

**DEPARTMENT OF TECHNICAL EDUCATION (DIPLOMA SECTOR)
UTTAR PRADESH**

**CURRICULUM FOR DIPLOMA PROGRAMME
IN
FOOD TECHNOLOGY
(5th to 6th Semester)**

=====

Semester System

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(EFFECTIVE FROM YEAR 2026-27)

Prepared By:

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PREFACE

An important issue generally debated amongst the planners and educators' world over is how technical education can contribute to sustainable development of the societies struggling hard to come in the same bracket as that of the developed nations. Rapid industrialization and globalization have created an environment for free flow of information and technology through fast and efficient means. This has led to the shrinking of the world, bringing people from different culture and environment together and giving rise to the concept of world turning into a global village. In India, a shift has taken place from the forgettable years of closed economy to knowledge based and opens economy in the last few decades. In order to cope with the challenges of handling new technologies, materials and methods, we have to develop human resources having appropriate professional knowledge, skills and attitude. Technical education system is one of the significant components of the human resource development and has grown phenomenally during all these years. Now it is time to consolidate and infuse quality aspects through developing human resources in the delivery system. Polytechnics play an important role in meeting the requirements of trained technical manpower for industries and field organizations.

In order to meet the requirements of future technical manpower, we will have to revamp our existing technical education system and one of the most important requirements is to develop outcome-based curricula of diploma programmes. The curricula for diploma programmes have been revised by adopting a time-tested and nationally acclaimed scientific method, laying emphasis on the identification of COURSE OUTCOMES of diploma programme.

The real success of the diploma programme depends upon its effective implementation. However best the curriculum document is designed, if that is not implemented properly, the output will not be as expected. In addition to acquisition of appropriate physical resources, the availability of motivated, competent and qualified faculty is essential for effective implementation of the curricula.

It is expected of the polytechnics to carry out job market research on a continuous basis to identify the new skill requirements, reduce or remove outdated and redundant courses, develop innovative methods of course offering and thereby infuse the much-needed dynamism in the system.

F.R Khan

Director

Institute of Research, Development & Training

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2. SALIENT FEATURES

- | | |
|--------------------------------------|--|
| 1. Name of the Programme | ➤ Diploma in Food Technology |
| 2. Duration of the Programme | ➤ Three years (Six Semesters) |
| 3. Entry Qualification | ➤ Matriculation or equivalent NEP-
2020/NSQF Level 5 as Prescribed by State
Board of Technical Education, U.P. |
| 4. Pattern of the Programme | ➤ Semester System |
| 5. Ratio between theory and Practice | ➤ 40% (Theory) / 60% (Practical) |

1) Industrial Training/Internship:

Four and six weeks of industrial training is made mandatory after the II and IV semesters during summer vacation. Total marks allotted to industrial training will be respectively 50 & 100.

In the last (6th Semester) we have made the one semester Industrial training/Internship as optional along with usual classroom training.

2) Audit & Pathways:

As per AICTE and NEP-2020 directives, Essence of Indian Knowledge & Tradition, Indian Constitution, Entrepreneurship & Startup, subjects on Environmental Studies have been incorporated in the curriculum.

3) Student Centered Activities:

A provision of 4-8 hrs. per week has been made for organizing Student Centered Activities for overall personality development of students. Such activities will comprise co- curricular activities such as expert lectures, classroom seminars, games, hobby club like photography, painting, singing etc. declamation contests, field visits, NCC, NSS and other cultural activities, etc.

4) Project work:

Micro/Mini/Major project work has been included in the curriculum to enable the student to get familiarized with the practices and procedures being followed in the industries and provide an opportunity to work on some live projects in the industry

3. EMPLOYMENT OPPORTUNITIES

Employment opportunities for diploma holders in Food technology are visualized in following industries at various levels/positions:

Diploma in Food Technology Employment Areas

- Flight Kitchens
- Quality Control & Food Inspection Departments
- Academic Institutes
- Food Processing and Production Factories
- Food Analysis Laboratories
- Research & Development Centers

Diploma in Food Technology Job Types

- Hygiene Executive
- Analyst
- Small-Scale Entrepreneur
- Home Economist
- Product Development Executive
- Technical Marketing Personnel

Food, Chemical and Allied Industries like

- Food processing units
- Food industry
- Agro industry
- General processing industries
- Petroleum refinery and petrochemical industry
- Oil and natural gas corporation
- Cosmetic industry
- Sugar industry
- Mineral industry
- Pulp and Paper industry
- Polymer industry
- Pharmaceutical industry
- Distillery
- Soap & detergent industry
- Textile industry etc.
- Pesticide industry

In various functional areas like erection and commissioning of plant, plant operation, energy conservation, plant utilities, production, water treatment, maintenance and safety, quality control, inspection and testing, marketing and sales, consultancy services and areas concerning environmental protection.

- Entrepreneurs to small/tiny units especially food, agro and chemical industries such as paints, soap, detergents, equipment repairing etc.
- Academic Institutions (as technicians/instructors at all levels)
- Startups and new inventions in the field of food and chemical engineering.

Management Positions

- Plans and schedules for production
- Allocates duties to various workers.
- Imparts training to workers engaged in the unit.
- Supervises the work of various sections in the food plants.
- Estimates the unit cost of leather produced under his charge.
- Supervises the receiving, packing and forwarding of goods.
- Controls inventory of chemicals and raw materials and makes out a schedule of such materials to be kept in stock for continuous production.
- Accounting and maintaining records. Assists in ensuring working conditions in tanneries in accordance with labor and factory laws. Supervises labor welfare schemes. Marketing of food products.
- Assists in conducting techno-economic surveys and preparing project reports for starting tanneries.

Activities Connected with Research and Development

- Assists in research and development in the fields of: Curing and preservation; food manufacture; Auxiliaries; Utilization of bye-products Treatment of effluents; utilizing local resources.
- Research Organizations like CSIR laboratories, Defense laboratories, Atomic energy establishments etc.
- Boards and Corporations.

4. (A) PROGRAM OUTCOMES (POS)

PO1: Basics and Discipline specific Knowledge

Assimilate knowledge of basic mathematics, science, engineering fundamentals, and Food Technology.

PO2: Problem's Analysis and solution

Identify, analyze and solve problems using standard methods and established techniques.

PO3: Design and Development

Design solutions for technical problems.

Assist in designing components, systems, or processes to meet specific requirements.

PO4: Engineering Tools, Experimentation, and Testing

Use modern engineering tools and appropriate techniques to conduct experiments as per BIS standard.

PO5: Socio/ Economic /Environmental impact assessment/remedy.

Apply relevant technologies while considering societal needs, environmental impact keeping in view sustainable and ethical responsibilities.

PO6: Project Management and Communication

Apply engineering management principles, work effectively as an individual or in a team, and communicate clearly on activities.

PO7: Lifelong Learning

Recognize the importance of continuous learning and actively pursue self-improvement to keep pace with technological developments.

4. (B) COURSE OUTCOMES OF THE PROGRAM

After undergoing this program, students will be able to:	
1	Prepare and interpret drawings of engineering components and plants.
2	Read and interpret drawings related to plant layout, process equipment and components, process flow sheets and product manufacturing.
3	Imparting technical knowledge to develop human resources for food Processing sectors.
4	Imparting knowledge & technical skills for better processing and value Addition of Food& Agro-products through R&D.
5	Inculcating innovative thinking with the aim to support entrepreneurship and to develop state-of-art technologies for testing and consultancy to fulfill. The needs of food industry and society
6	Cultivating strong ethical values for sustainable modern and safe food to Society.
7	Calculate the quantity of raw materials, energy inputs, manpower
8	Control the process and quality of the products commensuration with laid specifications
9	Recognize the need for and have the ability to engage in lifelong learning
10	Conduct experiments, analyses, interpret data and synthesis valid conclusion.
11	Operate conventional machine for machining of components as per Specifications as an aid to function effectively in the process industry.
12	Use electrical and electronic instruments to measure various engineering parameters
13	Use various measuring and gauging instruments
14	Select material as per desired application
15	Understand the general design of process equipment and testing
16	Operate different utility plants
17	Understand different renewable sources of energy and their applications.
18	Understand different plants utilities and their generation and maintenance
19	Use various software tools for automation and process development.
20	Interpret factory acts, laws and taxes
22	Communicate effectively in English and local language in oral and written form with others
23	Manage resources effectively at workplace.
24	Plan and execute given task/project as a team member or leader.
25	Prepare detailed project proposal and report.
26	Use computer and IT tools for creating documents, making spread sheets and making presentation.
27	Solve real life problems by applying knowledge and skills.
28	Use energy conservation methods to manage energy efficiency.
29	Use appropriate practices for conservation and prevention of environmental pollution and safety in process industries.
30	Understand various unit operations, unit processes and processes instrumentation in food process industry

5. STUDY AND EVALUATION SCHEME FOR FOOD TECHNOLOGY(363)

FIFTH SEMESTER

FOOD TECHNOLOGY (363)

Sr. No.	SUBJECTS	COURSE TYPE & CATEGORY	STUDY SCHEME			Credits	MARKS IN EVALUATION SCHEME										Total Marks of Internal & External
			Periods/Week				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT							
			L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot			
5.1	CEREALS & PULSES TECHNOLOGY	PROGRAM CORE (PRACTICUM)	02	-	04	4		60	60	-	-	40	03	40	100		
5.2	PROGRAM ELECTIVE-3	PROGRAM CORE (PRACTICUM)	02	-	02	3	40	-	40	60	03	-	-	60	100		
5.3	PRINCIPALS OF FOOD PROCESSING & PRESERVATIONS	PROGRAM CORE (PRACTICUM)	02	-	02	3	40		40	60	03	-	-	60	100		
5.4	PROGRAM ELECTIVE-4	PROGRAM CORE (PRACTICUM)	02	-	04	4	40	-	40	60	03	-	-	60	100		
5.5	(Q) INDIAN CONSTITUTION	AUDIT COURSE	02				50		50						N/A		
5.6	FOOD PACKAGING TECHNOLOGY	PROGRAM CORE (PRACTICUM)	02	-	04	4	-	60	60	-	-	40	3	40	100		
5.7	SUMMER INTERNSHIP** (6 Weeks)		-	-	-	2	-	60	60	-	-	40	3	40	100		
	#STUDENT CENTERED ACTIVITIES	-	-	-	08			50	50	-	-	-	-		50		
Total			12	-	24	20	120	230	350	180	-	120	-	300	650		

(Q) It is compulsory to appear and to pass the examination, but marks will not be included for percentage and division of obtained marks.

** Students will present a seminar on their summer internship along with certificate, project and report.

Student Centered Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. Photography etc., Seminars, Declamation Contests, voluntary contribution in physical activities, Educational Field Visits, NCC, NSS, Cultural Activities and Self-Study.

