. It will contain seven (07) short answer type questions of two (02) marks each. Out of remaining eight questions, a candidate is required to attempt four questions by selecting one from each unit. All questions including compulsory question i.e. question number one shall carry equal marks i.e. fourteen (14) marks each.*

Unit-I

Food safety and quality: definition and terminology; quality control & quality assurance; 5S, six sigma, lean manufacturing, Just-In-Time (JIT), kanban; food traceability and authenticity.

Unit-II

Pre-requisite programs (PRP's) for food safety: GAP (good agricultural practice), GLP (good laboratory practice), GHP (good hygiene practice), GMP (good manufacturing practice) in food industry; HACCP (hazard analysis critical control point): introduction, principles, application of HACCP system in different food industry.

Unit-III

Quality Management Sysstems: total quality management (TQM): Objectives, principles, implementation; quality tools, FSMS (food safety management system), GFSI (global food safety initiative), FSSC 22000 (food safety system certification), SQF (safe quality food).

Unit-IV

Auditing: introduction, definition, objectives of auditing, types of audit, principles of auditing, audit program procedures.

Recommended readings:

1. Mathur, Pulkit (2018). Food Safety and Quality Control. The Orient Blackswan. ISBN 13: 978-9352873791
2. Alli I. (2003). Food Quality Assurance -Principles and Practices, CRC Press, Boca Raton
3. Bryan, F.L. (2007) Hazard Analysis Critical Control Point Evaluations A Guide to Identifying Hazards and Assessing Risks Associated with Food Preparation and Storage. World Health Organization, Geneva.

SEMESTER I **Course Code: IFQA04** **Course Title: Food Laws, Standards and Regulations** **Credits: 4**	***Note for Paper Setters:*** *Nine questions are to be set by the examiner. Question number one (01) is compulsory and will be based on entire syllabus i.e. all four units. It will contain seven (07) short answer type questions of two (02) marks each. Out of remaining eight questions, a candidate is required to attempt four questions by selecting one from each unit. All questions including compulsory question i.e. question number one shall carry equal marks i.e. fourteen (14) marks each.*

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:

1. Food Safety and Standards Act 2006 and Regulations 2011.
2. https://www.fssai.gov.in/home and Custom Act
3. Codex e-Learning Centre (http://www.fao.org/ag/agn/agns/capacity_elearning_codex_ en.asp)

SEMESTER I **Course Code: IFQA05** **Course Title: Food Plant Sanitation and Hygiene** **Credits: 4**	*Note for Paper Setters:* *Nine questions are to be set by the examiner. Question number one (01) is compulsory and will be based on entire syllabus i.e. all four units. It will contain seven (07) short answer type questions of two (02) marks each. Out of remaining eight questions, a candidate is required to attempt four questions by selecting one from each unit. All questions including compulsory question i.e. question number one shall carry equal marks i.e. fourteen (14) marks each.*

UNIT-I

Introduction to food sanitation and hygiene: meaning, basics principles, applications and importance of cleanliness, hygiene, sanitation in food sector. An approach to food safety: causes and preventing measures for food borne illness.*(contamination, sterilization and disinfectant)*. Developing a food safety plan.

UNIT-II

Characterization of food hazards: physical, chemical and biological hazards issues significance and implications. Potentially hazardous foods (PHFs) and time-temperature control of PHFs. Risk analysis frameworks for chemical and microbial hazards.

UNIT-III

Hygiene practices and procedure: before and after production in food industry. Personal hygiene and sanitary food handling. Cleaning compounds: characteristics, classification, selection, handling and storage. Cleaning procedures and schedules for work place sanitation.

UNIT-IV

Quality assurance for sanitation: Sanitation equipment. Waste products handling. Sanitary design and construction for food processing and total quality management.

Recommended Readings:

1. Marriott, N. G. & Gravani, R. B. (2006). Principles of Food Sanitation Fifth Edition: Springer.
2. Schmidt, R.H. & Rodrick, G.E. (2003). Food Safety Handbook: Willey Interscience.
3. Roberts. C.A. (2015). The Food Safety Information Handbook: Oryx Publication.

