

GURU KASHI UNIVERSITY



Bachelor of Vocational in Fire Safety

Session: 2025-26

Department of Mechanical Engineering

GRADUATE OUTCOME OF THE PROGRAMME

The program focuses to develop an ability to apply appropriate knowledge in Mechanical Engineering to identify, formulate, analyze, and solve complex engineering problems in order to develop sustainable computing solutions in broader economic, societal and environmental contexts.

PROGRAMME LEARNING OUTCOMES

Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and a mechanical engineering specialization to the solution of complex engineering problems.

Problem analysis: Identify, formulate, review research literature, and analyze complex mechanical engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design/development of solutions: Design solutions for complex mechanical engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex mechanical engineering activities with an understanding of the limitations.

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the mechanical engineering practice.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Semester: I									
Course Code	Course Name	Type of Course	L	T	P	Credits	Int	Ext	Total Marks
BFI101	Fundamentals of Fire Science	Core Course	3	0	0	3	25	50	75
BFI102	Fire Control Technology & First Aid	Core Course	3	0	0	3	25	50	75
BFI103	Applied Chemistry	Core Course	3	0	0	3	25	50	75
BFI104	Environmental Studies	Core Course	3	0	0	3	25	50	75
BFI105	Fundamentals of Fire Science Practical	Skill Based	0	0	2	1	10	15	25
BFI106	Fire Control Technology & First Aid - Practical	Skill Based	0	0	4	2	15	35	50
BFI107	Applied Chemistry - Practical	Skill Based	0	0	2	1	10	15	25
BFI108	Project-I	Skill Based	0	0	4	2	15	35	50
BFI109	Entrepreneurship Setup & Launch	Skill Based	0	0	4	2	15	35	50
Total			12	0	16	20	165	335	500

Semester: II									
Cours e Code	Course Name	Type of Course	L	T	P	No. of Credi ts	Int	Ext	Total Marks
BFI201	Industrial Safety Management	Core Course	3	0	0	3	25	50	75
BFI202	Fire Fighting Equipment	Core Course	3	0	0	3	25	50	75
BFI203	Applied Physics	Core Course	3	0	0	3	25	50	75
BFI204	Industrial Safety Management - Practical	Skill Based	0	0	4	2	15	35	50
BFI205	Fire Fighting Equipment - Practical	Skill Based	0	0	6	3	25	50	75
BFI206	Applied Physics - Practical	Skill Based	0	0	2	1	10	15	25
BFI207	Project-II	Skill Based	0	0	6	3	25	50	75
BFI208	Environmental Science	VAC	2	0	0	2	15	35	50
Total			11	0	18	20	165	335	500

Semester: III									
Cours e Code	Cours e Title	Type of Cours e	L	T	P	No. of Credit s	Int	Ext	Total Mark s
BFI301	Health Safety and Disaster Management	Core course	3	0	0	3	25	50	75
BFI302	Search & Rescue Techniques and Paramedics	Core course	3	0	0	3	25	50	75
BFI303	Fire Protection System	Core course	3	0	0	3	25	50	75
BFI304	Health Safety and Disaster Management - Practical	Core course	0	0	4	2	15	35	50
BFI305	Search & Rescue Techniques and Paramedics - Practical	Core course	0	0	6	3	25	50	75
BFI306	Fire Protection System - Practical	Skill Based	0	0	6	3	25	50	75
BFI307	Project-III	Skill Based	0	0	6	3	25	50	75
Total			9	0	22	20	165	335	500

Semester: IV									
Cours e Code	Course Title	Type of Course	L	T	P	No. of Credits	Int	Ext	Total Marks
BFI401	Hydraulics & Pumps	Core Course	3	0	0	3	25	50	75
BFI402	Construction Safety	Core Course	3	0	0	3	25	50	75
BFI403	Laws Related to Safety, Health & Environment	Core Course	3	0	0	3	25	50	75
BFI404	Hydraulics & Pumps - Practical	Skill Based	0	0	4	2	15	35	50
BFI405	Fire Protection System - Practical	Skill Based	0	0	6	3	25	50	75
BFI406	Laws Related to Safety, Health & Environment - Practical	Skill Based	0	0	6	3	25	50	75
BFI407	Project-1V	Skill Based	0	0	6	3	25	50	75
Total			09	0	22	20	165	335	500

Semester: V									
Course Code	Course Title	Type of Course	L	T	P	No. of Credits	Int	Ext	Total Marks
BF1501	Explosion & Fire Dynamics	Core Course	3	0	0	3	25	50	75
BF1502	Salvage and Fire Accident Investigation	Core Course	3	0	0	3	25	50	75
BF1503	Fire Prevention Measures	Core Course	3	0	0	3	25	50	75
BF1504	Explosion & Fire Dynamics - Practical	Skill Based	0	0	4	2	15	35	50
BF1505	Salvage and Fire Accident Investigation - Practical	Skill Based	0	0	6	3	25	50	75
BF1506	Fire Prevention Measures - Practical	Skill Based	0	0	6	3	25	50	75
BF1507	Project-V	Skill Based	0	0	6	3	25	50	75
Total			09	0	22	20	165	335	500

