

**Programme Project Report (PPR)**  
**for**  
**Distance Learning Programme under School of Distance Education**

**Post Graduate Diploma in Food Analysis and Quality Control  
(PGDFAQC)**

**Course Co-ordinator: Dr. Jisha.M.S**

*Academic support by*  
**National Institute of Plant Science Technology (NIPST)**  
**Mahatma Gandhi University**  
**Kottayam, Kerala**

**POST GRADUATE DIPLOMA IN FOOD ANALYSIS AND QUALITY CONTROL  
(PGDFAQC)  
(Distance Learning Programme –Post Graduate Diploma Programme)  
Programme Project Report**

Mahatma Gandhi University started the School of Distance Education in 1989 with the vision of providing the opportunity for quality education to all realms of society. Since the beginning, thousands of students have availed themselves of this opportunity for higher education to a great extent throughout Kerala. Many students outside the State have also benefited from this. But after the new directions of the UGC in 2014, the University had stopped all the Off-Campus Centres of the School of Distance Education both inside and outside the State.

Now it is the new endeavour of the School to revamp its functioning by offering different types of Diploma and Certificate programmes very relevant to contemporary society, in addition to the conventional Graduate and Post Graduate programmes. This is being done with the academic and infrastructural support of the eminent Schools and Interdisciplinary Interuniversity Centres of the University. All these Schools/ Centres have already conducted similar Programmes or Post Graduate Programmes in the same area. This Post Graduate Diploma Programme has been designed by the National Institute of Plant Science Technology and to be conducted by the School of Distance Education with the academic support of the School.

National Institute of Plant Science Technology (NIPST), an Inter-School centre of Mahatma Gandhi University. The course established on 20th August 2014. The Institute enrolling students through competitive examinations at the National level in the campus of Mahatma Gandhi University for advanced education in plant science, promoting research in Interdisciplinary areas of ‘Plants and their Environment Relations’ towards developing ‘Plant-based Eco-technologies’.

The Institute will inspire students to apply their creative talents to research potentials of the rich botanical wealth of Kerala in the development of globally significant technologies useful in sustainable agricultural, phyto-medicinal, bio-fuel, bio-based industrial and eco-remediation purposes. Instead of keeping science and technology as watertight compartments in conventional programmes, this institute will enable science students to end up their post graduation to a productive research on plant-based eco-technology and entrepreneurship based on the technology that they develop. Overall, the Institute aims at boosting entrepreneurship in the country through productive research in plant science.

## **A. Need and scope of the course**

In the world, India is the second largest producer of food after China. The country has achieved the potential of being the biggest, with the food and agricultural sector. Indian food industry is considered to supply about two third of total Indian retail market needs. In addition to that, modern skills and equipments have been introduced in food industries such as canning, dairy, cereal processing, specialty processing, packaging, frozen food, refrigeration and thermal processing. India's food processing industry has been growing at the rate of 13% despite the global slowdown. And now the government is aiming to double the turnover in the next five year by setting up mega food parks to attract even global capital.

At present the export from agro-sector represents about 16% of total Indian exports. The primary export commodities are cereals, fruits, vegetables and their processed products, and marine products but fast growing specialty products have also penetrated into the foreign markets. Considering the contribution of these products in Indian export, it is necessary to have appropriate technology for handling and processing of agricultural produce.

Food technologist develops the manufacturing process and recipes. They work on existing and newly discovered ingredients and technologies to invent new products, recipes and concept. They are involved in conducting experiments and producing sample products as well as designing the processes and machinery for making products with a consistent flavor, color and texture.

- Modifying existing products, processes and new product development (NPD).
- Checking and improving quality control procedures from raw material stage to the finished product incorporating traceability.
- Addressing issues of safety and quality.
- Selecting raw material and other ingredients.
- Maintaining proper hygienic condition of entire food industry.
- Develop steps undertaken to meet the requirements with respect to hygiene, sanitation, good manufacturing practices, HACCP and nutritional quality.