STUDY AND EVALUATION SCHEME FOR FOOD TECHNOLOGY (363)

NORMAL PATHWAY SIXTH SEMESTER

FOOD TECHNOLOGY (363)

Sr. No.	SUBJECTS	COURSE TYPE & CATEGORY	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME									Total Marks of Internal & External
							INTERNALASSESSMENT			EXTERNAL ASSESSMENT						
			L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot		
6.1	FOOD QUALITY CONTROL & LAWS	PROGRAM CORE (PRACTICUM)	03	-	02	4	40	-	40	60	03	-	-	60	100	
6.2	ENTREPRENEURSHIP AND START-UPS	HUMANITIES & SOCIAL SCIENCE	02	-	-	2	40	-	40	60	03	-	-	60	100	
6.3	IN-HOUSE PROJECT	PROJECT	04	-	16	12	-	240	240	-	-	160	-	160	400	
6.4	ADVANCE SKILL DEVELOPMENT	(Q) OPEN ELECTIVE-3 (THEORY)	02	-	-	2	50	-	-	-	-	-	-	-	N/A	
		(Q) OPEN ELECTIVE-3 (Certification Course)					-	-	-	-	-	-	-	N/A		
#STUDENT CENTERED ACTIVITIES			-	-	07	-	-	50	50	-	-	-	-	-	50	
Total			11		25	20	80	290	370	120	-	160	-	280	650	

NOTE: -

- (Q) It is compulsory to appear and to pass the examination, but marks will not be included for percentage and division of obtained marks.
- Advance skill development mention at 6.4 in the table provides the scope of selecting the course as per choice from the elective list provided in the syllabus conducted by various agencies of repute of duration not less than 20 Hrs (Offline/Online).

Student Centered Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. Photography etc., Seminars, Declamation Contests, voluntary contribution in physical activities, Educational Field Visits, NCC, NSS, Cultural Activities and Self-Study.

OR

INDUSTRIAL PATHWAY

Sr. No.	SUBJECTS	CATEGORY & COURSE TYPE	STUDY SCHEME Periods/Week			Credits(C) (L+T)+P=C	MARKS IN EVALUATION SCHEME										Total Marks of Internal & External	ASSESSMENT
							INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT								
			L	T	P		Th	Pr	Tot	Th	Hrs.	Pr	Hrs	Tot				
6.1	ENTREPRENEURSHIP AND START-UPS (ONLINE MODE)	HUMANITIES & SOCIAL SCIENCE (THEORY)	-	-	-	2	-	-	-	100	03	-	-	100	100	THEORY		
6.2	INDUSTRIAL HANDS-ON PRACTICE	INDUSTRIAL TRAINING	-	-	-	12	150*			200**					350			
6.3	INDUSTRIAL PROJECT	INDUSTRIAL TRAINING	-	-	-	4	50*			50**					100			
6.4	SEMINAR	IN HOUSE	-	-	-	2	-	100	100	-	-	-	-	-	100			
Total			-	-	-	20									650			

NOTE:

1. The Industrial training tenure should not be less than 14 weeks.
2. Industry must be registered with MSME/Directorate of industries/Limited Organization/State/Central Government establishments.
3. Monthly progress reports of Intern/ Trainee should be attested and forwarded by industrial supervisor (allotted to Intern/Trainee) during industrial Internship/Training.
4. The Industrial unit/organisation must evaluate students using the format provided by polytechnic in the form of marks.
5. The Industrial Hands on Practice, Industrial Project and seminar must be evaluated on the basis of the AICTE Internship Policy: Guidelines and procedures (Chapter -9 Procedures / format for organizing internship)
6. "Entrepreneurship and Start-up" course is also mandatory in Industrial internship/training mode. It will be conducted online mode by his/her polytechnic institute. After completing the online course, students must appear for exam conducted by the Board of Technical Education, Lucknow.
7. ***Evaluation by faculty mentor**
The institute will depute one faculty member for mentoring at least 20-30 students undertaking apprenticeship training. Such mentors will monitor, guide and provide counselling to the students as and when required. Faculty mentor of the institute(s) may make a surprise visit to the internship/apprenticeship site to check the student's presence physically. (The Proforma of the evaluation is attached as the Annexure -1)
8. **** Evaluation by industry** : The industry shall assess the candidates based on the following parameters attendance, discipline and punctuality, familiarity of tools and material, engineering skills, application of knowledge and problem-solving skills, comprehension and observation, professional ethics, safety and environmental consciousness, communication skills, supervisory skills and general conduct during the period (The Proforma of the evaluation is attached as the Annexure -2)
9. **# Evaluation through seminar presentation/Viva-Voce at the institute** : The student will give a seminar based on his training report, before an expert committee constituted by the concerned department as per norms of the institute. The evaluation will be based on the following criteria:

OPEN ELECTIVE -3

SR.NO.	(Q) THEORY COURSES NAME
1	DISASTER MANAGEMENT (Course offered by Polytechnic Institute)
2	INTERNET OF THINGS (Course offered by Polytechnic Institute)

SR.NO	CERTIFICATE COURSES
1	COURSES CONDUCTED BY CENTRE OF EXCELLENCE (ESTABLISHED BY THIRD PARTY AS: - TATA TECHNOLOGIES. etc) (Annexure-1)
2	COURSES CONDUCTED BY NPTEL OF MINIMUM 02 CREDITS
3	COURSES CONDUCTED BY MOOCS THROUGH SWAYAM
4	COURSES CONDUCTED BY AICTE-ELIS AND CENTRALLY FUNDED TECHNICAL INSTITUTES
5	COURSES CONDUCTED BY THE INSTITUTE OF NATIONAL IMPORTANCE (IIT, NIT,IIT ETC.)
6	COURSES CONDUCTED BY C-DAC.
7	COURSES CONDUCTED BY ISRO E-LEARNING.
8	COURSES CONDUCTED BY OTHER RELEVANT GOVERNMENT, INTERNATIONAL/NATIONAL PLATFORMS OF REPUTE, NEILIT

PROGRAMME ELECTIVE-3

SR.NO.	SUBJECT NAME
1.	POLLUTION CONTROL & SAFETY
2.	MECHANICAL OPERATIONS IN FOOD PROCESSING

PROGRAMME ELECTIVE-4

SR.NO.	SUBJECT NAME
1.	FOOD STORAGE & TRANSPORTATION
2.	PROCESS CONTROL AND INSTRUMENTATION

ANNEXURE-1

LIST OF COURSES CONDUCTED BY TATA TECHNOLOGIES

1. Fundamentals of Innovation and Design Thinking
2. Product Design and Development
3. Product Verification and Analysis
4. Advanced Automobile
5. Electric Vehicle
6. Internet of Things
7. Advanced Manufacturing
8. Advanced Welding & Painting using Simulator
9. Industrial Automation and MES
10. Industrial Robotics
11. Inspection and Quality Control
12. Advanced Plumbing
13. AI and ML

6. DETAILED CONTENTS OF VARIOUS SUBJECTS

PRACTICUM	5.1 CEREALS AND PULSES TECHNOLOGY	L	T	P
		2	-	2

COURSE OBJECTIVES

This subject is aimed at imparting knowledge and skills related to the processing techniques, value addition, and handling processing equipment of cereal, pulses and oilseeds to the students, as the understanding of these aspects is essential for diploma holders in food technology to perform efficiently and effectively in the industry.

COURSE OUTCOMES

After studying this course, the students will be able to:

CO1: Explain the production status, structure and chemical composition of cereals, pulses and oilseeds.

CO2: Describe milling and processing technologies of wheat, rice, maize, barley, sorghum and millets.

CO3: Perform physical and quality evaluation tests for cereals, pulses and oilseeds.

CO4: Explain pretreatment, milling and value-added product development such as pasta and extrusion products.

CO5: Describe by-product utilization and oil extraction processes in cereal and pulse processing industries.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

Course Outcomes (COs)	PO1 Basics & Discipline Knowledge	PO2 Problem Analysis	PO3 Design & Development	PO4 Tools, Experimentation & Testing	PO5 Socio-Economic/ Environmental	PO6 Project Mgmt & Communication	PO7 Lifelong Learning	PSO1	PSO 2
CO1	3	1	–	–	1	–	–	*	*
CO2	3	2	2	2	2	–	–	*	*
CO3	2	3	–	3	1	–	–	*	*
CO4	2	3	1	1	2	–	–	*	*
CO5	2	2	2	2	3	–	1	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENTS

Unit-1:

(08 Periods)

Introduction - Status, production and major growing areas of cereals, pulses and oil seeds in India and world. Structure and chemical composition of cereals, pulses and oil seeds, anti-nutritional factors wherever applicable.

Unit-2: Cereals and millets

(12 Periods)

Wheat: types of wheat, conditioning and tempering, types of wheat milling technology, pasta and extruded products

Rice: Varieties of rice, classification of rice based on various physical parameters, parboiling, milling of rice, and factors affecting quality of rice products.

Maize: Classification of maize, dry and wet milling of corn, preparation of cornflakes.

Barley and sorghum: Grain characteristics, malt production technology, milling, malting and popping of sorghum.

Different millets and their chemical composition, processing and utilization

Experiment:

1. Determination of physical characteristics of rice
2. Determination of physical characteristics of wheat
3. Determination of physical characteristics of pulses
4. Determination of physical characteristics of maize
5. Determination of physical characteristics of barley and Periods)
6. Determination of physical characteristics of oil seeds
7. Milling of wheat to study its effect on various physico-chemical properties
8. Estimation of flour quality: Gluten Ash, Water Absorption Power (WAP), Sedimentation Test, Maltose Value.
9. Parboiling and milling of rice

Unit-3:

Pulses- Pretreatment of pulses for milling, milling of major pulses

(04 Periods)

Experiment:

1. Pre-treatment and milling of pulses

Unit-4:

By-product utilization of different milling industries

(04 Periods)

Experiment:

1. Demonstration of oil extraction and refining of oil, and visit to relevant industry
2. Preparation of Pasta products–Noodles, Macroni, Vermicelli (Sevian)
3. Preparation of ready-to-eat (RTE) food products by extrusion cooking technology

INSTRUCTIONAL STRATEGY

This being one of the most important subjects, teachers should lay emphasis on developing basic understanding of various concepts and principles and procedures involved herein. Suitable tutorial exercises may be designed by the teachers, which require students visit to various industries. Students may also be exposed to various National and international standards. Visits to the relevant industry to demonstrate various operations involved in bakery and confectionary processing industry is a must.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests
- Demonstration of practical by using experimental set-up.
- Presentation and viva-voce

RECOMMENDED BOOKS :

1. Cereal Technology by Kent, CBS.
2. Wheat Chemistry and Technology by Y Pomeranz, AACC.
3. Post Harvest Technology of Cereals pulses and oil seeds by Chakraborty AC, IBH.
4. Rice Chemistry and Technology by Julian, AACC.
5. Chemistry of Technology of Cereals as Food and Feed by Matz.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	08	30
2	12	40
3	04	15
4	04	15
Total	28	100

PRACTICUM	5.2.1 POLLUTION CONTROL AND SAFETY	L	T	P
		2	-	2

COURSE OBJECTIVES

A Chemical Engineering technician must have the knowledge of different types of pollution caused due to industrialization so that he may help in balancing the eco-system and control the pollution by means of control devices. The technician must know various types of accidents which occur in chemical plants and how to safeguard them to avoid injury to men and material.