SEMESTER II **Course Code: IIFQA01** **Course Title: Introduction to Food Analysis** **Credits: 4**	***Note for Paper Setters:*** *Nine questions are to be set by the examiner. Question number one (01) is compulsory and will be based on entire syllabus i.e. all four units. It will contain seven (07) short answer type questions of two (02) marks each. Out of remaining eight questions, a candidate is required to attempt four questions by selecting one from each unit. All questions including compulsory question i.e. question number one shall carry equal marks i.e. fourteen (14) marks each.*

Unit-I

Basic food analytical methods: Introduction to chemical and physical analytical methods for food samples. Sampling, and preparation of samples. Analysis of principal food constituents - moisture, fiber, carbohydrates, proteins, fat, vitamins, and minerals.

Unit-II

Textural analysis of foods: Introduction, Methods for measuring textural properties of foods– Instron food tester, penetrometer, texture analyser.

Unit-III

Rheological Analysis of foods: Introduction, basic principles and applications of methods for measuring rheological properties of foods.

Unit-IV

Advanced analytical techniques: Spectroscopy– basic principles of UV and visible spectroscopy, Chromatography – basic principles of Thin layer, Gas Chromatography.

Recommended readings:

1. Nielson S. S. (2003) Food analysis, Kluwer Academic Press.
2. Pomeranz Y. J. (2000) Food Analysis, Springer Publications.
3. Srivastava (2000) Instrumental Approach to chemical analysis, S. Chand Publishers.

SEMESTER II **Course Code: IIFQA02** **Course Title: Food Adulteration and Testing** **Credits: 4**	*Note for Paper Setters:* *Nine questions are to be set by the examiner. Question number one (01) is compulsory and will be based on entire syllabus i.e. all four units. It will contain seven (07) short answer type questions of two (02) marks each. Out of remaining eight questions, a candidate is required to attempt four questions by selecting one from each unit. All questions including compulsory question i.e. question number one shall carry equal marks i.e. fourteen (14) marks each.*

Unit- I

Introduction to Food Adulteration and Adulterants: Adulteration, types of food adulteration; intentional, incidental and natural adulteration, Common foods subjected to adulteration, Poisonous substances, foreign matter, cheap substitutes, Adulteration through Food Additives, General Impact on Human Health.

Unit- II

Adulteration of Plant foods and their Methods of detection: Means of adulteration, Methods of detection adulterants in plant foods; Edible oil, grains, pulses, tea, coffee, sugar, spices and condiments, processed food from plant sources, fruits and vegetables products

UNIT-III

Adulteration of Animal foods and their Methods of detection: Animal based products; Egg and Egg products, Milk and milk products, Processed Meat and Fish Products, Types of adulteration and their detection methods

UNIT-IV

Microbiological/Packaging Hazards and Contamination: Contamination with pathogenic microorganisms like bacteria, virus, fungi, insects, rodents and pests, Presence of microorganisms on fresh and RTE products, Food impurities, Packaging Hazards and their health impacts.

Recommended Readings:

1. A first course in Food Analysis, A.Y. Sathe, New Age International (P) Ltd., 1999.
2. DART- Detect adulteration with rapid test. FASSAI, Imprinting Trust, assuring safe and nutritious food, Ministry of Health and Family Welfare, Government of India.
3. Rapid detection of food adulterants and contaminants Theory and Practice, S. N. Jha, 2016, Kindle Edition.

SEMESTER II **Course Code: HFQA03** **Course Title: Food Packaging and Labelling** **Credits: 4**	***Note for Paper Setters:*** *Nine questions are to be set by the examiner. Question number one (01) is compulsory and will be based on entire syllabus i.e. all four units. It will contain seven (07) short answer type questions of two (02) marks each. Out of remaining eight questions, a candidate is required to attempt four questions by selecting one from each unit. All questions including compulsory question i.e. question number one shall carry equal marks i.e. fourteen (14) marks each.*

UNIT-I

Food Packaging: definitions, functions of packaging, characteristics of food packaging materials for package selection. Paper, metal, glass and plastic materials used in food packaging.

UNIT-II

Packaging requirements of different foods: fresh fruits and vegetables, dairy Products, meat products, beverages, frozen and microwavable foods products.

UNIT –III

Recent packaging techniques to extend shelf life of foods: edible packaging, aseptic packaging, MAP, active and intelligent packaging and packaging machineries used in food packaging.

UNIT -IV

Packaging regulations and labelling: Shelf life of packaged food stuff, recycling of packaging materials, packaging standards and regulations. Importance of labelling in food packaging.

Recommended Readings:

1. Robertson G. L., (2006). Food Packaging: Principles and Practice. 2nd edition, Taylor and Francis Group.
2. Paine FA and Paine HY, A Handbook of Food Packaging, Blackie Academic and Professional, 1992.
3. Coles R, McDowell D, Kirwan MJ. Food Packaging Technology. Blackwell, 2003.