## **B. Purpose of course**

The purpose of this course is to enable the graduate to acquire the scientific, technical and professional skills for teaching/research/executive career in the food industry/food research and teaching institutions through an of science underlying food technology together with a deeper comprehension of food quality assurance.

The expected outcomes are that students acquire and demonstrate:

- Knowledge and competence in the principles of quality assurance and quality management system as they are applied in the food manufacture and distribution to produce safe food meeting quality and legal requirements.
- Thorough knowledge of chemical, biological and physical principles which underlie food processing, package and storage.

- Ability to apply the principles of chemical analysis, microbiological and statistical control techniques to analyze and assure the quality and safety of food.

**C. Nature of prospective target group of learners:**

Candidates who have passed B.Sc./M.Sc. in Food Science and Nutrition/Food Science and Technology/ Biotechnology/Biochemistry/ Microbiology or B.Tech./M.Tech. in Food Technology/ Biotechnology/ Lifesciences with minimum of 50% marks

**D. Appropriateness of programme to be conducted in Open and Distance Learning mode to acquire specific skills and competence:**

The course provides an outline of State-Of-Art theoretical information and practical experience, directly and indirectly related to a better understanding of food safety problems, their origin and solutions. The program is framed for transmission of both knowledge and know-how of local importance and global significance to the students.

**E. Instructional design:**

The programme is of 1 year duration comprising eight courses with a total of 32 credits. There are adequate contact classes and the assessment involves both internal as well as external components. Each student has to submit a report based case studies or project.

Duration-1 Year							
Course Code	Course Type	Course Name	Contact Sessions (hours)	Credits	*Internal Marks	External Marks	Total Marks
PGDFAQ C 101	Core course	Food fundamentals and chemistry	12	4	20	80	100
PGDFAQ C 102	Core course	Food microbiology	12	4	20	80	100
PGDFAQ C 103	Core course	Food analysis	12	4	20	80	100
PGDFAQ C 104	Core course	Quality management and product development	12	4	20	80	100
PGDFAQ C 105	Core course	Food safety and allied laws	12	4	20	80	100
PGDFAQ C 106	Core course	Food safety & quality assurance	12	4	20	80	100
PGDFAQ C 107	Core course	Food safety and quality auditing	12	4	20	80	100
PGDFAQ C 108	Practical and Project report	Practical and Project work	60	4 (2+2)	20	80	100
Total			144	32	160	640	800

\*Through assignments

## F. Procedure for admission, curriculum transaction and evaluation:

**Eligibility:** Candidates who have passed B.Sc./M.Sc. in Food Science and Nutrition/Food Science and Technology/ Biotechnology/Biochemistry/ Microbiology or B.Tech./M.Tech. in Food Technology/ Biotechnology/ Lifesciences with minimum of 50% marks are eligible for admission.

Admission to the programme will be done by the University through a common procedure for all the programmes under the School of Distance Education. Candidates are eligible for admission irrespective of age. The fee structure will be decided by the University. The study materials will be delivered through online and print formats. The School will prepare an academic calendar/activity planner that will be circulated among all the learners at the time of admission itself. The academic calendar will include all the significant activities, important dates, schedule of submission of assignments, schedule of contact classes, schedule of examinations, etc.

Evaluation of the courses shall be done by the faculty themselves on the basis of internal assessment and end semester examinations. 20% of the marks will be decided by the internal evaluations and the remaining 80% by the end semester examinations which will be done by the University. The performance of a student in each course is evaluated in terms of percentage of marks with a provision for conversion to grade points.

Each student shall be required to do one Assignment/Book Review/Debate/Seminar/Presentation of case study for each course. Assignments/Book Review after valuation shall be returned to the students. The teacher shall define the expected quality of the above in terms of structure, content, presentation and the like, and inform the same to the students.

**Grading System** will be followed for the evaluation on a ten point scale. The details of the grading system are given in the following Table.