Semester: VI									
Course Code	Course Title	Type of Course	L	T	P	No. of Credits	Int	Ext	Total Marks
BFI601	Safety Legislations	Core Course	3	0	0	3	2 5	50	75
BFI602	Combustion Products & its Effects on Life Safety	Core Course	3	0	0	3	2 5	50	75
BFI603	Industrial Hygiene & Occupational Health	Core Course	3	0	0	3	2 5	50	75
BFI604	Safety Legislations - Practical	Skill Based	0	0	4	2	1 5	35	50
BFI605	Combustion Products & its Effects on Life Safety - Practical	Skill Based	0	0	4	2	1 5	35	50
BFI606	Industrial Hygiene & Occupational Health - Practical	Skill Based	0	0	4	2	1 5	35	50
BFI607	Project-VI	Skill Based	0	0	6	3	2 5	50	75
BFI608	Personality Development	VAC	2	0	0	2	1 5	35	50
Total			11	0	18	20	165	335	500

SEMESTER- I

COURSE TITLE: FUNDAMENTALS OF FIRE SCIENCE

COURSE CODE: BFI101

L	T	P	Credits
3	0	0	3

Total Hours-45

Course Content

UNIT I

12 Hours

Fundamentals of Fire Service and Mechanics

History of fire service, Force, resultant force, Mass and weight, work, power, energy, Law of Conservation of energy Mechanics – rest and motion, Distance and displacement, Speed and velocity

UNIT II

10 Hours

Chemistry and Investigation of Fire

Pure substance and mixture, Physical and chemical changes, Energy changes, Temperature, Heat of Decomposing Chemical reaction, Investigation of fire Arson and detection of fires.

UNIT III

11 Hours

Fire Classification and Extinguishing Techniques

Classification of fire, General Causes of fire, Detection of fire Extinguishing, methods First aid, firefighting equipment, Fire bucket, Fire beater, hose reel, hose Portable extinguisher, Construction Operation, Maintenance Refilling.

UNIT IV

12 Hours

Advanced Fire Suppression Systems

Hydrant or fire water system, Classification of hydrant system, Sprinkling system, Special fires and firefighting, fixed firefighting, installations not using water Complete CO2 flooding system, Complete DCP spraying system, Complete Halon flooding system

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

Course Title: FIRE CONTROL TECHNOLOGY & FIRST AID

Course Code: BFI102

L	T	P	Credits
3	0	0	3

Total Hours-45

Course Content

UNIT I

15 Hours

Firefighting Equipment and Safety Measures

Causes and prevention of shock, Causes and prevention of rubber, acid Couplings Component parts of inter locking couplings Suction coupling wrenches Branches, nozzles and branch holders Breechings.

UNIT II

10 Hours

Fire Detection Systems and Electronics

Fire alarm Introduction of Electronics and Electricity Circuit Control and Protective Devices Transistors Principles of fire detectors, Principles of fire detectors, Type of detectors, Automatic fire detection, Classification of detector

UNIT III

10 Hours

Firefighting Equipment: Maintenance and Usage

Trouble shooting and maintenance, Rope, Lines, knots and ladders Cordage, Different type of knot Ladders

UNIT IV

10 Hours

Emergency Response and First Aid

Action at Emergency, The practice of First Aid, Control of bleeding, Burns and Scalds, Heart Attack, Disorder of Circulation, Dressing & Bandages, Handling & transport of injured.

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

Course Title: APPLIED CHEMISTRY
Course Code: BFI103

L	T	P	Credits
3	0	0	3

**Total
Hours-45**

Course Content

UNIT I

11 Hours

Principles of Fire Chemistry and Combustion

Triangle of Fire, Tetrahedron of Fire, Life Cycle of Fire Chain Reaction , Chain Reaction Steps
Combustion: Role of Fuel in Combustion, Role of Temperature in Combustion, Role of Oxygen in
Combustion, Chain Reaction, Flash Point, Fire Point, Different Forms of Natural Fire, Spontaneous
Auto Ignition Temperature, Ignition Point, Auto Ignition

UNIT II

12 Hours

Heat and Combustion Dynamics in Fire Safety

Heat in Chemical, Reaction Bomb Calorimeter Describe, The Experiment to Determine the
Specific Heat of Given Substance (Copper), Latent Heat, Calorific Value, Delong's Formula, Types
of Gaseous Flames: Premixed vs. Diffusion Flames, Stationary vs. Propagating Flames, Laminar
Versus Turbulent Flames, Deflagration vs. Detonation, Radiation from Flames, Heat Transfer, and
Burning Rates in Fire

UNIT III

11 Hours

Understanding Explosions and Combustibility Hazards

Basics of Explosions, Common Ignition Sources, Ignition Hazards, Ignition Sources, Combustibility
Hazards, Material Properties, Ambient Conditions, Resulting Spread of Flame Fire, Properties of
Common Material- Ammonia, Ammonium Nitrate, Benzene, Carbon Dioxide, Carbon Monoxide,
Chlorine, Chloroform, Hydrochloric Acid, Hydrogen, Oxygen, Sulphuric Acid, Solvent Naphtha