SEMESTER II **Course Code: IIFQA04** **Course Title: Food Toxicants, Contaminants and Allergens** **Credits: 4**	***Note for Paper Setters:*** *Nine questions are to be set by the examiner. Question number one (01) is compulsory and will be based on entire syllabus i.e. all four units. It will contain seven (07) short answer type questions of two (02) marks each. Out of remaining eight questions, a candidate is required to attempt four questions by selecting one from each unit. All questions including compulsory question i.e. question number one shall carry equal marks i.e. fourteen (14) marks each.*

UNIT- I

Introduction to Food Toxicology: Natural toxins in food: food-toxins of plant and animal origin; microbial toxins (e.g., bacterial toxins, fungal toxins and Algal toxins) toxicity and significance

UNIT- II

Introduction to Food Contaminants: Drug residues in food: fungicide and pesticide residues in foods; heavy metal, use of veterinary drugs (e.g. malachite green in fish and β-agonists in pork)

UNIT- III

Introduction to Food Allergens: Natural sources of food allergens, Food allergens as Ingredients, Gluten, Peanuts & Lactose, Handling of food allergen in industry

UNIT- IV

Toxicants produced during Processing: Polycyclic aromatic hydrocarbons, N – nitrosamines, Acrylamide and their mode of action, Flavour and Colour Enhancer like nitrate, nitrite and N- nitroso compounds

Recommended Readings:

1. Bagchi & Swaroop, (2016). Food Toxicology, CRC Press.
2. Liangli (Lucy) Yu, Shuo Wang, Bao-Guo Sun, (2015). Food Safety Chemistry Toxicant Occurrence, Analysis and Mitigation, CRC Press.
3. Jonathan, B.M. (2000). Food Allergies and Food Intolerance: The Complete Guide to Their Identification and Treatment, Healing Arts Press.

SEMESTER II Course Code: IIFQA05 Course Title: HACCP in Food Industry Credits: 4	*Note for Paper Setters:* *Nine questions are to be set by the examiner. Question number one (01) is compulsory and will be based on entire syllabus i.e. all four units. It will contain seven (07) short answer type questions of two (02) marks each. Out of remaining eight questions, a candidate is required to attempt four questions by selecting one from each unit. All questions including compulsory question i.e. question number one shall carry equal marks i.e. fourteen (14) marks each.*

UNIT- I

HACCP: Definition, History, Need, Importance in food safety. Concept of PDCA in Food safety, Food contamination, Food borne Diseases. Food Hazard: Definition, Types of food safety hazards (physical, chemical, biological etc.), Preventive Methods to control hazards.

UNIT- II

Prerequisites of HACCP: Role of prerequisites in HACCP, Good manufacturing practices, Good Hygienic practices, Good laboratory practices, Good Distribution practices, Ornament policy, 18 inch rule, FIFO (First in First out), Supplier checklist. Operational prerequisite programs.

UNIT- III

Principles of HACCP: Hazard Analysis: Hazard Identification, Hazard Evaluation, And Determination of Control Measures. Control point, Critical control points, Concept of probability: severity, likelihood. Decision tree: Importance, types. CCP in different food industry: Dairy processing, Bakery products processing, beverage industry, meat industry, fruit processing industry. Control Limits for Hazards, Monitoring procedures (What, How, When, Who). Corrective actions against CCP. Verification Procedure: Need, Importance, Methods of verification. Record Keeping and Documentation: Need, Importance, Methods of Documentation.

UNIT- IV

Implementation of HACCP in Food industry: Assemble the HACCP team: Characteristics of team leader, responsibility of team leader, responsibility of HACCP Team. Scope of product and process. Identify intended user: Who and how. Construction of Flow diagram: Raw material to end product

consumption. Methods of validation of flow diagram. Audit Report preparation: Characteristics of auditor, responsibilities of auditor, plan of audit, procedure of audit.

Recommended readings:

1. Clute M. (2008). Food Industry Quality Control Systems, CRC Press, Boca Raton
2. Gould, W.A and Gould, R.W. (2005) Total Quality Assurance for the Food Industries, CTI Publications Inc. Baltimore.
3. Bryan, F.L. (2007) Hazard Analysis Critical Control Point Evaluations A Guide to Identifying Hazards and Assessing Risks Associated with Food Preparation and Storage. World Health Organization, Geneva.