### Percentage Equivalence of Grade:

Range of % of Marks	Grade Letter	Performance	Grade Point
95 - ≤ 100	O	Outstanding	10
85 - < 95	A plus	Excellent	9
75 - < 85	A only	Very Good	8
65 - < 75	B plus	Good	7
55 - < 65	B only	Above Average	6
45 - < 55	C	Average	5
40 - < 45	P	Pass	4
< 40	F	Fail	0
Absent	Ab	Absent	0

'P' grade is required for a minimum pass in a course. The minimum GPA required for a pass in the Certificate programme is 4.

### **Calculation of Grade Point Average (GPA) :**

**Credit Points for the Course** = (No. of Credits assigned for the course x Grade Point secured for that course).

**GPA** indicates the performance of a student in the programme. GPA is based on the total **credit points** earned by a student in all the courses divided by the total number of credits assigned to the courses required in the programme.

Note: GPA is computed only if the candidate passes in all the required courses (gets a minimum required grade for a pass in all the required courses as per the curriculum).

**GPA** =

**Total credit points earned by the student from all the required courses of the programme**  
**Total credits of all courses required in the programme**

This formula shall be printed on the Grade Card issued to the student with a note that it could be used to convert the grades into mark-percentages. (The details of the grading system as indicated above shall also be printed on the Grade Card).

### **Conversion of GPA to Grade**

<b>GPA</b>	<b>Grade</b>
10	O
9.0 - < 10	A plus
8.0 - < 9	A only
7.0 - < 8	B plus
6.0 - < 7	B only
5.0 - < 6	C
4.0 - < 5	P
< 4	F
Absent	Ab

### **Conversion of GPA to percentage**

**Equivalent Percentage** = (GPA obtained) X 10

### **G. Requirement of the laboratory support and library resources:**

The library and infrastructure support of the Centre and the University will be extended to the learners as per the requirement.

Mahatma Gandhi University Library and Information System consists of University Library, libraries of the Schools and 4 study centre Libraries. The University Library was established in 1989. The University Library which is situated in the main campus occupies purpose-built accommodation, and provides a variety of facilities and has a user-friendly environment. These include individual work spaces, room for group study and teaching, audio-visual access and online information retrieval system. The building of the University Library is 2000 sq.m in area consisting of the cellar, the ground floor and the first floor.

Academic as well as public users are given the facility to use the library. Special category membership is provided to journalists. The library is providing service from 8 am to 8 pm in three shift timings for its staff. The library functions on an average of 345 days in a year. The libraries of teaching departments are open during working hours of the Schools. Reading space is provided in all the three floors housing the various sections of the library. The library provides reading facility to the visually impaired users too. For this, an electronic lab custom made for visually and physically challenged users has been set up during 2016.

The University Library has a Library Advisory Committee. It is an 18 member committee with Vice-Chancellor as Chairman and University Librarian as Convener.

The library has a collection of 59,000 books, 232 journals, 2,135 Ph.D. theses and has access to 15000+ e-journals under E-ShodhSindhu. The activities of the Library are comprehensively automated using open source library management software KOHA. OPAC, Journal Article Index, By monthly Bibliography compilation and Literature Search Service are also available

The library is a member of the INFLIBNET Centre, Ahmedabad as well as DELNET (Developing Library Network). As a member of these networks, the library provides access to the resources of other major libraries in the country. In addition to the access to UGC INFONET consortium, it has access to major online databases, such as EBSCO, ProQuest dissertations and theses, Oxford Scholarship Online, IEEE All Society Periodicals Package etc. Mahatma Gandhi University had won the State IT Award during the year 2009 in the e-learning category for its university online theses digital library. The various department libraries have a good collection of subject specific books and journals.