COURSE OUTCOMES

After completion of this course, the students will be able to:

1. Understand different types of pollution caused due to industrialization.
2. Balance pollutants to save the ecosystem
3. Control pollution by means of control devices
4. Have knowledge of different Acts and rules about the environmental protection.
5. Manage solid wastes to reduce the pollution.
6. Have Knowledge of various types of accidents which occur in chemical plants

COURSE CONTENTS

Unit-1: Introduction & Air Pollution and Control Mechanism (06 Periods)

Environment and Pollution, Classification of pollution e.g. Land, Water, Air, Noise Environment Impact assessment Studies, Character and origin of industrial wastes.

1. Definition of air pollution, Types of Air pollutants and their sources like SPM, SO_x, NO_x, NH₃, F, Cl, CFC, CO₂ etc.
2. Air Pollution control equipment in industries
3. Settling chamber
4. Cyclone
5. Electrostatic precipitator
6. Bag Filter
7. Ambient air quality measurement & their standards

Experiments :

1. Removal of suspended impurities from air using fabric filter.
2. Demonstration of Cyclone Separator for removal of suspended particles from air.

Unit-2: Water Pollution (08 Periods)

1. Water pollution, standards for drinking water, domestic waste water and industrial waste water. Methods of measurement of various parameter like BOD, SS, pH, COD, TDS etc.
2. Methods of treatment of industrial waste water like chemical treatment, physio-chemical treatment, bio-chemical treatment

Experiment:

1. Determination of pH value
3. Determination of turbidity
4. Determination of total solids, suspended solids, and total dissolved solids
5. Determination of dissolved oxygen (DO)/BOD/COD.
6. Determination of sulphate in water
7. Determination of chloride in water
8. Removal of suspended solids from water by coagulation

Unit-3: Environment Protection & Pollution Acts

(06 Periods)

1. Environmental protection from hazardous chemicals waste:
2. Terminology relating to chemical hazards and air pollution, classification of chemical hazards and hazardous chemicals, codes of safety for operational hazards in laboratories, industries etc. (Reference should be made of I.S. Codes)
3. A water pollution prevention control Act 1974, Air Pollution Act 1981, Environment protection Act 1986, Hazardous chemical manufacturing, storage and impact rules 1989 and
4. hazardous waste and management and handling rules 1989, Regulation and control Rules 2000.

Unit-4: Radio Active Pollution & Solid Waste Management

(04 Periods)

Sources and effect on human, animal, plant and material; measurement; means to control and preventive measures

1. Municipal solid waste, biomedical waste, Plastic waste and its management, solid waste disposal methods such as open dumping, sanitary landfilling composting, incineration.
2. Importance of development of green area.

Experiments :

1. Prepare chart for treatments of different solid waste

Unit-5: Safety in Chemical Industry

(04 Periods)

Receiving and storing chemicals- transporting and moving chemicals- Safety in chemical reactions, pipelines with color coding in chemical factories. Precautions in the case of processes in operations involving explosive or inflammable dusts, gases, vapours etc. Maintenance of chemical plants- corrosion health hazards in common chemical processes, Fire hazards and their prevention. Codes of practice and specification for safety equipment (Reference should be made from I.S. Codes), case study of major chemical process industries disasters/accidents.

INSTRUCTIONAL STRATEGY

- Case Study of any disaster should be undertaken. Study should be data based. Field visit to the industries should be planned.
- Student should encourage to undertake project work related to environmental problems.

MEANS OF ASSESSMENT

- Class Test
- Home Assignment
- Attendance
- Sessional Test

RECOMMENDED BOOKS

1. Safety in Process Plant Design by Wells
2. Safety and Accident Prevention in Chemical Operation by H. H, Tana catte and W. S. Wood
3. Engineering Chemistry by P.C. Jain.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1.	06	20
2.	08	30
3.	06	20
4.	04	15
5.	04	15
Total	28	100

PRACTICUM	5.2.2 MECHANICAL OPERATIONS IN FOOD PROCESSING	L	T	P
		2	-	2

COURSE OBJECTIVES

This subject is aimed to develop an understanding among the students about various methods of handling, transportation and storage of food grains and perishables. It will also impart knowledge and skills as how to minimize post-harvest loss of food commodities.

COURSE OUTCOMES

After studying this course, the students will be able to:

CO1: Explain preliminary unit operations such as cleaning, sorting and grading used in food processing.

CO2: Apply principles of size reduction and sieve analysis and evaluate the performance of size reduction equipment.

CO3: Describe mixing, agitation, blending and homogenization processes and related equipment.

CO4: Explain principles and equipment used in separation processes such as filtration, sedimentation, crystallization and distillation.

CO5: Perform experimental analysis and interpret results related to mechanical operations in food processing.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

Course Outcomes (COs)	PO1 Basics & Discipline Knowledge	PO2 Problem Analysis	PO3 Design & Development	PO4 Tools, Experimentation & Testing	PO5 Socio-Economic/ Environmental	PO6 Project Mgmt & Communication	PO7 Lifelong Learning	PSO1	PSO 2	Legend: High (3), Medium (2), Low (1) and No mapping (-)
CO1	3	1	—	1	1	—	—	*	*	
CO2	3	3	2	3	1	—	—	*	*	
CO3	3	2	2	2	1	—	—	*	*	
CO4	3	3	2	3	1	—	—	*	*	
CO5	2	3	1	3	1	—	1	*	*	

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENTS

UNIT-1:

(06 Periods)

Preliminary Unit operation -Cleaning, sorting & Grading-aims, methods and applications.

Experiment:

1. Analysis of sampled foods for physical characteristics.

UNIT-2:**(10 Periods)**

Size Reduction and Sieve Analysis -Theory of comminution; Calculation of energy required during size reduction. Crushing efficiency; Size reduction equipment; Size reduction of fibrous, dry and liquid foods; effects of size reduction on sensory characteristics and nutritive value of food, Sieving: Separation based on size (mesh size); types of screens; effectiveness of screens.

Experiment:

1. Determination of critical speed of ball-mill
2. Size reduction and particle size distribution using hammer-mill

UNIT-3:**(06 Periods)**

Mixing -Mixing, Agitating, kneading, blending, homogenization and related equipment.

Experiment:

1. Analysis of sampled foods for physical characteristics

UNIT-4:**(06 Periods)**

Separation Processes- Principles of Filtration, Sedimentation, Crystallization and Distillation and equipment used.

Experiment:

1. Steam distillation of herbs
2. Concentration by crystallization
3. Clarification of apple juice using filter press

INSTRUCTIONAL STRATEGY

Teachers should prepare tutorial exercises for the students, involving visits to various food-processing units. These tutorials can be considered a mini project. Students may be asked to bring specifications and catalogues from industries. Students may also be exposed to relevant National, BIS and international standards. An intensive exercise on actual workbench performance in the industries is recommended. Experts may be invited to deliver lectures on various themes. Use of audio-visual aids will also be useful for better conceptualization of various operations.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests
- Mid-term and end-term written tests
- Demonstration of practical by using experimental set-up.

RECOMMENDED BOOKS:

1. Rao DG. 2009. Fundamentals of Food Engineering. PHI
2. Sharma K, Mulvaney SJ, and Rizvi SSH. 2012. Food Process Engineering: Theory and Laboratory Experiments. Wiley-India.
3. Singh RP and Heldman DR. 2013. Introduction to Food Engineering. Fifth Edition. AP.
4. Handling, Transportation and Storage of Fruits and Vegetables by A Lloyd, Ryall Penizer (AVI Publications).
5. Proceedings of Regional Workshop on Warehouse Management of Stored Food Grains by Girish and Ashok Kumar (UNDP).

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1.	06	20
2.	10	40
3.	06	20
4.	06	20
Total	28	100

PRACTICUM	5.3 PRINCIPALS OF FOOD PROCESSING & PRESERVATIONS	L	T	P	COURSE
		2	-	2	

OBJECTIVES

Knowledge and skills related to food processing and preservation are essential for the diploma holder in food technology. In this subject, students are exposed to various techniques of food preservation such as low temperature, high temperature, moisture removal, chemical and radiation preservation. Relevant skills will also be imparted through this subject.

COURSE OUTCOMES

After studying this course, the students will be able to:

CO1: Explain the scope of food processing and principles of food spoilage and preservation.

CO2: Describe preservation methods based on sugar and salt and preparation of intermediate moisture foods.

CO3: Explain preservation techniques using low and high temperature methods including refrigeration, freezing, pasteurization and canning.

CO4: Describe preservation methods based on moisture removal such as evaporation and drying.

CO5: Explain the use of food additives, irradiation and microwave processing in food preservation.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

Course Outcomes (COs)	PO1 Basics & Discipline Knowledge	PO2 Problem Analysis	PO3 Design & Development	PO4 Tools, Experimentation & Testing	PO5 Socio-Economic/Environmental	PO6 Project Mgmt & Communication	PO7 Lifelong Learning	PSO1	PSO 2	Legend: High (3), Medium (2), Low (1) and No mapping (-)
CO1	3	2	—	—	2	—	—	*	*	
CO2	2	2	1	2	2	—	—	*	*	
CO3	3	3	2	2	2	—	—	*	*	
CO4	2	3	2	2	2	—	—	*	*	
CO5	2	2	1	2	3	—	1	*	*	

PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENTS

UNIT-1:

(04 Periods)

Scope and trends in food industry - Status of Indian food industry with emphasis on State of Haryana. Definition of food – food technology, food science, food preservation and food engineering –basic considerations. Importance of food processing and preservation. Classification of foods on the basis of shelf life, pH, origin; Different types of food spoilage viz. microbiological, bio-chemical, chemical, physical and their effects on food quality. Principles of food preservation.

Experiment:

1. Study of changes in fruits/ vegetables during storage

UNIT- 2:

(04 Periods)

Preservation by sugar and salt - Principles of Salt and sugar preservation, Intermediate Moisture Food (IMF) like jam, jelly and marmalade. Techniques of pickling.

Experiment:

1. Preparation of brine and syrup
2. Preparation of Jam, Jelly & squash

UNIT- 3:

(08 Periods)

3.1 Preservation by Low Temperature-

Low temperature required for different foods – refrigeration – refrigeration load, refrigeration systems; slow and fast freezing, freezing process; types of freezer, advantages and disadvantages of freezing; storage and thawing of frozen food.

Experiments:

1. Freezing of seasonal vegetables, meat and fish products
2. Storage of frozen products

3.2 Preservation by High Temperature -

Pasteurization, Sterilization, Canning: their Definition, Method, advantages and disadvantages.

Experiment:

1. Blanching of seasonal fruits and vegetables

UNIT-4: Moisture Removal

(04 Periods)

Evaporation, concentration, drying and dehydration, types of dryers, advantages and disadvantages, and selection of dryers.

Experiment:

1. Dehydration of fruits & vegetables

UNIT- 5:

(08 Periods)

5.1 Food Additives including Chemical Preservatives-Classification, functions and uses in foods.

5.2 Preservation of foods by Radiation – Irradiation of foods, Radiation doses for spices, onions, potatoes and meat. Concept of microwave heating effect on food quality

Experiment:

1. Pickle preparation

INSTRUCTIONAL STRATEGY

This being one of the most basic subjects for the students of food technology, the teachers should lay a lot of emphasis on explaining the facts, concepts, principles and procedures involved in various topics. The students should be given appropriate tutorial exercises. Teachers should make use of charts and other appropriate media to support classroom instruction. Emphasis during the practical session should be on performance by individual students and teachers should develop instructional manuals for various exercises to facilitate the students. Visits to some of the local industries and quality control centers may be arranged to demonstrate various aspects of food technology and preservation and principle involved there into the students. Experts may be invited to deliver lectures on the latest developments in the field.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests
- Mid-term and end-term written tests
- Demonstration of practical by using experimental set-up.