UNIT IV

11 Hours

Chemical Kinetics in Fire Safety

Basic Chemical Kinetics; Chemical Kinetics (or Kinetics of Chemical Reaction), Rate of Chemical
Reaction (Velocity) Order of Reactions, Zero Order Reaction, First Order Reaction, Second Order
Reaction, Third Order Reaction, Nth Order Reaction,

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion,
Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

Course Title: ENVIRONMENTAL STUDIES

Course Code: BFI104

L	T	P	Credits
3	0	0	3

Total Hours-45

Course Content

UNIT I

10 Hours

Introduction to Environmental Studies

Definition, scope, and importance of environmental studies, Relationship between environment and human health, Environmental education and sustainability, Ecosystems: structure, function, and energy flow

UNIT II

11 Hours

Natural Resources and Their Conservation

Types of natural resources: renewable and non-renewable, Conservation of resources: water, soil, forests, and energy Impact of human activities on natural resources, Sustainable practices in agriculture, water, and energy use

UNIT III

12 Hours

Environmental Pollution

Types of pollution: air, water, soil, and noise pollution, Sources and effects of pollution on health and the environment Waste management: methods of disposal and recycling, Case studies on pollution control measures

UNIT IV

12 Hours

Global Environmental Issues

Climate change, global warming, and their impacts Loss of biodiversity and conservation strategies, Ozone layer depletion and acid rain, Role of international organizations in addressing global environmental challenges

UNIT V

7 Hours

Environment and Public Health

Link between environment and public health: water-borne and air-borne diseases, Environmental sanitation and hygiene, Food safety and its relation to the environment, Role of individuals and communities in environmental protection

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

Course Title: FUNDAMENTALS OF FIRE SCIENCE PRACTICAL
Course Code: BFI105

L	T	P	Credits
0	0	2	1

Total Hours-30

Course Content

UNIT I

Fire Behavior and Classification

Activity 1: Study of Fire Behavior

Objective: Observe and analyze different types of fire behavior, including ignition, spread, and extinguishment, Equipment: Fire behavior simulation models, fire behavior charts.

Activity 2: Fire Classification and Identification

Objective: Identify and classify various types of fires (Class A, B, C, D, and K) based on their sources and materials involved. Equipment: Fire classification charts, sample fire materials.

UNIT II

Fire Extinguishers and Their Operation

Activity 1: Hands-On Fire Extinguisher Training

Objective: Demonstrate the correct use of different types of fire extinguishers (water, foam, CO2, dry chemical). Equipment: Fire extinguishers, fire simulation equipment.

Activity 2: Extinguisher Maintenance and Inspection

Objective: Learn the procedures for inspecting and maintaining fire extinguishers to ensure they are operational and compliant with safety standards. Equipment: Fire extinguisher maintenance tools, inspection checklists

UNIT III

Fire Detection Systems

Activity 1: Fire Alarm Systems Overview

Objective: Understand the components and functioning of fire alarm systems, including detectors, alarms, and control panels. Equipment: Fire alarm system models, simulation panels.

Activity 2: Testing and Calibration of Fire Detection Systems

Objective: Practice testing and calibrating fire detection systems to ensure accuracy and reliability. Equipment: Testing equipment, calibration tools.

UNIT IV

Fire Safety Equipment and Personal Protective Gear

Activity 1: Inspection and Use of Fire Safety Gear

Objective: Learn to inspect and correctly use personal protective equipment (PPE) used in fire safety, such as helmets, gloves, and suits. Equipment: PPE gear, inspection checklists.

Activity 2: Fire Safety Equipment Familiarization

Objective: Familiarize with various fire safety equipment, including hoses, nozzles, and breathing apparatus. Equipment: Fire hoses, nozzles, breathing apparatus, safety equipment guides

Course Title: FIRE CONTROL TECHNOLOGY & FIRST AID PRACTICAL

Course Code: BFI106

L	T	P	Credits
0	0	4	2

Total Hours-60

Course Content

UNIT I

Fire Control Technology Basics

Activity 1: Fire Control Systems Operation

Objective: Learn the operation of various fire control systems, including sprinkler systems, fire suppression systems, and smoke control systems. Equipment: Fire control system models, operational guides, and simulation tools.

Activity 2: Fire Hose Techniques and Maintenance

Objective: Practice using different types of fire hoses and nozzles, and perform maintenance tasks such as cleaning, testing, and repairing hoses. Equipment: Fire hoses, nozzles, maintenance tools, and cleaning supplies.

UNIT II

Fire Control Technology Basics

Activity 1: Fire Control Systems Operation

Objective: Learn the operation of various fire control systems, including sprinkler systems, fire suppression systems, and smoke control systems. Equipment: Fire control system models, operational guides, and simulation tools.