<b>A. MAHATMA GANDHI UNIVERSITY LIBRARY</b>	
<b>Category</b>	<b>No.</b>
Books	59000
Journals	232
Bound Journals	7500
Ph.D Theses	2135
E-Journals (in UGC-Infonet, renamed as E-ShodhSindhu)	15000
Online databases (in UGC Infonet)	11
Online Archives subscribed	185 Titles
Online databases subscribed	4
E-books	7338
DVDs: Educational Videos	293

<b>B</b>	<b>Name of School/Centre</b>	<b>Total No. of books</b>
	National Institute of Plant Science Technology	420

## H. Cost estimate of the programme and the provisions:

Budget estimate (for 100 students)

S.No.	Item	Amount (Rs. in Lakhs)
1.	Manpower	6
2.	Study material	3
3.	Laboratory	4.5
4.	Internal assessment/Project	1
5.	Examination &Evaluation	1.5
6.	Books and Periodicals	1.5
	Total	17.5

**Total Programme fee: Rs. 18000/-**

## I. Quality assurance mechanism and expected programme outcomes:

The quality of the programme will be ensured through strict monitoring by an executive committee including the Co-ordinator of the programme, the subject experts, Director, School of Distance Education and Head of the National Institute of Plant Science Technology. The Co-ordinator of the programme shall ensure the regular student feedback of courses, teachers and programme in the prescribed format towards the end of the semester and the same shall be analysed to draw conclusions for effecting improvement. Periodical review meetings on the programme efficacy will be held in which the remarks of teachers on curriculum, syllabi and methods of teaching and evaluation will be given due importance. Moreover, the progress and the quality of the programme will be monitored by the Internal Quality Assurance Cell of the University from the outcome and feedback of the learners as well as the proper documentation maintained in the Centre.

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## **Syllabus**

### **Post Graduate Diploma in Food Analysis and Quality Control (PGDFAQC)**

PGDFAQC 101.FOOD FUNDAMENTALS AND CHEMISTRY

(4+0: Theory Course)

#### **Unit1. Introduction to Food Science and Food Chemistry**

Chemical composition of food: Carbohydrates, lipids, proteins, fiber, vitamins, and minerals – characteristics, sources, physiological and biochemical functions, daily requirement, digestion and absorption. Biological value of proteins (BV), Protein efficiency ratio (PER), Digestibility coefficient, Net protein Utilization, Net Protein Ratio(NPR), Chemical Score, Free Radicals and Antioxidants. Energy value of foods, Respiratory Quotient (RQ), Determination of Basal Metabolic Rate (BMR), Determination of energy metabolism during work, Energy expenditure for various types of activities, Recommended Daily Allowance (RDA), Specific Dynamic Action (SDA) of foods, Balanced diet formulation.

#### **Unit2.Food additive**

Food additives, antioxidants, sequestrants, preservatives, nutrient supplement, emulsifiers, stabilizers and thickening agents, bleaching and maturing agent, sweeteners, humectants and anti caking agents coloring and flavoring substance. Analytical techniques used in detection of adulteration of food: Principle, procedure and detectors of chromatographic techniques (Column, paper, TLC, HPLC and GC), Spectroscopic techniques (IR, UV, MS and AAS).

#### **Unit 3. Food adulteration**

Types of adulterants- intentional and incidental adulterants, methods for detection of common adulteration, contamination and pesticide. Oils and Fats - Iodine value and saponification value

#### **Unit 4. Food Processing and Preservation**

Introduction to Food Preservation and Processing, Food Packaging, Waste Management in Food Processing Industry

## References.

- Goldberg, I. Functional foods, Designer foods, pharma foods and nutraceuticals. An aspen publication, gaithers burg, maryland, 1999.
- Roday, S., food science and nutrition. Third edition, Oxford University Press, New Delhi, 2008.
- Khader, V. Text book of Food science and Technology. Published by India Council of Agricultural Research, NewDelhi 110012, 2001

## PGDFAQC 102. FOOD MICROBIOLOGY

(4+0: Theory Course)

### Unit1. Fundamentals of Food Microbiology

Introduction to Food Microbiology, Sources of microorganisms in food, perishable, semi perishable and non- perishable foods, intrinsic and extrinsic parameters influencing microbial content of food