RECOMMENDED BOOKS

1. Food Science by N N Potter, CBS publishers, New Delhi
2. Technology of Food Preservation by Desrosier, The Avi Publishing Company, Inc., Westport.
3. Principles of Food Science Vol.– I by Fennema, Karrel, McGraw-Hill Book Company, New York.
4. Preservation of Fruits and Vegetables by Girdhari Lal, Sidhapaand Tandon, CBS Publishers, Delhi
5. Food Canning Technology by Larcousse & Brown
6. Food Composition & Preservation by Bhawna Sabarwal, Commonwealth Publishers 1999, New Delhi.
7. Food Preservation by S.K. Kulshrestha, vikas publishing house Pvt. Ltd., New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1.	04	10
2.	04	15
3.	08	30
4.	04	15
5.	08	30
Total	28	100

PRACTICUM	5.4.1. FOOD STORAGE & TRANSPORTATION	L	T	P	COURSE
		2	-	4	

OBJECTIVES

This subject is aimed to develop an understanding among the students about various methods of handling, transportation and storage of food grains and perishables. It will also impart knowledge and skills as how to minimize post-harvest loss of food commodities.

COURSE OUTCOMES

After studying this course, the students will be able to:

CO1: Explain the importance of handling, transportation and storage in reducing post-harvest losses.

CO2: Describe various material handling systems and conveying equipment used in food industries.

CO3: Explain storage requirements and spoilage control measures for grains, fruits and vegetables.

CO4: Describe handling, transportation and storage requirements of animal foods and milk to maintain quality.

CO5: Explain cold storage systems and evaluate their role in preservation of perishable foods.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

Course Outcomes (COs)	PO1 Basics & Discipline Knowledge	PO2 Problem Analysis	PO3 Design & Development	PO4 Tools, Experimentation & Testing	PO5 Socio-Economic/ Environmental	PO6 Project Mgmt & Communication	PO7 Lifelong Learning	PSO1	PSO 2	Legend: High (3), Medium (2), Low (1) and No mapping (-)
CO1	3	2	–	–	3	–	–	*	*	
CO2	3	2	2	2	2	–	–	*	*	
CO3	2	3	2	2	3	–	–	*	*	
CO4	2	3	1	2	3	–	–	*	*	
CO5	2	2	2	2	3	–	1	*	*	

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENTS

UNIT-1:

(04 Periods)

Introduction -Scope and importance of handling, transportation and storage of food and food products, post-harvest losses

Experiment:

1. Sampling Techniques of stored foods from different storage structures and conditions

UNIT-2:**(04 Periods)**

Handling, Transportation and Storage -Various unit operations of post-harvest handling, transportation, introduction to different conveying systems like belt conveyors, chain conveyors, screw conveyors, hydraulic conveyors, pneumatic conveyors, vibrating and oscillating conveyors, bucket elevators–their selection, operation and maintenance.

UNIT-3:**(08 Periods)****3.1 Grains-**

Preparation of grains for storage, Storage requirements, infestation control, mycotoxin, handling practices, causes of spoilage and their prevention, factors affecting quality of grain during storage and types of storage structures and facilities.

3.2 Fruits and Vegetables-

Handling, transportation and storage, spoilage and prevention.

Experiment :

1. Analysis of sampled grain for foreign matter like straw parities, rodent excreta and rodents & insects infected grains.

UNIT-4:**(08 Periods)****4.1 Animal Foods-**

Pre-slaughter handling and transportation system–their effects on quality of meat products, transportation and storage requirements, ante-mortem examination of animal.

4.2 Milk-

Collection, pre-cooling ,handling and transportation systems–their effects on quality of milk.

Experiment :

1. Visit to a public distribution system (PDS) showing storage facilities, warehouse, cold storage, refrigeration system and slaughter house etc.
2. Determination of changes in pH and acid values in storage of milk

UNIT-5:**(04 Periods)**

Cold Storage -Introduction to cold storage facilities & requirements for storage of different fruits and vegetables.

Experiment :

1. Visit to demonstration of material handling systems in various food industries
2. Visits to cold storage

INSTRUCTIONAL STRATEGY

Teachers should prepare tutorial exercises for the students, involving visits to various food-processing units. These tutorials can be considered a mini project. Students may be asked to bring specifications and catalogues from industries. Students may also be exposed to relevant National, BIS and international standards. An intensive exercise on actual workbench performance in the industries is recommended. Experts may be invited to deliver lectures on various themes. Use of audio-visual aids will also be useful for better conceptualization of various operations.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests
- Mid-term and end-term written tests
- Demonstration of practical by using experimental set-up.

RECOMMENDED BOOKS:

1. Handling, Transportation and Storage of Fruits and Vegetables by A Lloyd, Ryall Penizer (AVI Publications)
2. Proceedings of Regional Workshop on Warehouse Management of Stored Food Grains by Girish and Ashok Kumar (UNDP)
3. Controlled Atmospheric Storage of Fruits by Mettel Skilv
4. Food Grains in Tropical and Sub Tropical Areas by Hall
5. Food Storage Part of a system by Sinha and Muir (AVI)

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	04	10
2	04	15
3	08	30
4	08	30
5	04	15
Total	28	100

PRACTICUM	5.4.2 PROCESS CONTROL AND INSTRUMENTATION	L	T	P
		2	-	4

COURSE OBJECTIVES

The subject Automatic Process Control deals with the different types of controls in processes in chemical industries including automatic control systems. Process characteristics of first order (i.e. time constant element) and second order (i.e. oscillatory type element). Different modes of control action and closed loop in automatic control are well known. The student will be well conversant with these process control systems.

COURSE OUTCOMES

After studying this course, the students will be able to:

CO1: Explain the principles and working of instruments used for measurement of temperature, pressure, level and flow rate.

CO2: Describe process dynamics, elements of control systems and mathematical modeling of first and second order systems.

CO3: Analyze the behavior and response of process control systems using transfer functions and feedback concepts.

CO4: Apply different control modes (P, PI, PD, PID, ON-OFF) and evaluate controller performance in industrial processes.

CO5: Explain the fundamentals of PLC and DCS in modern process automation systems.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

Course Outcomes (COs)	PO1 Basics & Discipline Knowledge	PO2 Problem Analysis	PO3 Design & Development	PO4 Tools, Experimentation & Testing	PO5 Socio-Economic/Environmental	PO6 Project Mgmt & Communication	PO7 Lifelong Learning	PSO1	PSO 2	Legend: High (3), Medium (2), Low (1) and No mapping (-)
CO1	3	2	1	3	–	–	–	*	*	
CO2	3	3	2	2	–	–	–	*	*	
CO3	3	3	2	2	–	–	1	*	*	
CO4	2	3	3	3	1	–	1	*	*	
CO5	3	2	2	2	1	–	1	*	*	

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENTS

Unit-1: Instrumentation

(06 Periods)

1. Temperature : Types of Temperature measuring instruments, Bimetallic Thermometer , Thermocouples, RTD , Temperature Transmitter.
2. Pressure: Types of Pressure measuring instruments, Bourdon Tube gauge, U Tube Manometer, Diaphragm pressure sensor, Pressure Transmitter.
3. Level measurement: Types of Level measuring instruments, Float type Level measuring instrument, Ultrasonic Level measuring instrument, Differential Pressure Type Level measuring instrument, level transmitter.
4. Flow rate: Types of Flow rate measuring instruments, Mass flow meter

Experiment:

1. Measurement of Temperature by Thermocouple module.
2. Measurement of Temperature by of RTD module.
3. Level measurement by using Differential Pressure (DP) Transmitter.
4. Measurement of Pressure by Bourdon Pressure Transducer.

Unit-2: Introduction: Process Dynamics

(06 Periods)

Automatic control system and its significance; Manual v/s Automatic control, Physical and block diagrams of stirred tank heater system.

Elements of control System: Controller, Measuring instrument, Final control elements, Transmitter, Transducers.

Process Characteristics: Process variables, Laplace transformation, Forcing functions: step, ramp, impulse and sinusoidal function.

Unit-3: Elements of Process Dynamics

(08 Periods)

1. Ist order system - Examples of 1st order system: Naked bulb thermometer and its derivation; Stirred tank heater; Mixing process; Liquid levels (derivation excluded).
2. IInd order system- Examples of 2nd order system: Non-Interacting and Interacting system (concept only). Transfer function of 2nd order system (derivation excluded); Terms used in Underdamped system: Decay ratio, Overshoot, Response time and Rise time.

Experiment:

1. Study of ON- OFF controller using Temperature controller Trainer kit by monitoring the process in SCADA mode or Analog mode
2. Study of characteristics of control valve (Linear, Equal% and Quick opening).
3. Study the linearity of P/I and I/P converter (Transducers).
4. Study of P, PI, PD and PID controller using Pressure controller Trainer kit by monitoring the process in SCADA mode or Analog mode
5. To study the response of two tank in non-interacting liquid level system.
6. To study the response of two tank in interacting liquid level system.

Unit-4: Controller Characteristic or Modes of Control Action

(06 Periods)

Standard block diagram symbol, overall transfer function for a single loop system, Negative and positive feedback system, servo and regulatory problem, Final control elements: control valve mechanism, Elements of controller, Type of controllers: proportional control, Two positions/ON-OFF control, integral control, proportional-integral control, proportional derivative control, proportional-integral-derivative control their comparison.

Experiment:

1. To study on-off controller for temperature control.
2. To calibrate pressure gauge with the help of dead weight pressure gauge

Unit-5: Introduction to Programmable Logic Controller (PLC) and Distributed Control System (DCS)

(02 Periods)

INSTRUCTIONAL STRATEGY

The subject gives the knowledge of various process, instruments and controls to measure process parameters. So the theoretical knowledge of this subject should be properly imparted to the students with the help of practical examples. Each topic should be supplemented with examples.

MEANS OF ASSESSMENT

- Class Test
- Home Assignment
- Sessional Test
- Practical work

RECOMMENDED BOOKS

1. Industrial Instrumentation by Donald P. Eckman, Wiley Eastern Publications.
2. Process System Analysis and Control by Coughanowr and Steven LeBlanc, McGraw Hill publications.
3. Industrial Instrumentation by SK Singh, Tata McGraw Hill Publications.
4. Principles of Industrial Instrumentation by D. Patranabis; Tata McGraw Hill Company
5. Chemical Process Control: An Introduction to Theory BY George Stephanopoulos

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted(%)
1	6	25
2	6	25
3	8	25
4	6	20
5	2	5
Total	28	100

AUDIT COURSE	5.5 INDIAN CONSTITUTION	L	T	P
		2	-	-

COURSE OBJECTIVES:

To provide a comprehensive understanding of the Indian Constitution's history and philosophy, and to familiarize them with the administrative structure, powers, and functions of the Union, State, and Local governments, along with the Judiciary and Election Commission.