Activity 2: Fire Hose Techniques and Maintenance

Objective: Practice using different types of fire hoses and nozzles, and perform maintenance tasks such as cleaning, testing, and repairing hoses. Equipment: Fire hoses, nozzles, maintenance tools, and cleaning supplies.

UNIT III

First Aid Basics

Activity 1: Basic First Aid Procedures

Objective: Learn and practice fundamental first aid techniques including CPR, wound care, and treatment of burns, fractures, and choking. Equipment: First aid kits, CPR mannequins, simulation aids.

Activity 2: Emergency Response Drills

Objective: Conduct emergency response drills to practice first aid skills in simulated fire and accident scenarios. Learn to assess and prioritize treatment for multiple casualties. Equipment: Emergency response simulation setups, first aid kits, and role-playing materials.

UNIT IV

Fire Control and First Aid Integration

Activity 1: Integrated Fire Response Training

Objective: Combine fire control techniques with first aid practices in simulated emergency situations to enhance coordination between fire control and medical response. Equipment: Simulation equipment, fire control and first aid tools.

Activity 2: Case Studies and Scenario Analysis

Objective: Analyze real-life case studies and scenarios to understand the application of fire control technology and first aid in various emergency situations. Equipment: Case study materials, analysis guides.

Course Content

UNIT I

Chemical Properties and Reactions

Activity 1: Identification of Chemical Substances

Objective: Learn to identify and classify common chemicals used in fire safety, such as fire retardants and extinguishing agents, through physical and chemical tests. Equipment: Reagents, test tubes, beakers, chemical samples, and identification charts .

Activity 2: Chemical Reaction Demonstrations

Objective: Observe and document various chemical reactions, including those involving combustion, oxidation, and reduction, relevant to fire safety applications. Equipment: Laboratory setup for reactions, chemical reagents, safety equipment.

UNIT II

Fire Retardants and Extinguishing Agents

Activity 1: Testing Fire Retardants

Objective: Analyze the effectiveness of different fire-retardant chemicals through controlled experiments to understand their properties and performance in fire suppression. Equipment: Fire retardant samples, test setups, fire simulation equipment.

Activity 2: Comparison of Extinguishing Agents

Objective: Compare the efficiency of various extinguishing agents (e.g., foam, CO₂, dry chemical) by conducting tests to measure their effectiveness in suppressing simulated fires. Equipment: Extinguishing agents, fire simulation models, measurement tools.

UNIT III

Chemical Safety and Handling

Activity 1: Safe Handling and Storage of Chemicals

Objective: Learn proper techniques for the safe handling and storage of chemicals used in fire safety, including proper labeling, storage conditions, and emergency procedures. Equipment: Safety containers, storage cabinets, safety labels, handling procedures.

Activity 2: Preparation of Safety Data Sheets (SDS)

Objective: Prepare and review Safety Data Sheets for various chemicals to understand their hazards, handling requirements, and emergency response procedures. Equipment: SDS templates, chemical samples, safety guidelines.

UNIT IV

Environmental Impact of Fire Chemicals

Activity 1: Assessment of Environmental Impact

Objective: Evaluate the environmental impact of various fire chemicals, including their effects on air, water, and soil, through analysis and discussion of case studies. Equipment: Environmental assessment tools, case study materials.

Activity 2: Sustainable Alternatives in Fire Safety

Objective: Explore and test sustainable and eco-friendly alternatives to traditional fire chemicals, assessing their effectiveness and environmental benefits. Equipment: Sustainable chemical samples, testing equipment.

Course Title: PROJECT 1
Course Code: BFI108

L	T	P	Credits
0	0	4	2

Total Hours-60

Course Content

Basic Fire Safety Inspection of a Residential Building

Objective: Conduct a basic fire safety inspection of a residential building to identify potential hazards.

Description: Students will perform an inspection of a residential building, focusing on key fire safety elements such as smoke detectors, fire extinguishers, and escape routes. They will identify any hazards or non-compliance issues and suggest improvements

Fire Safety Awareness Poster Campaign

Objective: Create and design a series of fire safety awareness posters for a public space or community center.

Description: Students will design posters that communicate essential fire safety information, such as the importance of smoke detectors, fire escape plans, and proper use of fire extinguishers. They will use graphic design tools and principles to make the posters engaging and informative.

Fire Extinguisher Training Demonstration

Objective: Develop and present a fire extinguisher training demonstration for a small group.

Description: Students will create a demonstration to teach proper fire extinguisher use, including different types of extinguishers and their applications (e.g., water, foam, CO2). The demonstration will include both theoretical and practical components, such as hands-on practice with extinguishers.

Development of a Fire Escape Plan for a Family Home

Objective: Design a fire escape plan for a typical family home, including evacuation routes and safety measures.

Description: Students will create a fire escape plan for a family home, considering factors such as the layout, number of rooms, and potential obstacles. The plan will include detailed maps, escape routes, and safety procedures for family members.