### Unit 2. Spoilage of food and food Borne Diseases

Food borne pathogens and their control. Spoilage organisms in food and food products. Types of organisms in meat and meat products, seafoods, fruits and vegetables, milk and dairy products. Microbial infection and intoxication. Food intoxication- Staphylococcal intoxication, botulism. Food infection- *Salmonellosis*, *Clostridium perfringens*, *Bacillus cereus* gastroenteritis, *E. coli* infection and others

### Unit 3. Analytical Techniques in Microbiology

General Techniques of Detection and Enumeration of Micro-organisms in Food, Screening and Enumeration of Spoilage Micro-organisms in Food, Detection of Pathogens in Food, Rapid Detection Technique for Food Micro-organisms .Sampling methods for microbial analysis of foods, testing methods, total plate count (TPC), coliform count, MPN techniques, Enumeration and detection of salmonella and shigella

### Unit 4. Microbiological Safety of Foods

Collection of food samples – sampling, collection, transport and storage. Enumeration of microorganisms. Direct count, Total aerobic count, Selective media. Identification of pathogenic microorganisms – Selective media, PCR based identification, ELISA. Isolation and identification of virulent *E. coli* from foods. Detection of microbial metabolites- HPTLC, HPLC, ELISA; Bacterial toxins: Ceralides, *E coli* Toxins, Mycotoxins, Aflatoxins, Trichotheenes

## References

- Frazier, W.C. Food Microbiology. 4th edition. McGraw Hill. New York, 2008
- Khetarpaul, N. Food microbiology, Daya publishing house, New Delhi, 2009
- Pelzar, H.J. and Rober, D. Microbiology 5th edition McGraw Hill. New York, 2009
- Prescott, L.M., Harley, J.P. and Klein, D.A. Microbiology. 4th edition McGraw-Hill, New York. 1999

## **PGDFAQC 103. FOOD ANALYSIS**

(4+0: Theory Course)

### **Unit 1. Sensory Evaluation**

Subjective evaluation, Sensory evaluation: Definition, and applications, Sensory attributes of food: Appearance, Texture and Flavor; Factors affecting sensory measurements: Psychological- Expectation error, Mutual suggestion effect, Distraction error, Stimulus error, Logical error, Attribute dumping, Halo effect and proximity error, Error of habituation, Order/Position effect, Contrast & convergence effect, Central tendency error, Motivation error; Physiological: Adaptation, Mixture interactions- Enhancement, Synergy & Suppression, Health; Environmental-Gender, Genetics, Age & Culture.

Objective evaluation, Rheology- capillary viscometer, falling ball viscometer, rotational viscometer, Texture: viscometer, consistometer, penetrometer, succulometer, tenderometer, fibrometer, shortometer, texturometer.

Colour measurement- Spectroscopic Techniques, emission and absorption spectroscopy, visual colorimeters, spectrophotometers-, photoelectric colorimeters, CIE: tristimulus colorimetry, applications. Absorption spectrometry: Beer's law, identification of compounds

### **Unit2. Composition of foods**

Chemical Composition and Characteristics of foods: Titratable acidity, Moisture and total solids- Importance of moisture assay, Oven drying, Indirect, Physical, Chemical, azeotropic distillation, water activity. Ash analysis: Purpose, Total ash, soluble and insoluble ash, ashing procedures, minerals atomic absorption

Carbohydrate analysis: Importance, Sample preparation, Method of analysis- Calculation by difference, Chemical, Enzymatic, Physical and Modern analytical methods, Starch, Fiber

### **Unit 3. Chemical analysis**

Crude fat analysis- solvent and nonsolvent wet extraction and instrumental methods, Fat characterization

Protein analysis- Total organic nitrogen, proteins, peptides, amino acids, other non-protein nitrogen, Protein separation and characterization- separation by differential solubility, size, adsorption and electrophoresis, Protein quality tests

Vitamin analysis- Bio and chemical assay

Mineral analysis, Analysis of Pigments, Chemical preservatives, Pesticide Residues and Filth