COURSE OUTCOMES:

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

CO1: Explain the making of the Indian Constitution, interpret the Preamble, and discuss the significance of Fundamental Rights and Duties.

CO2: Describe the structure of the Union Executive, detailing the powers and roles of the President, Prime Minister, and Council of Ministers.

CO3: Distinguish between the functions of the Lok Sabha and Rajya Sabha and explain the jurisdiction and structure of the Supreme Court.

CO4: Discuss the administrative framework of State Governments, focusing on the roles of the Governor, Chief Minister, and State Secretariat.

CO5: Outline the hierarchy and functions of Local Administration, including District Administration, Municipal Corporations, and Zila Panchayats.

CO6: Examine the structure of the Election Commission of India and its critical role in conducting free and fair elections.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Engineering Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	-	-	-	-	3	1	3	*	*
CO2	-	-	-	-	2	2	2	*	*
CO3	-	-	-	-	3	1	2	*	*
CO4	-	-	-	-	2	2	2	*	*
CO5	-	-	-	-	3	2	2	*	*
CO6	-	-	-	-	3	1	2	*	*

Legend
: High (3), Medium (2), Low (1) and No mapping (-)
* PSOs will be developed by respective programme coordinator at

institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENT

Unit – I: The Constitution – Introduction

(06 Periods)

The History of the Making of the Indian Constitution
Preamble and the Basic Structure, and its interpretation
Fundamental Rights and Duties and their interpretation

Unit – II: Union Government

(06 Periods)

Structure of the Indian Union Government

President – Election, Role and Power
Prime Minister and Council of Ministers

Unit – III: Indian Legislature & Judiciary (06 Periods)
Composition of Lok Sabha and Rajya Sabha
Powers & Functions of Lok Sabha and Rajya Sabha
Structure of Supreme Court including Appointment of Judges
Powers & Functions of Supreme Court

Unit – IV: State Government (03 Periods)
Governor – Role and Power
Chief Minister and Council of Ministers
State Secretariat

Unit – V: Local Administration (04 Periods)
District Administration
Municipal Corporation
Zila Panchayat

Unit – VI: Election Commission (03 Periods)
Structure of Election Commission of India
Role and Function of Election Commission

INSTRUCTIONAL STRATEGY

Teach the Indian Constitution through interactive methods like case studies, debates, and role-plays to engage students. Use visuals and simplified texts to explain key features like fundamental rights and duties. Encourage discussions on amendments and landmark judgments. Incorporate quizzes and group projects to foster critical thinking and civic awareness.

MEANS OF ASSESSMENT

- Class test/quizzes
- Home assignments
- Attendance
- Sessional Test

RECOMMENDED BOOKS:

1. Ethics and Politics of the Indian Constitution Rajeev Bhargava Oxford University Press, New Delhi, 2008
2. The Constitution of India B.L. Fadia Sahitya Bhawan; New edition (2017)
3. Introduction to the Constitution of India DD Basu Lexis Nexis; Twenty-Third 2018 edition
4. Our Constitution Subhash Chand Kashyap NBT New Delhi.

SUGGESTED SOFTWARE/LEARNING WEBSITES:

- 1.1. <https://www.constitution.org/cons/india/const.html>
- 1.2. <http://www.legislative.gov.in/constitution-of-india>
- 1.3. <https://www.sci.gov.in/constitution>
- 1.4. <https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/>
- 1.5. <https://ncert.nic.in/textbook.php>

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
1	6	20
2	6	20
3	6	20
4	3	12
5	4	16
6	3	12
Total	28	100

PRACTICUM	5.6 FOOD PACKAGING TECHNOLOGY	L	T	P
		2	-	4

COURSE OBJECTIVES

The main objective of this subject is to impart knowledge and skills related to designing packaging system in food products and developing skills in handling of packaging equipment in the students.

COURSE OUTCOMES

After studying this course, the students will be able to:

CO1: Explain the importance, types and properties of food packaging materials.

CO2: Analyze different packaging systems such as vacuum, MAP, CAP, aseptic and active packaging.

CO3: Perform physical and mechanical testing of packaging materials using standard methods.

CO4: Select suitable packaging systems and machinery for different food products.

CO5: Explain packaging regulations, labeling requirements and industrial practices.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

Course Outcomes (COs)	PO1 Basics & Discipline Knowledge	PO2 Problem Analysis	PO3 Design & Development	PO4 Tools, Experimentation & Testing	PO5 Socio-Economic/ Environmental	PO6 Project Mgmt & Communication	PO7 Lifelong Learning	PSO1	PSO 2
CO1	3	2	–	1	2	–	–	*	*
CO2	2	3	2	2	2	–	–	*	*
CO3	2	3	1	3	2	–	–	*	*
CO4	2	2	3	2	2	–	–	*	*
CO5	2	2	1	1	3	–	1	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENTS

UNIT -1:

(04 Periods)

Introduction, Definition, importance and scope of packaging of foods, Packaging Materials, Origin of packaging materials, types, properties, advantages & disadvantages of packaging materials.

UNIT-2:

(12 Periods)

Types of packaging, Vacuum packaging, gas packaging, MAP, CAP, active packaging, aseptic packaging, edible packaging, shrink packaging. Brief Introduction to physical properties: WVTR, GTR, bursting strength, tensile strength, tearing strength, drop test, puncture test, impact test etc.

Experiment:

1. Identification of different types of packaging and packaging materials
2. Determination of tensile strength of given material
3. To perform different destructive tests for glass containers
4. To perform non-destructive tests for glass containers such as physical examination
5. Determination of wax weight
6. Determination of tearing strength of paper
7. Measurement of thickness of packaging materials
8. To perform grease-resistance test in plastic pouches
9. Determination of bursting strength of packaging material
10. Determination of water- vapour transmission rate for paper
11. Demonstration of can-seaming operation
12. Determination of drop test of food package

UNIT-3:

(04 Periods)

Packaging Requirements-

Packaging requirements and their selection for raw and processed foods

- a. Meat, fish, poultry, eggs
- b. Milk and dairy products
- c. Fruits and vegetables
- d. Cereal grains and baked food products
- e. Beverages
- f. Snacks

UNIT-4:

(04 Periods)

Packaging Machinery-

Bottling, conformer, form fill and seal machines, bags—their manufacturing and closing, vacuum packs unit, shrink pack unit, tetra pack unit.

UNIT-5:

Package labeling— functions and regulations

(04 Periods)

Experiment:

1. Visit to relevant industries.

INSTRUCTIONAL STRATEGY

This being one of the most important subject, teacher should lay emphasis on developing basic understanding of various concepts and principles and procedures involved herein. Suitable tutorial exercises may be designed by the teachers, which require students visit to various industries. Students may also be exposed to various National and international standards. Visits to the relevant industry for demonstrating various operations involved in bakery and confectionary processing industry is a must.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests
- Demonstration of practical by using experimental set-up.
- Presentation and viva-voce

RECOMMENDED BOOKS

1. Handbook of Packaging by Paine and Paine; Morgan-Grampian Publishing Co., New York(1976).

2. Manual of Analyzing for Fruits and Vegetables Products by S Ranganna; CBS Publishers & Distributor, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1.	04	15
2.	12	40
3.	04	15
4.	04	15
5.	04	15
Total	28	100

PRACTICUM	6.1 FOOD QUALITY CONTROL & LAWS	L	T	P
		3	-	2

COURSE OBJECTIVES

In the production of processed foods, one of the important aspects is to assure quality. This subject is introduced in the curriculum to impart knowledge and skills in the students related to various food quality parameters/systems, techniques of food analysis, food laws and standards.

COURSE OUTCOMES

After studying this course, the students will be able to:

CO1: Explain principles of proximate analysis and quality control systems in food industries.

CO2: Apply appropriate sampling techniques and analyze physicochemical properties of food products.

CO3: Perform sensory evaluation and interpret statistical quality control data.

CO4: Explain food laws, regulatory agencies and standards governing food quality and safety.

CO5: Describe hygiene, sanitation practices and quality assurance systems such as GMP, GHP, GLP and HACCP.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

Course Outcomes (COs)	PO1 Basics & Discipline Knowledge	PO2 Problem Analysis	PO3 Design & Development	PO4 Tools, Experimentation & Testing	PO5 Socio-Economic/Environmental	PO6 Project Mgmt & Communication	PO7 Lifelong Learning	PSO1	PSO 2	Legend: High (3), Medium (2), Low (1) and No mapping (-)
CO1	3	2	—	3	2	—	—	*	*	
CO2	2	3	1	3	2	—	—	*	*	
CO3	2	3	—	3	2	—	—	*	*	
CO4	2	2	—	1	3	—	1	*	*	
CO5	2	2	1	2	3	—	1	*	*	

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENTS

UNIT-1:

(10 Periods)

Introduction-

1.1 Principle behind different methods of proximate analysis of

- Moisture
- Ash
- Crude Fat
- Crude Protein
- Crude Fibre
- Total Carbohydrates

1.2 Concept, objectives and need of

- quality,
- quality control and
- quality assurance

- d. TQM(Total Quality Management) and
- e. TQC(Total Quality Control),
- f. Plan and methods of quality control

Experiment:

1. Proximate analysis of marketed food products
 1. Moisture
 2. Ash
 3. Crude Fat
 4. Crude Protein
 5. Crude Fibre
 6. Total Carbohydrates

UNIT-2 :

(08 Periods)

Sampling-

Definition of sampling, purpose, sampling techniques requirements and sampling procedures for liquid, powdered and granular materials

UNIT-3:

(06 Periods)

Physicochemical and mechanical properties-

Colour, gloss, flavour, consistency, viscosity, texture and their relationship with food quality

Experiment:

1. Detection of basic tastes and their threshold values

UNIT-4:

(08 Periods)

Sensory quality control -

Definition, objectives, panel selection and their training, subjective and objective methods, interpretation of sensory results in statistical quality control, consumer preferences and acceptance.

Experiment:

1. Statistical analysis of sensory data.
2. Consumer acceptability trial.

UNIT-5 :

(10 Periods)

5.1 Food Laws and Regulations in India - Agencies and standards:

- a. BIS (Bureau of Indian Standards)
- b. AGMARK (Agricultural Marketing Board)
- c. PFA (Prevention of Food Adulteration Act)
- d. FSSA (Food Safety and Standards Act)
- e. FPO (Fruit Products Order)
- f. MOFPI (Ministry of Food Processing Industries)
- g. ISO (International Organization for Standardization)-Objectives and principles
- h. CAC (Codex Alimentarius Commission)

5.2 General Hygiene and Sanitation in food industry

5.3 Concepts of:-

- a. GMP (Good Manufacturing Practices)

- b. GHP (Good Hygienic Practices)
- c. GLP (Good Laboratory Practices)
- d. HACCP(Hazard analysis and critical control point)

Experiment:

1. Visits to the quality control laboratories of the food industry, educational institutions and testing centres.

INSTRUCTIONALSTRATEGY

This being one of the most important subjects, teacher should lay emphasis on developing basic understanding of various concepts and principles and procedures involved herein. Suitable tutorial exercises may be designed by the teachers, which require students visit to various industries. Students may also be exposed to various National and international standards. Visits to the relevant industry for demonstrating various operations involved in the food evaluation and quality control is a must. Experts from the industry may be invited to deliver lectures on the latest technology. Knowledge from pollution control and devices for the same may be provided to the students. Wherever relevant, students may be made aware about safety aspects.