Analysis of Fire Safety Regulations and Standards

Objective: Research and analyze basic fire safety regulations and standards relevant to residential or small commercial buildings.

Description: Students will research fire safety regulations and standards, such as building codes, fire alarm requirements, and safety equipment specifications. They will analyze how these regulations impact fire safety in residential or commercial settings.

Fire Safety Equipment Inventory and Management

Objective: Conduct an inventory of fire safety equipment in a local facility and assess its condition and management.

Description: Students will perform an inventory of fire safety equipment, such as extinguishers, alarms, and sprinklers, in a local facility (e.g., school, office). They will assess the condition, maintenance records, and proper placement of the equipment.

Basic Fire Safety Training Manual for Beginners

Objective: Create a training manual for beginners that covers essential fire safety concepts and practices.

Description: Students will develop a comprehensive training manual for individuals new to fire safety. The manual will include information on fire prevention, emergency procedures, and basic fire safety equipment. It will be designed to be easy to understand and use.

Course Title: Entrepreneurship Setup & Launch	L	T	P	Cr.
Course Code: BFI109	0	0	04	02

Introduction:

Total Hours : 60

This semester lays the foundation for the learner to understand what entrepreneurship is, beyond just starting a business. It introduces key ideas like problem-solving, value creation, and self-awareness. The learner will begin exploring basic business concepts while discovering their own interests and strengths.

Learners Objective:

1. Understand the core concepts of entrepreneurship through relatable, real-life examples.
2. Begin to see themselves as problem-solvers and creators.
3. Learn about business paths and choose one to try based on interest or local fit.
4. Launch a micro-hustle (online or offline) to earn their first income.
5. Build confidence and self-belief by doing.

Outcome: By the end of this semester, learners will start a simple business activity, earn their first income, and build belief in their ability to do business.

Guiding Principles/Approach:

This syllabus is built on principles of **experiential learning, growth mindset development**, and **identity-first learning**. Drawing from learning science and behavior design, the course shifts students from passive learning to *active doing*, where they try out small business activities in real contexts. The design helps students not just learn entrepreneurship, but begin to see themselves as entrepreneurs. Emphasis is placed on *small wins, peer collaboration, and locally relevant opportunities* to ensure learning feels achievable and connected to their realities. The curriculum focuses on conceptual understanding without heavy theory, combining *practical action, reflection, and*

collaboration. By making progress visible and success feel possible, it plants the seeds of self-reliance, initiative, and long-term motivation.

Semester Syllabus:

Format: 12 weeks, 4 hours/week | 2 credits

Revenue Target: ₹10,000

Week	Learning Goal	Measurable Outcome
1	Understand what entrepreneurship is and who can be an entrepreneur	Students define entrepreneurship in their own words and list 2 entrepreneurs from their local area or community
2	Connect personal identity to entrepreneurship (strengths, interests, struggles)	Students create a “value map” showing how a skill/interest/problem from their life could become a business opportunity
3	Learn about 5 business paths: content creation, dropshipping, cloud kitchen/food business, gig economy and local services	Students explore 1–2 examples from each domain and share one they’re most curious to try and why
4	Choose a path and generate a basic business idea	Students write down a clear offer (what, for whom, why) and one way to reach their customer
5	Take first real action: message, post, pitch, or sell	Students reach out to or serve 1 real potential customer and record what happened

6	Reflect on first attempt and share with peers	Students share their result, a challenge faced, and one idea to improve next time
7	Improve and try again: aim for first ₹100	Students apply a change, try again, and aim to make their first ₹100 or get meaningful response
8	Learn how to identify and understand your target customer	Students talk to 2 potential customers or observe them and list 3 insights about their needs
9	Learn how to serve your target audience better	Students improve one part of their offer (product, delivery, messaging, or interaction) based on customer feedback or need
10	Explore core entrepreneurial values (resilience, honesty, effort)	Students reflect on 1 value they're building and show it in a business task or peer story
11	Focus on earning and staying consistent	Students complete a second earning task and track their consistency (e.g., same product or message for 3 days)
12	Reflect on earnings, grit, and how to keep going	Students record total earnings, one resilience moment, and one support system or habit they'll continue with

Weekly Component:

Component	Duration	Description
Learning Module	~1.5 hrs	<ul style="list-style-type: none"> - Introduces key concepts in a simple and engaging way - Includes, examples, and 1–2 interactive discussions or quizzes

Action Lab	~2 hrs	<ul style="list-style-type: none"> - Hands-on task on the weekly concept - Includes step-by-step guidance, templates, and worksheets - Ends with a submission (e.g., video, reflection, or proof of action)
Resources	Self-paced	- Supplementary videos, short readings, real-life stories, and tools to deepen understanding at their own pace

Evaluation Criteria

Evaluation Component	Description	Weightage
Weekly Task Completion	Timely submission of weekly tasks including reflections, activities, quizzes etc.	40%
Target Completion	Performance-based evaluation on hitting revenue or profit targets (e.g., generating ₹10,000 revenue)	30%
Final Project	A comprehensive project based on the semester's theme	30%