Heavy metals such as Hg, Cd, Pb, Cr<sup>6+</sup>, As& Se: importance and analysis, Total Volatile Base Nitrogen (TVBN): importance and analysis

#### **Unit 4. Analytical Instrumentation**

Analytical Instrumentation: Chromatographic techniques, and Electrophoretic techniques

Densitometry: specific gravity of liquids and of solids, pycnometer, buoyancy, specific gravity balance, hydrometer

Refractometry: Refractive index, Lorenz equation, refractometers- Abbe, Pulfrichrefractometers

Centrifugation- relative centrifugal force, types of centrifuges, rotor heads

#### **Unit5. Microbiological evaluation**

Microbiological evaluation: Total viable count by TPC and pour plate, quality indices-indicator microorganisms- *E. coli*, faecal streptococci, *Staphylococcus aureus*, sulfite reducing bacteria-*Clostridium perfringens*, MPN. New concepts in indicators-bacteriophages

#### **References**

- Kalia, M. Food Analysis and Quality Control. Kalyani Publishers, New Delhi. 2002.
- Winton, A.L and Winton, K.B. Techniques of food analysis. Allied Scientific Publishers, New Delhi. 1999.
- Nielsen, S.S. Introduction to the chemical analysis of foods. Jones and Bartlett Publishers, Boston, London. 2003.
- Connell, J.J. Control of fish quality. Blackwell Scientific Publications, Cambridge.2000.

### **PGDFAQC 104QUALITY MANAGEMENT AND PRODUCT DEVELOPMENT**

(4+0: Theory Course)

#### **Unit 1. Quality Standards**

Legal Standards, Voluntary Label Standards, Industry Standards, Grade standards. Methods for determining quality: objective and subjective methods.Definition and

organization of the quality control function in the food industry. Preparation of specifications. In-plant Quality Control and end product inspection. Instrumental and sensory methods for evaluation. Statistical process control (SPC). Regulations and standards for raw and finished products.

### **Unit-I2. Total quality management in food industry**

Food quality assurance programme: Quality Control, Quality Evaluation and Quality audits. ISO 9000, 22000 and HACCP systems. Food safety and HACCP principles. Biological, chemical and physical and chemical hazards in food processing. Ingredient specification. Product formulation, product tracability, Documentations. Good Manufacturing Practices (GMP). In process monitoring and records. SOP & SSOP, Packaging quality. Product recall.

### **Unit 3. Food laws and Standards**

FDA regulations, USDA regulations, EPA regulations, Codex Alimentarius, Food Safety and Standards regulations, The Prevention of Food Adulteration Act, Export & Import Laws and Regulations, Export (Quality Control and Inspection) Act, 1963., etc. Packaging and labeling Laws, regulations.

### **Unit 4. Factory layout and design.**

Regulations for processing units, Flow sheet of operations, Drainage and sweet water connections. Ware housing of products and raw materials. Utilities for manufacturing units. Water treatment, boilers, types of boilers, quality of steam.

Product development, identification and testing of new product concepts, basic process design, and pilot plant studies, scaling up and trial plant production. Application and integration of food technology, engineering, and safety and packaging technology to develop a new product from concept to pilot plant scale up.

### **References**

- Godbole, N.N; Milk – The Most Perfect Food ; Biotechnology books, 2007
- Manay, N.S, Shadaksharaswamy, M., Foods- Facts and Principles, New Age International Publishers, New Delhi, 2004.
- Potter, N. N, Hotchkiss, J. H. Food Science. CBS Publishers, New Delhi. 2000.
- Hui, Y H and Associate Editors; Hand Book of Food Products Manufacturing Vol I, Wiley- Interscience, New Jersey 2007.
- Hui, Y H and Associate Editors; Hand Book of Food Products Manufacturing Vol II, wiley- Interscience, New Jersey 2007.
- Srilakshmi, B. Food Science (3rd edition), New Age International (P) Limited Publishers, New Delhi, 2003.