RECOMMENDED BOOKS

1. Food Analysis by Suzzane Nielsen
2. ISI Handbook of Food Analysis-(18Volumes in 5 parts)- BIS
3. AOAC-18th Edition-(CDROM Edition)
4. Hand Book of Analysis of Fruits and Vegetables by S Ranganna (THM)
5. Food Analysis Theory and Practices by Pomeranz and Meloan (AVI)
6. Quality Control for the Food Industry (Vol. I and II) by Kramer and Twigg (AVI)
7. Laboratory Methods of Sensory Evaluation by Larmond
8. Sensory Analysis by Piggot

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted(%)
1	10	25
2	08	20
3	06	10
4	08	20
5	10	25
Total	42	100

THEORY	6.2 ENTREPRENEURSHIP AND START-UP	L	T	P
		2	-	

COURSE OBJECTIVES:

To foster an entrepreneurial mindset by equipping students with the skills to identify business opportunities, formulate comprehensive business plans, understand management functions, and navigate the financial and legal landscapes of starting and sustaining a venture.

COURSE OUTCOMES:

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

CO1: Explain the concept of entrepreneurship, classify business structures, and distinguish between the roles of an entrepreneur, intrapreneur, and manager.

CO2: Identify feasible business ideas using activity maps and develop a preliminary Business Plan based on case study analysis.

CO3: Analyze market strategies using STP and SWOT analysis, and formulate the Vision, Mission, and Objectives for a start-up.

CO4: Discuss the fundamental functions of management, organizational structures, and the processes of recruitment, selection, and training.

CO5: Select appropriate financing methods (Govt schemes, Venture Capital) and apply Intellectual Property Rights (IPR) concepts to protect business ideas.

CO6: Describe the strategies for business succession, harvesting, and the legal types of dissolution.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Engineering Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	-	-	-	-	2	3	2	*	*
CO2	-	2	2	-	1	3	2	*	*
CO3	-	2	2	-	2	3	2	*	*
CO4	-	-	-	-	1	3	1	*	*
CO5	-	2	-	-	2	3	2	*	*
CO6	-	-	-	-	1	3	1	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENTS

Unit – I: Introduction to Entrepreneurship and Start – Ups

(05 Periods)

Definitions, Classification of Entrepreneur

Traits of an Entrepreneur, Intrapreneurship, Motivation

Types of Business Structures- On the Basis of size and on the basis of ownership

Similarities/differences between entrepreneurs and managers

Unit – II: Business Ideas and their implementation**(05 Periods)**

Discovering ideas and visualizing the business

Activity map

Business Plan (Case Study)

Unit – III: Ideas to Start-up**(05 Periods)**

Marketing and Accounting- Definition and Importance.

Market Analysis – STP (Segmentation, Targeting, Positioning)

Competition evaluation and Strategy Development – Vision, Mission, Goal, Objectives.

Risk analysis- SWOT Analysis.

Unit – IV: Management**(05 Periods)**

Definition Concept and Functions of Management

Company's Organization Structure- Concept and Classification

Recruitment and Selection- Definition,

Training and Development- Importance.

Unit – V: Financing and Protection of Ideas**(04 Periods)**

Financing methods available for Entrepreneurship/ Startups in India (Government Scheme, Banking, NBFCs, SHG and Micro Financing).

Intellectual Property Rights- Overview of - Copyrights, Trademark, Geographical Indicators, Patenting and Licenses

Communication of Ideas to potential investors – Investor Pitch.

Unit – VI: Succession, Dissolution and Harvesting strategy**(04 Periods)**

Ways of succession

Types of Dissolution

INSTRUCTIONAL STRATEGY

Some of the topics may be taught using question/answer, assignment, seminar or case study method. The teacher will discuss stories and case studies with students, which in turn will develop appropriate managerial and entrepreneurial and start-up qualities in the students. In addition, expert lecturers may also be arranged from outside experts and students may be taken to nearby industrial organizations on visit. Approach extracted reading and handouts may be provided.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests
- Mid-term and end-term written tests
- Model/Proto type making.

RECOMMENDED BOOKS:

1. The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company – Steve Blank and Bob Dorf, K & S Ranch, ISBN: 978-0984999392
2. Entrepreneurship Development (A New Venture Creation) – Vasant Desai, Himalaya Publishing House
3. Entrepreneurship Development – S.S. Khanka, S. Chand & Company Ltd., New Delhi
4. Entrepreneurship Development – Gupta and Srinivasan, S. Chand & Company Ltd., New Delhi
5. Demand: Creating What People Love Before They Know They Want It – Adrian J. Slywotzky with Karl Weber, Headline Book Publishing, ISBN: 978-0755388974
6. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses – Eric Ries, Penguin UK, ISBN: 978-0670921607
7. The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business – Clayton M. Christensen, Harvard Business Review Press, ISBN: 978-1422196021

SUGGESTED SOFTWARE/LEARNING WEBSITES:

1. <https://www.fundable.com/learn/resources/guides/startup>
2. <https://corporatefinanceinstitute.com/resources/knowledge/finance/corporate-structure/>
3. <https://www.finder.com/small-business-finance-tips>
4. <https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/>
5. NPTEL Course on Entrepreneurship https://onlinecourses.nptel.ac.in/noc23_mg74/preview
6. National Geographic Channel you tube Video on “GI Tag Crafts of Bharat”

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
1	05	15
2	05	15
3	05	15
4	05	15
5	04	20
6	04	20
Total	28	100

THEORY	6.4.1 DISASTER MANAGEMENT	L	T	P
		2	-	

COURSE OBJECTIVES:

Following are the objectives of this course:

- To learn about various types of natural and man-made disasters.
- To know pre- and post-disaster management for some of the disasters.
- To know about various information and organisations in disaster management in India.
- To get exposed to technological tools and their role in disaster management.

COURSE OUTCOMES:

After completing this course, student will be:

CO1: Acquainted with fundamental concepts of disaster, hazard, vulnerability, risk, and capacity, and explain their inter-relationships.

CO2 : Classify various types of disasters (Geological, Hydro-meteorological, Biological, Man-made) and analyze their causes, trends, and consequences.

CO3 : Apply the Disaster Management Cycle (Pre, During, Post) and global frameworks (Hyogo, IDNDR) to plan for risk assessment and mitigation.

CO4 : Familiarised with institutional and legal mechanism of Disaster Management in India, including the DM Act 2005 and the role of various agencies.

CO5: Able to select scientific tools (GIS, RS, GPS) and engineering practices (structural/non-structural mitigation) for disaster preparedness and safe construction.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Engineering Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PS O 1	PSO 2
CO1	2	-	-	-	3	-	1	*	*
CO2	3	2	-	-	3	-	2	*	*
CO3	1	2	1	-	3	2	2	*	*
CO4	2	-	-	-	3	1	2	*	*
CO5	3	2	1	2	3	2	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENT

Unit-I:

(02 Periods)

Understanding Disaster

Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity–Disaster and Development, and disaster management.

Unit-II:

Types, Trends, Causes, Consequences and Control of Disasters

(05 Periods)

Geological Disasters (earthquakes, landslides, tsunamis, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire);

Technological Disasters (chemical, industrial, radiological, nuclear) and Man made Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends–Emerging Risks of Disasters–Climate Change and Urban Disasters.

Unit-III:

Disaster Management Cycle and Framework

(08 Periods)

Disaster Management Cycle–Paradigm Shift in Disaster Management.

Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness.

During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Relief and Rehabilitation –

Post-disaster–Damage and Needs Assessment, Restoration of Critical Infrastructure–Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Framework of Action.

Unit-IV:

Disaster Management in India

(05 Periods)

Disaster Profile of India–Mega Disasters of India and Lessons Learnt. Disaster Management Act 2005–Institutional and Financial Mechanism, National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter Governmental Agencies.

Unit-V:

Applications of Science and Technology for Disaster Management (08 Periods)

Geo-informatics in Disaster Management (RS, GIS, GPS and RS). Disaster Communication System (Early Warning and Its Dissemination). Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions, Structural and Non Structural Mitigation of Disasters S&T Institutions for Disaster Management in India.

RECOMMENDED BOOKS

1. Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management
2. Bhandani, R. K., An overview on natural & man-made disasters and their reduction, CSIR, New Delhi.
3. Srivastava, H.N., and Gupta G.D., Management of Natural Disasters in developing countries, Daya Publishers, Delhi
4. Alexander, David, Natural Disasters, Kluwer Academic London
5. Ghosh, G.K., Disaster Management, APH Publishing Corporation
6. Murthy,D.B.N., Disaster Management: Text & Case Studies, Deep & Deep Pvt. Ltd

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
I	02	10
II	05	19
III	08	28
IV	05	19
V	08	24
Total	28	100

THEORY	6.4.2 INTERNET OF THINGS	L	T	P
		2	-	

COURSE OBJECTIVES:

Internet of Things (IOT) is presently an important technology with wide ranging interest from Government, academia and industry. IoT cuts across different application domain verticals ranging from civilian to defence sectors which includes agriculture, space, health care, manufacturing, construction, water, mining, etc. Today it is possible to build different IOT solutions such as shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

COURSE OUTCOMES:

Students will have good understanding of various aspect of IoT, know some tools and have basic implementation skills.

COURSE CONTENT

UNIT1: (04 Periods)

Introduction to IoT; Sensing; Actuation

UNIT2: (06 Periods)

Basics of IoT Networking, Communication Protocols, Sensor networks

UNIT3: (06 Periods)

Introduction to Arduino programming, Integration of Sensors/Actuators to Arduino

UNIT4: (06 Periods)

Implementation of IoT with Raspberry Pi; Data Handling Analytics

UNIT5: (06 Periods)

Case Studies: Agriculture, Healthcare, Activity Monitoring

INSTRUCTIONAL STRATEGY

Some of the topics may be taught using question/answer, assignment, seminar or case study method. The teacher will discuss stories and case studies with students, which in turn will develop appropriate managerial and entrepreneurial and start-up qualities in the students. In addition, expert lecturers may also be arranged from outside experts and students may be taken to nearby industrial organizations on visit. Approach extracted reading and handouts may be provided.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests
- Mid-term and end-term written test

RECOMMENDED BOOKS

1. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
2. Internet of Things by Dr. Jeeva Jose, Khanna Publishing House (Edition 2017)
3. "Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti (Universities Press)
4. Internet of Things: Architecture and Design Principles, Raj Kamal, McGraw Hill

SUGGESTED SOFTWARE/LEARNING WEBSITES:

1. https://nptel.ac.in/noc/individual_course.php?id=noc17-cs22

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
1	04	20
2	06	20
3	06	20
4	06	20
5	06	20
Total	28	100

7. GUIDELINES FOR THE ASSESSMENT OF STUDENT-CENTRED ACTIVITIES (SCA)

It was discussed and decided that the maximum marks for SCA should be 50 as it involves a lot of subjectivity in the evaluation. The marks may be distributed as follows:

i. 15 Marks for general behaviour and discipline
(by HODs in consultation with all the teachers of the department)

ii. 10 Marks for attendance as per following:
(by HODs in consultation with all the teachers of the department)

- | | | |
|----|-----------|----------|
| a) | 75 - 80% | 6 Marks |
| b) | 80 - 85% | 8 Marks |
| c) | Above 85% | 10 Marks |

iii. * Even Semester:

25 Marks maximum for Sports/NCC/Cultural/Co-curricular/NSS activities as per following: (by In-charge Sports/NCC/Cultural/Co-curricular/NSS)

- a) State/National Level participation
- b) Participation in two of above activities
- c) Inter-Polytechnic level participation

****Odd Semester:**

25 Marks maximum

- a) Language Lab Practices / foreign language practices
- b) Group Discussion and Personality Development
- c) Industrial Visits/Industrial Talks
- d) Power Point Presentations and Resume Making
- e) Development of Aptitude and Reasoning Skills
- f) Participation in the technical Exhibitions, Symposiums, Seminars, Workshops at the Institute /District/State/National Level.