SEMESTER- II

Course Title: INDUSTRIAL SAFETY MANAGEMENT

Course Code: BFI201

L	T	P	Credits
3	0	0	3

Total Hours-45

Course Content

UNIT-I

10 Hours

Fundamentals of Safety Management

Concept of Safety Industrial Accidents Reasons for Accident Prevention Function of Safety Management Safety Organizations Objectives of Safety Organizations Role of Industrial Organization in Safety Essential Requirements of a Safety Programme Plant Safety Rules and Procedures Formulation of Safety Rules Types of Safety Rules Violation of Safety Rules Reduction of Hazards

UNIT-II

11 Hours

Effective Material Handling Techniques

Kinetics of Manual Handling Hazards Due to Lifting Loads Techniques and Working Methods Correct Method of Lifting Straight Back Lifting Bent Back Lifting Physical Work Capacity and Age Differences Load Lifting Techniques Carrying Objects of Different Sizes and Shapes Minimizing Ergonomic Hazards in Material Handling Safe Use of Accessories for Manual Handling

UNIT-III

13 Hours

Electrical Safety and Protection

Definitions and Fundamentals: Current, Voltage, Ohm's Law, Earthing, Fuse Safety Measures for Electrical Work Electrical Work in Hazardous Work Classification of Hazardous Areas Electrical Shock Treatment Flameproof Electrical Equipment Overload and Short Circuit Protection.

UNIT-IV

11 Hours

Safety in Diverse Industrial Sectors

Hazards and Safety Measures for Welding Processes Fertilizer Industry Pesticides Industry Textile Industry Steel Industry Chemical Hazards

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

Course Title: FIRE FIGHTING EQUIPMENT'S
Course Code: BFI202

<i>L</i>	<i>T</i>	<i>P</i>	Credits
3	0	0	3

Total Hours-

45

Course Content

UNIT I

13 Hours

Fire Extinguishers and Classification

Classification of Fire Fighting Systems Types of Fire Extinguishers (Water Type Extinguishers, Soda Acid Extinguishers, Water CO₂ Extinguishers, Foam Extinguishers, CO₂ Extinguishers, Dry Chemical Powder (DCP) Type Extinguishers, Halon Type Fire Extinguishers) Standard Tests for Fire Extinguishers

UNIT II

10 Hours

Hoses and Hose Fittings

Types of Hoses Testing of Hoses Characteristics of Hoses Care and Maintenance of Hoses Couplings Collecting Breechings Hose Bandages

UNIT III

11 Hours

Valves and Their Applications

Function of Valves Gate Valves Rising Stem Gate Valve Limitations of Gate Valves Ball Valves Butterfly Valves Foot Valves Air Release Valves Non-Return Valves Landing Valves Valve Selection Considerations

UNIT IV

11 Hours

Ladders: Types, Uses, and Maintenance

Types of Ladders Use of Ladders Materials of Ladders Advantages and Disadvantages of Ladder Materials Maintenance of Various Ladder

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

COURSE TITLE: APPLIED PHYSICS
COURSE CODE: BFI203

L	T	P	Credits
3	0	0	3

Total Hours: 45

Course Content

UNIT I

10 Hours

Introduction to Physical Measurements and Analysis

Introduction to Physics Systems of Units Fundamental and Supplementary Units of SI Practical Norms for the Use of SI Systems Dimension and Dimensional Formula Dimensional Analysis Vectors (Laws of Vector Addition, Laws of Vector Multiplication) Properties of Fluids

UNIT II

12 Hours

Principles of Hydrostatics and Fluid Mechanics

Introduction to Fluids Hydrostatic Paradox Pascal's Law Buoyancy Archimedes' Principle Intermolecular Forces Molecular Range Surface of Influence Surface Film and Surface Tension Surface Energy Angle of Contact Capillarity Streamline Flow Tube of Flow Laminar Flow Turbulent

UNIT III

12 Hours

Fundamentals of Thermodynamics

Introduction to Thermodynamics Thermodynamic Systems Thermodynamic Variables Thermodynamic Equilibrium Work Done by a Thermodynamic System Joule's Law Zeroth Law of Thermodynamics First Law of Thermodynamics Second Law of Thermodynamics

UNIT IV

11 Hours

Thermodynamic Processes and Heat Engines

Reversible and Irreversible Processes Thermodynamic Processes Cyclic Processes Heat Engines Types of Heat Engines Expansion and Compression of Gases Laser: Introduction, principle of Laser, stimulated and spontaneous emission, Einstein's Coefficients, He-Ne Laser, Ruby Laser, Application of Lasers.

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

COURSE TITLE: INDUSTRIAL SAFETY MANAGEMENT PRACTICAL

COURSE CODE: BFI204

L	T	P	Credits
0	0	4	2

Total Hours-60

Course Content

Safety Hazard Identification and Risk Assessment

Activity 1: Conducting Safety Audits Objective: Perform a safety audit of an industrial facility to identify potential hazards and assess associated risks.