## **PGDFAQC105 FOOD SAFETY AND ALLIED LAWS**

(4+0: Theory Course)

### **Unit 1. General principles for food safety and hygiene**

Principles of food safety and quality - Food Safety System - Quality attributes - Total Quality Management. Good Hygienic Practices, Good Manufacturing Practices - Risk Analysis, Risk Management, Risk Assessment, Risk Communication - Traceability and authentication.

### **Unit 2. General principles for food safety regulation at national/regional level**

The Structure of Food Law, Food Regulation What Should be Regulated?, Laws and Regulations to Prevent Adulteration and Cross Contamination, Microbial Contamination, Hygienic Practice, Chemical and Environmental Contamination, Food Additives, Labeling, Food Laws and Regulations at the International Level for Harmonization.

### **Unit3. National standards**

Food Safety and Standard Authority of India regulations - Agricultural and Processed food Export Development Authority - Marine Product Export Development Authority - Export Inspection council and Export Inspection Agency. International food standards., Trends in Food Standardization, An Overview and structure of 9001:2000/2008, Clause wise Interpretation of ISO 9001:2000, Case Studies, An overview and Structure of 22000:2005, Clause wise Interpretation of ISO 22000:2005, Case Studies.

### **Unit4. International bodies dealing in standarization**

International Standardization Organization (ISO), Joint FAO/WHO Food Standards Program. Codex Alimentarius Commission (CAC), Other International Organizations Active in Food Standard Harmonization. Advantages of Utilizing International Standards. Rapid Alert system.

### **Unit 5. Country specific standards**

European Committee for Standardization (CEN), PAN American Standards Commission (COPANT), Euro-Asian Council for Standardization, FDA, EPA, EU, ASEAN, EFSA (European Food Safety Authority)

## References

- The training manual for Food Safety Regulators. Vol.II- Food Safety regulations and food safety management. (2011) Food safety and Standards Authority of India. New Delhi
- Mortimore, S., and Wallace, C., (2005) HACCP: A practical approach, 2<sup>nd</sup> Ed, Aspen Publication
- Surak, J.G., and Wilson, S. (2007) American Society for Quality, 2<sup>nd</sup> Ed., Quality Press

## PGDFAQC 106. FOOD SAFETY & QUALITY ASSURANCE

(4+0: Theory Course)

### Unit 1 Food Safety and Quality Management Systems

Introduction to Food Safety, Food Safety System, Total Quality Management, Project Management, Risk Analysis, An Introduction to Risk Analysis, Risk Management, Risk Assessment, Risk Communication, Philosophy of Good Manufacturing Practices (GMP), current good manufacturing practices (cGMP), Good Laboratory Practices (GLP), ISO 22000 FSMS

### Unit 2 Physical and Chemical Hazards

Definition of food safety and concept of safe food; characterization of food hazards- Physical hazards (Glass, Wood, Stones, Metal Fragments, Insulation Materials, Plastic and Bones)

Chemical hazards:

1. Naturally occurring chemical hazards – Natural occurring toxicants in foods and antinutritional factors in foods.
2. Unintentional Chemicals: Pesticides, Fertilizers, Pollutants, Toxic metals (Lead, Cadmium, Mercury, Aluminium and Arsenic)
3. Intentional Chemicals (Food preservatives Food additives)

### Unit 3 HACCP

History, Background and Structure of HACCP, HACCP Prerequisites and Good Hygienic Practices, Principles and Implementation of HACCP, Case Studies on HACCP Food standards - Voluntary and mandatory food laws and Food Safety and Standards Act of India, 2006

#### **Unit 4. Quality Control & Standard Tests for Quality Assessment.**

Definition, Statistical Quality Control: Definition, How to determine the need for SQC and the Control chart – definition, uses, process control. Standard tests for quality assessment, Microanalytical tests, Microbiological tests, Histological tests, Standard test methods

#### **Unit 5. Laboratory Quality Management System**

An Overview and Requirements of ISO 17025, Requirements Specific to Food Testing Laboratories - Physical and Chemical Parameters, Requirements Specific to Food Testing Laboratories - Biological Parameters

#### **Unit6. Retailer Standards**

BRC Food and BRC/IoP Standards - An Overview, International Food Standard (IFS), SQF 1000 and SQF 2000, Global GAP and India GAP.