8. RESOURCE REQUIREMENT

A. PHYSICAL RESOURCES

a) Space requirement

Norms and standards laid down by All India Council for Technical Education (AICTE) are to be followed to work out space requirement in respect of classrooms, tutorial rooms, drawing halls, laboratories, space required for faculty, student amenities and residential area for staff and students.

b) Equipment Requirement:

The following Laboratories are required for a diploma programme in Chemical Engineering (3rd and 4th Semester):

FOOD TECHNOLOGY LAB				
S.No.	Name of Equipment	No.	@ Rs. Aprox.	Amt. in Rs. aprox
1	Test tube stand (Plastic/Teflon)	30	20	600
2	Funnel Stand (Plastic/Teflon)	30	20	600
3	Burette Stand Stainless Steel/Wooden/Iron	30	50	1500
4	Pipette Stand Stainless Steel/Wooden/Plastic	30	20	600
5	Fractional Weights set with rider 10 mg to 500 mg with rider	5 sets	25	125
6	Reagents bottles 250 ml 500ml 1000ml	120 25 5	20 25 30	2400 625 150
7	Wide mouth bottle 250 ml Glass	50	15	750
8	Winchester bottle 2.5 liter Plastic/Teflon	15	30	450
9 i ii	Test tubes 1/4" x 6" Corning or Borosil Glass	200 200	9 2	1800 400
10 i ii	Boiling tube 1" x 6" Corning or Borosil Glass	100 100	16 5	1600 500
12	Pestle and mortar Dia 10 cm 15 cm (Ceramics)	2	30	60
12	Beakers (Glass/Borosil/Corning Plastic) 250ml 500ml	50 50	20 20	1000 1000
13	Wash bottles (Plastic/Teflon)	30	15	450
14	Conical flask 250 ml. glass (Borosil/Corning/Plastic) Transparent	100	30	3000
15	Flat bottom flask 500 ml. Glass	15	40	600
16	Flat bottom flask 250 ml. Glass	15	25	375
17	Burette 500 ml. (Plastic/Teflon)	30	60	1800
18	Pipette 25 ml. (Plastic/Teflon)	30	20	600
20	Measuring flask 250 ml. with stopper	30	50	1500

20	Measuring Cylinder of various sizes (100 ml, 250 ml, 500 ml, 1000 ml) 3 no. of each	12	30	360
22	Bunsen's burner of brass	30	50	1500
22	Gas plant petrol/LPG 10 to 20 burners automatic	1	5000	5000
24	Spirit lamp (Brass)	30	30	900
25	Tripod stand (Steel/Iron) Large/Medium	30	30	900
26	Wire gauge 15 x 15 cm. with asbestos	30	15	450
27	Test tube holder wooden	50	10	500
28	Porcelain plates Ceramic	30	20	600
29	Funnel 15 cm. Glass Borosil	60	16	960
30	Spatula hard & nickel/steel	2 each	50	100
31	Brush for cleaning	100	10	1000
32	Jars 20 Lit. for keeping distilled water	5	100	500
33	Lab table 2m. x 1.2 m. x 1m. height with central sink and cupboards (Teak wood) with drawers and two built in Amirah on each side with reagent racks, better tile top	4	8000	32000
34	Side racks and selves for bench reagents made of teak wood for 24 bottles each set	4	2000	8000
35	Digital balance electronic Electronics up to 2 decimal places	1	10000	10000
36	Hot plates 7-1/2", 3" Dia controlled 2000 watts	1	1000	1000
37	hot air oven thermostatically controlled with shelves and rotary switches 350 x 350 x 25 high	1	8000	8000
38	PH Meter (Digital)	1	1000	1000
39	Glass Electrode	2	850	1700
40	Reference Electrode	2	850	1700
41	Weight Box 1gm, 2gm x 2, 5gm, 10 gm, 20gm x 2, 50gm, 100gm with for cep miscellaneous	LS		15000
42	Incubator	1		30000
43	Vertical Autoclave	1		30000
44	Analytical Balance	1		50000
45	UV-vis spectrophotometer	1		300000
46	Compound Microscope	1		10000
47	Water distillation plant	1		20000
48	Water bath	1		20000
49	Muffle furnace	1		200000
50	k-jeldal assembly for N2 estimation	1		20000
51	Deep Freezer	1		40000
52	Food Processor	1		7000
53	Sox let Extraction Apparatus Glass Assembly	1		6000
54	Heating Mantle (2 lit & 5 lit)	1		5000
55	Juicer/Mixer/Grinder	1		5000
56	Centrifuge	1		20000
57	Microwave Oven	1		20000
58	Fluidized Bed reactor	1		60000
59	Refrigerator	1		10000
60	Laminar Air Flow	1		20000
61	Clinching Machine	1		7000
62	Butyrometer Glass Assembly	1		2000
63	Refractometer	1		12000
64	Vacuum Oven	1		300000
65	Tray Dryer	1		200000
66	Freeze Dryer	1		500000

67	Baking oven	1		300000
68	Homogenizer	1		50000
69	Cream Separator	1		50000
70	Freeze Drier	1		534000
71	Mini Spray Drier	1		200000
72	Balances	1		126000
73	UV Vs. Spectrophotometer	1		309000
74	Gel Electrophoresis	1		102000
75	Trinocular Microscope	1		214000
76	Microprocessor Controlled gas Chromatograph	1		395000
77	Automatic Solvent Extraction System	1		194000
78	Automatic Solvent Extraction System	1		249000
79	Infra-Red Moisture Analyzer (IR-30)	1		120000
80	Research Microscope	1		127000
81	Automatic Microscope Bomb Calorimeter	1		458000
82	Texture Analyzer	1		864000
83	Potato Chip Making Plant	1		85000
84	Pasta Making Machine	1		308000
85	Economy Khoya Machine	1		78000
86	Automatic Protein Analyzer	1		1250000
87	Water Activity Meter	1		468000
88	Electronic Analytical balance	1		50000
89	Water Treatment Plant	1		128000
90	Colour Measurement System	1		11905

PROCESS CONTROL & INSTRUMENTATION LAB

1. Apparatus for calibration of pressure gauge	01
2. Bimetallic Thermometer	01
3. Energy Meter	01
4. Watt Meter	01
5. Manometers	01
6. Flapper nozzle system apparatus	01
7. On-off Controller	01
8. Thermopiles/ Thermo couple	01
9. Resistance thermometer	01
10. Strip chart recorder	01
11. Circular chart recorder	01
12. Pneumatic valve	01
13. Set up for study response of two tank in non-introductory and interacting system	01
14. P controller, PD controller PID controller	01

POLLUTION CONTROL AND SAFETY LAB

1. BOD incubator (5 C- 50C) with digital temperature indicator	01
2. COD Heater	01

3. Refrigerator, 280 ltrs.	01
4. Laboratory oven 2'x2'x2'	01
5. Turbidity meter (0-4000 NTU)	01
6. TDS portable meter	01
7. Electronic balance (0.001 grams)	01
8. Beakers	01
9. Conical flask, round bottom flasks	01
10. Condenser, reflux condenser	01
11. BOD bottles, rubber pipe, burette, pipette etc. LS	

B. Furniture Requirement

Norms and standards laid down by AICTE -APH (latest) be followed for working out furniture requirement for diploma courses

C. Human Resources:

Weekly work schedule, annual work schedule, student teacher ratio for various group and class size, staffing pattern, workload norms, qualifications, experience and job description of teaching staff workshop staff and other administrative and supporting staff be worked out as per norms and standards laid down by the AICTE.

9. EVALUATION SCHEME GUIDELINES: As Per AICTE ATTACHED (ANNEXURE- 2)

a. Theory Courses:

- Internal Assessment: 40%
- End Semester Examination: 60%
- Passing Criteria: A student must secure a minimum of 40% marks separately in both internal assessment and end semester examination to pass the course.

b. Practical Courses:

- Internal Assessment: 60%
- End Semester Examination: 40%
- Passing Criteria: A student must secure a minimum of 40% marks separately in both internal assessment and end semester examination to pass the course.

c. Summer Internship / Projects / Seminars, etc.:

- Evaluation is based on the following components:
 - Quality of work completed
 - Report preparation and documentation
 - Viva-voce performance
 - Presentation skills

Note:

Internal assessment is conducted based on the student's overall performance, which includes:

- Two best out of three mid-semester tests
- Quizzes and assignments
- Class participation and attendance
- Viva-voce and lab records (for practical subjects)

ANNEXURE- 2

EVALUATION METHODOLOGY

1. EVALUATION METHOD for THEORY

	Internal Assessment (40 marks)				External Assessment (60 marks)
	IA 1	IA 2	IA 3	IA 4	
Mode	Written Test	Written Test	Attendance and Assignments	Pre – Semester Examination	End Semester Examination
Portion	2 units	2 units	Regularly	All units	All units
Duration1hr	1hr	1hr	-	3hrs	3hrs
Exam Marks	20	20	20	60	60
Converted to	10	10	15	15	60
Tentative Schedule	5 th Week	10 th Week	Regularly	12 th -13 th Week	

IA1 and IA2: A written assessment test worth 20 marks should be conducted for two units. The marks earned (20 marks) will be converted to 10 marks. The best of the two assessments will be evaluated for an internal 10-mark assessment.

IA3: Assignments given after the completion of each unit, along with attendance throughout the semester, will be assessed for a total of 15 marks.

IA4: The pre-semester examination should follow the end-semester examination question pattern. The marks should be adjusted to 15 for internal assessment.

2. EVALUATION METHOD for PRACTICAL

	Internal Assessment (60 marks)				External Assessment (40 marks)
	IA 1	IA 2	IA 3	IA 4	
Mode	Practical Test	Practical Test	Attendance and Practical Documentation	Practical Test and Quiz – Viva Voce	Practical Examination
Portion	50% Practical	50% practical	All practical	All practical	All practical
Duration	3hrs	3 hrs	Regularly	3 hrs	3hrs
Exam Marks	20	20	20	20	40
Tentative Schedule	5th Week	10th Week	Regularly	12th -13 th Week	

IA1 and IA2: Complete all exercises and experiments as outlined and retain them for the practical test. The test should be conducted in accordance with the evaluation scheme. The best of the two practical tests will be internally evaluated for a total of 20 marks.