Equipment: Safety audit checklists, hazard identification tools, and risk assessment templates.

Activity 2: Risk Assessment Report

Objective: Develop a detailed risk assessment report based on audit findings, outlining potential hazards and recommending mitigation strategies.

Equipment: Report templates, risk assessment software.

Safety Equipment and Personal Protective Gear

Activity 1: Inspection and Maintenance of Safety Equipment

Objective: Learn to inspect and maintain various types of safety equipment, including fire extinguishers, safety showers, and eye wash stations

Equipment: Safety equipment, maintenance tools, inspection checklists.

Activity 2: PPE Usage and Compliance

Objective: Demonstrate proper usage and compliance with personal protective equipment (PPE) for different industrial settings.

Equipment: PPE gear (helmets, gloves, goggles, etc.), PPE compliance guidelines.

Emergency Response and Safety Drills

Activity 1: Emergency Response Plan Development

Objective: Develop a comprehensive emergency response plan for a specific industrial scenario, including evacuation routes, assembly points, and emergency contacts.

Equipment: Emergency response plan templates, mapping tools.

Activity 2: Conducting Safety Drills

Objective: Organize and conduct safety drills to practice emergency response procedures and evaluate the effectiveness of the emergency plan.

Equipment: Drill scripts, communication tools, and evaluation forms.

Industrial Safety Regulations and Compliance

Activity 1: Reviewing Safety Regulations

Objective: Review and analyze relevant industrial safety regulations and standards applicable to the facility, such as OSHA or local safety codes.

Equipment: Safety regulations documents, compliance checklists.

Activity 2: Compliance Audit

Objective: Conduct a compliance audit to ensure that the industrial facility adheres to safety regulations and standards.

Equipment: Compliance audit tools, audit reports.

Course Title: FIRE FIGHTING EQUIPMENT'S PRACTICAL
Course Code: BFI205

L	T	P	Credits
0	0	6	3

Total Hours-45

Course Content

Understanding and Operating Fire Extinguishers

Activity 1: Identification and Classification of Fire Extinguishers

Objective: Learn to identify and classify different types of fire extinguishers (e.g., water, foam, CO₂, dry chemical) and understand their specific uses.

Equipment: Various types of fire extinguishers, classification charts.

Activity 2: Practical Operation of Fire Extinguishers

Objective: Demonstrate the proper operation of different fire extinguishers, including the PASS technique (Pull, Aim, Squeeze, Sweep).

Equipment: Fire extinguishers, fire simulation equipment

Fire Hose and Hydrant Management

Activity 1: Fire Hose Handling and Deployment

Objective: Practice handling and deploying fire hoses, including connecting hoses to hydrants and using nozzles.

Equipment: Fire hoses, nozzles, hydrants, and coupling tools.

Activity 2: Hydrant Testing and Maintenance

Objective: Perform routine testing and maintenance of fire hydrants to ensure proper function and water flow.

Equipment: Hydrant testing tools, maintenance checklists.

Fire Suppression Systems

Activity 1: Operation of Sprinkler Systems

Objective: Learn to operate and maintain different types of sprinkler systems (e.g., wet, dry, pre-action systems) and understand their installation requirements.

Equipment: Sprinkler system models, operational guides.

Activity 2: Testing and Calibration of Fire Suppression Systems

Objective: Conduct testing and calibration of fire suppression systems to ensure they meet operational standards and function correctly.

Equipment: Suppression system components, testing tools.

Advanced Fire Fighting Equipment

Activity 1: Using Fire Pumps and Auxiliary Equipment

Objective: Operate and maintain fire pumps and other auxiliary firefighting equipment, including understanding their role in fire suppression.

Equipment: Fire pumps, auxiliary equipment, operational manuals.

Activity 2: Simulated Fire Fighting Scenarios

Objective: Engage in simulated firefighting scenarios to apply knowledge of various firefighting equipment in realistic conditions.

Equipment: Fire simulation setups, complete firefighting gear

Course Title: APPLIED PHYSICS PRACTICAL
Course Code: BFI206

L	T	P	Credits
0	0	2	1

Total Hours-30

Course Content

Understanding Heat and Fire Dynamics

Activity 1: Heat Transfer Experiments

Objective: Investigate the principles of heat transfer (conduction, convection, and radiation) and their relevance to fire safety.

Equipment: Heat sources, thermal sensors, conduction, convection, and radiation apparatus.

Activity 2: Fire Dynamics Simulation

Objective: Simulate fire dynamics to understand heat release rates, flame spread, and smoke behavior.

Equipment: Fire simulation kits, thermal cameras, and data recording tools.

Fluid Dynamics in Fire Safety

Activity 1: Hydraulic Pressure and Flow Measurement

Objective: Measure and analyze hydraulic pressure and flow rates in firefighting systems, such as hoses and pumps.

Equipment: Pressure gauges, flow meters, fire hoses, and pumps.

Activity 2: Airflow Analysis in Smoke Control Systems

Objective: Study the airflow dynamics in smoke control systems and their effectiveness in smoke ventilation.