Understanding ISO 17025 requirements for FSMS and QMS .Audits relating to clause 7.6 in ISO 9001 and clause 8.3 in ISO 22000(Establishing Traceability to national/international standards)

#### **References**

- Bhatia,R. and Ichhpujan,R.L. Quality assurance in Microbiology. CBS Publishers and Distributors, New Delhi. 2004.
- Kher, C.P. Quality control for the food industry. ITC Publishers, Geneva. 2000.
- Philip,A.C. Reconceptualizing quality. New Age International Publishers,Banglore. 2001.

### **PGDFAQC 107. FOOD SAFETYAND QUALITYAUDITING**

(4+0: Theory Course)

#### **Unit 1 Standard Operating Procedures**

Preparing scope, quality policy and quality objectives of food processing company, Defining Standard operating procedure – purpose- Format - developing and implementing, effective writing. SOP for purchasing raw materials, receiving raw materials, storage, cleaning, holding, cooling, freezing, thawing, reheating, personal hygiene, facility and equipments. Systems in laboratory accreditation

#### **Unit 2. Audit Check List**

Preparation of HACCP based SOP checklist - personal hygiene, food preparation, hot holding, cold holding, refrigerator, freezer and milk cooler, food storage and dry



storage, cleaning and sanitizing, utensils and equipments, large equipments, garbage storage and disposal and pest control.

### **Unit 3**

Pre-requisite Program -Good Manufacturing Practices - Personal hygiene – occupational health and safety specification, Food Plant Sanitation Management - Plant facilities construction and maintenance - exterior of the building- interior of the building- equipments. Storage, transportation, traceability, recalling procedures, training.

### **Unit 4. HACCP principle**

Conduct a hazard analysis, CCP identification, establish critical limits for each CCP, establish CCP monitoring procedures, establish corrective actions procedures, establish procedures for HACCP verification and validation, documenting the HACCP Program.

### **Unit 5.**

Implementation of HACCP and conducting audit --HACCP for jam, biscuit, bread, dairy, meat, fish and egg industries. Conducting of open meeting and close meeting in auditing, preparation of audit reports for different department- audit exercise

### **References**

- Gazette of Food Safety and Standards Act, (2006) Food Safety regulations and food safety management. Food Safety and Standards Authority of India. New Delhi
- The training manual for Food Safety Regulators. (2011) Vol.III, Food Safety regulations and food safety management. Food Safety and Standards Authority of India. New Delhi.

### **PGDFAQC 108. Practicaland Project work**

(2+2: Practical)

#### **A. Practical exercises –Microbiology**

1. Introduction to the Basic Microbiology Laboratory Practices Experiment
2. Cleaning and Methods of Sterilization Experiment
3. Cultivation and Sub-culturing of Microbes Experiment
4. Staining Techniques Experiment
5. Standards Plate Count Method Experiment
6. Direct Microscopic Examination of Foods Experiment

7. Enumeration of Fungi (Yeasts and Molds) Experiment
8. Assessment of Air using Surface Impingement Method Experiment
9. Assessment of Surface Sterilization using Swab and Rinse Method Experiment
10. Detection of Coliforms and Indicator Organisms (1) Most Probable Number Experiment
11. Detection of Coliforms and Indicator Organisms (2) Confirmed and Completed Tests, Membrane Filter Techniques Experiment
12. Interpretation of Microbiological Data and its Inferences

**B. Food analysis**

- 1) Estimation of proximates from food samples
- 2) Estimation of vitamins from food samples
- 3) Estimation of minerals from food samples
- 4) Estimation of trace elements from food samples
- 5) Estimation of mycotoxins from food samples

**C. Project work and report submission**