IA3: Maintain a practical file for each exercise while ensuring attendance throughout the semester. Submit the required documents for the practical file, quiz, and practical test along with a valid certificate (Progress Card). This will be assessed for 20 marks.

IA4: The pre-semester practical examination, quiz, and viva-voce should follow the end-semester practical examination pattern, with marks adjusted to 20 for internal assessment.

SUGGESTED DISTRIBUTION OF MARKS FOR **INTERNAL** EVALUATION

Part	Description	Marks Allotted
A.	Objective	5
B.	Circuit Diagram	5
C.	Procedure and Connections	10
D.	Observation Table and Calculation	10
E.	Result and its Discussion, Conclusion	10
F.	Practical Test	20
	Total	60

SUGGESTED DISTRIBUTION OF MARKS FOR **EXTERNAL** EVALUATION

Part	Description	Marks Allotted
A.	Objective	5
B.	Circuit Diagram	5
C.	Procedure and Connections	5
D.	Observation Table and Calculation	5
E.	Result and its Discussion, Conclusion	10
F.	Viva-Voce	10
	Total	40

3. EVALUATION METHOD for PRACTICUM (End Exam-Practical)

	Internal Assessment (60 marks)				External Assessment (40 marks)
	IA 1	IA 2	IA 3	IA 4	
Mode	Practical Test	Practical Test	Attendance and Practical Documentation	Micro Project	Practical Examination
Portion	50% practical	50% practical	All practical	All practical	All practical
Duration	3hrs	3 hrs	Regularly	Regularly	3hrs
Exam Marks	20	20	20	20	40
Tentative Schedule	5th Week	10th Week	Regularly	12th -13 th Week	

- **IA1 and IA2:** Complete all exercises and experiments as instructed and retain them for the practical test. The test should be conducted according to the evaluation scheme. The best of the two practical tests will be internally assessed for a total of 20 marks.
- **IA3:** Maintain a practical file for each exercise, ensuring attendance throughout the semester. Submit the required documents for the practical file, quiz, practical test, and end-semester examination, along with a valid certificate (Progress Card). This will be evaluated by 20 marks.
- **IA4:** Submit a micro-project report along with a fabrication model or analysis report. The performance of each student in the group will be assessed by both the laboratory supervisor and an internal examiner. This evaluation will contribute 20 marks.

SUGGESTED DISTRIBUTION OF MARKS FOR INTERNAL EVALUATION

Part	Description	Marks Allotted
A.	Objective	5
B.	Circuit Diagram	5
C.	Procedure and Connections	10
D.	Observation Table and Calculation	10
E.	Result and its Discussion, Conclusion	10
F.	Mini Project	20
	Total	60

SUGGESTED DISTRIBUTION OF MARKS FOR EXTERNAL EVALUATION

Part	Description	Marks Allotted
A.	Objective	5
B.	Circuit Diagram	5
C.	Procedure and Connections	5
D.	Observation Table and Calculation	5
E.	Result and its Discussion, Conclusion	10
F.	Viva-Voce	10
	Total	40

4. EVALUATION METHOD for PRACTICUM (End Exam-Theory)

	Internal Assessment (40 marks)						External Assessment (60marks)
	IA 1		IA 2		IA 3	IA 4	
Mode	Written Test	Practical Test	Written Test	Practical Test	Attendance and Practical Documentation	Pre Semester Examination and Micro Project	End Semester Examination
Portion	2 units	Practical related to the units	2 units	Practical related to the units	All unit	All Practical	All unit
Duration	1hr	3hrs	1hr	3 hrs	3hrs	Regularly	3hrs
Exam Marks	10	20	10	20	60	60	60
	30		30				
Converted to	10		10		15	15	60
Tentative Schedule	5 th Week		10 th Week		Regularly	12 th -13 th Week	

IA1 and IA2: A written assessment test worth 10 marks should be conducted for two **UNITs**. Complete all exercises and experiments as outlined and retain them for the practical test worth 20 marks. The practical test should be conducted in accordance with the evaluation scheme. The total marks earned (30 marks) will be converted to 10 marks. The best of the two assessments will be internally evaluated for a total of 10 marks.

IA3: Attendance and the pre-semester examination should follow the end-semester examination question paper pattern. The marks should be adjusted to 15 for internal assessment.

IA4: Maintain a practical file for each exercise. Submit the required documents for the practical file, quiz/viva-voice, practical test, and end-semester examination, along with a valid certificate (Progress Card). This will be assessed for 40 marks. Additionally, submit a micro-project report along with a fabrication model or analysis report. The performance of each student in the group will be evaluated by both the laboratory supervisor and an internal examiner. The total of 60 marks will be converted to 15 marks.

SUGGESTED DISTRIBUTION OF MARKS FOR INTERNAL EVALUATION FOR IA4

Part	Description	Marks Allotted
A.	Objective	5
B.	Circuit Diagram	5
C.	Procedure and Connections	5
D.	Observation Table and Calculation	5
E.	Result and its Discussion, Conclusion	10
F.	Attendance & Mini Project	10
	Total	40

10. LIST OF EXPERTS

Sr.No	Name	Designation	Organization
1.	Dr. Pawan Kumar	Lecturer Chemical Engineering	Govt. Poly. Firozabad.
2.	Smt. Namrata Pal	Lecturer Chemical Engineering	Govt. Poly. Kotwan, Mathura.
3.	Dr. Baijnath	Lecturer Chemical Engineering	Govt. Poly. Kanpur.
4.	Dr. Rahul	Lecturer Chemical Engineering	Govt. Poly. Bindki, Fatehpur.
5.	Dr. Sudhir Kumar	Assist. Professor Food Technology	C.S.J.M. University, Kanpur

(ANNEXURE-I)

PROCEDURES / FORMATS FOR ORGANIZING INTERNSHIPS.

STUDENT INTERNSHIP PROGRAM APPLICATION

Complete and submit to the TPO/ Internship Program Coordinator.

1. Student Name:		Enroll. No.:	
2. Campus Address:		Phone:	
3. Home Address:		Phone:	
4. Student email address:			
5. Branch:	6. Internship Semester: _____		
7. Internship Preferences			
	Company/Industry	Core Area	Location
Preference-1			
Preference-2			
Preference-3			
Faculty mentor Signature: _____ Date _____.			
Student Signature: _____ Date _____.			
Signature confirms that the student agrees to the terms, conditions, and requirements of the Internship Program			

Signature with seal
HOD/Principal

(ANNEXURE-I)

REQUEST LETTER FROM INSTITUTE TO INTERNSHIP/INDUSTRIAL TRAINING PROVIDER

Ref. No.: _____

Date: _____

To,
The HR Manager/Training Coordinator
.....
.....

Subject: Request for Internship/Industrial Training for Diploma Students

Sir/Madam,

We are pleased to introduce....., a premier institution affiliated with Board of Technical Education, Uttar Pradesh, offering diploma programs in various diploma disciplines.

As a part of the curriculum, our students are required to undergo Internship/Industrial Training to gain practical exposure and enhance their technical competencies. Therefore, we kindly request your esteemed organization to provide Internship/Training opportunities to our students during the period from to

S. No.	Name	Enroll. No.	Semester/Year	Discipline

Yours sincerely,

(Head of Department/Principal)

(ANNEXURE-II)

PROFORMA FOR EVALUATION OF INTERNSHIP BY INDUSTRY

Student Name:Evaluation Date:

Industry Supervisor Name:

Company/Organization:

Title of the Project:

Please evaluate your intern by indicating the frequency with which you observed the following behaviors:

Parameters	Max. Marks	Marks Given
Attendance and Punctuality	20	
Discipline and Professional Behavior	20	
Technical Knowledge and Understanding of Processes	30	
Practical Skills and Quality of Work	20	
Ability to Apply Theoretical Knowledge	20	
Problem Solving and Analytical Ability	10	
Communication and Interpersonal Skills	20	
Teamwork and Collaboration	10	
Internship Report/Documentation	20	
Presentation and Viva-Voce	30	
Total Marks	200	

Additional comments, if any:

Signature with seal of Industry supervisor

HR Manager

INTERNSHIP REPORT

STUDENT'S DIARY/ DAILY LOG

The main purpose of writing daily diary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning abilities. The students should record in the daily training diary the day to day account of the observations, impressions, information gathered and suggestions given, if any. It should contain the sketches & drawings related to the observations made by the students.

The daily training diary should be signed after every day by the supervisor/ in charge of the section where the student has been working. The diary should also be shown to the Faculty Mentor visiting the industry from time to time and got ratified on the day of his visit.

Student's Diary and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training. It will be evaluated on the basis of the following criteria:

- Regularity in maintenance of the diary.
- Adequacy & quality of information recorded.
- Drawings, sketches and data recorded.
- Thought process and recording techniques used.
- Organization of the information.

INTERNSHIP REPORT

After completion of Internship, the student should prepare a comprehensive report to indicate what he has observed and learnt in the training period. The student may contact Industrial Supervisor/ Faculty Mentor/TPO for assigning special topics and problems and should prepare the final report on the assigned topics. Daily diary will also help to a great extent in writing the industrial report since much of the information has already been incorporated by the student into the daily diary. The training report should be signed by the Internship Supervisor, TPO and Faculty Mentor. The Internship report will be evaluated on the basis of following criteria:

- i. Originality.
- ii. Adequacy and purposeful write-up.
- iii. Organization, format, drawings, sketches, style, language etc.
- iv. Variety and relevance of learning experience.
- v. Practical applications, relationships with basic theory and concepts taught in the course.

MONITORING & EVALUATION OF INTERNSHIP

The industrial training of the students will be evaluated in three stages:

1. Evaluation by Industry.
2. Evaluation by faculty supervisor of Industry.
3. Evaluation through seminar presentation/viva-voce at the Institute.

1. EVALUATION BY INDUSTRY

The industry will evaluate the students based on the Punctuality, eagerness to learn, Maintenance of Daily Diary and skill test in addition to any remarks.

2. MONITORING/ SURPRISE VISIT BY TPO/ STAFF/ FACULTY MENTOR

TPO/Staff/ Faculty Mentor of the institutes will make a surprise visit to the internship site, to check the student's presence physically, if the student is found absent without prior intimation to the T & P Cell, entire training will be cancelled. Students should inform the TPO, faculty mentor as well as the industry supervisor at least one day prior to availing leave by email. Students are eligible to avail 1-day leave in 4 weeks and 2 days leave in 6 weeks of the internship period apart from holidays and weekly offs.

3. EVALUATION THROUGH SEMINAR PRESENTATION/VIVA-VOCE AT THE INSTITUTE

The student will give a seminar based on his training report, before an expert committee constituted by the concerned department as per norms of the institute. The evaluation will be based on the following criteria:

- Quality of content presented.
- Proper planning for presentation.
- Effectiveness of presentation.
- Depth of knowledge and skills.
- Attendance record, daily diary, departmental reports shall also be analyzed along with the Internship Report.

Seminar presentation will enable sharing knowledge & experience amongst students & teachers and build communication skills and confidence in students.