Equipment: Anemometers, smoke generators, and airflow measurement tools.

Electrical Systems and Fire Safety

Activity 1: Testing Fire Alarm Systems

Objective: Test and analyze the functionality of electrical fire alarm systems, including sensors and notification devices.

Equipment: Fire alarm panels, sensors, notification devices, testing tools.

Activity 2: Understanding Electrical Circuit Protection

Objective: Learn about circuit protection mechanisms (e.g., fuses, circuit breakers) and their role in preventing electrical fires.

Equipment: Electrical circuit kits, fuses, circuit breakers, and multimeters.

Mechanical Principles in Fire Safety Equipment

Activity 1: Operation and Maintenance of Fire Pumps

Objective: Analyze the mechanical principles behind fire pump operation, including pressure and flow control.

Equipment: Fire pumps, pressure gauges, maintenance tools.

Activity 2: Fire Suppression System Mechanisms

Objective: Study the mechanical mechanisms involved in various fire suppression systems, such as sprinkler systems and fire extinguishers.

Equipment: Fire suppression system components, operation manuals, and demonstration setups.

Course Title: PROJECT II

Course Code: BFI207

L	T	P	Credits
0	0	6	3

Total Hours-45

Course Content

Fire Safety Audit of a Small Commercial Establishment

Objective: Conduct a fire safety audit of a small commercial establishment (e.g., a retail shop, restaurant).

Description: Students will evaluate the fire safety measures in place at a small commercial establishment. The project will involve inspecting fire exits, signage, firefighting equipment, and adherence to fire safety regulations. Students will identify any potential fire hazards and recommend improvements.

Design and Implementation of a Basic Fire Evacuation Plan

Objective: Develop and implement a basic fire evacuation plan for a small building or institution (e.g., a school, office, or residential building).

Description: Students will design an evacuation plan considering the layout, occupancy, and potential fire hazards of the chosen location. They will create evacuation maps, designate assembly points, and conduct a drill to test the plan's effectiveness.

Evaluation and Testing of Fire Extinguishers in Various Scenarios

Objective: Evaluate the effectiveness of different types of fire extinguishers (e.g., water, foam, CO2, dry chemical) in various fire scenarios.

Description: Students will conduct controlled fire extinguishing tests using different types of extinguishers on various classes of fires (A, B, C, D). They will assess the effectiveness, ease of use, and limitations of each type of extinguisher.

Comparative Study of Fire Safety Regulations in Residential vs. Commercial Buildings

Objective: Compare fire safety regulations and requirements for residential and commercial buildings.

Description: Students will research the fire safety regulations applicable to residential and commercial buildings, noting similarities and differences. They will analyze why certain regulations are more stringent in one type of building and discuss the implications for fire safety management.

Design and Prototype of a Basic Fire Alarm System

Objective: Design and create a prototype of a basic fire alarm system suitable for a small residential or commercial space.

Description: Students will design a simple fire alarm system using basic electronic components, such as smoke detectors, buzzers, and control panels. The project will involve assembling the components, testing the system, and troubleshooting any issues.

Assessment of Emergency Lighting Systems in Public Buildings

Objective: Assess the adequacy and functionality of emergency lighting systems in a public building (e.g., library, community center).

Description: Students will inspect the emergency lighting systems of a selected public building, checking for compliance with safety standards, proper placement, and functionality during power outages. They will recommend improvements where necessary.

Simulation of Fire Spread in a Small Building Using Basic Software Tools

Objective: Simulate fire spread in a small building using basic fire modeling software.

Description: Students will use basic fire simulation software (e.g., a simplified version of PyroSim or a similar tool) to model the spread of fire in a small building. They will analyze how factors like building

layout, ventilation, and materials affect fire behavior.

Public Awareness Campaign on Fire Safety in the Home

Objective: Develop and implement a public awareness campaign on fire safety practices in the home.

Description: Students will design a campaign aimed at educating the public about fire safety in the home. The campaign could include brochures, social media content, workshops, and demonstrations on topics like fire prevention, the proper use of fire extinguishers, and creating escape plans.

Course Title: ENVIRONMENTAL SCIENCES
Course Code: BFI208

L	T	P	Credits
2	0	0	2

Total hours: 30

Learning Outcomes: After completion of this course, the learner will be able to:

1. Identify environmental problems arising due to engineering and technological activities and the science behind those problems.
2. Estimate the population - economic growth, energy requirement and demand
3. Analyze material balance for different environmental systems.
4. Realize the importance of ecosystem and biodiversity for maintaining ecological balance. Identify the major pollutants and abatement devices for environmental management and sustainable development

Course Content

UNIT-I

5 Hours

Introduction: Definition and scope and importance of multidisciplinary nature of environment. Need for public awareness.

Natural Resources: Natural Resources and associated problems, use and over exploitation, case studies of forest resources and water resources.

UNIT-II

10 Hours

Ecosystems: Concept of Ecosystem, Structure, interrelationship, producers, consumers and decomposers, ecological pyramids-biodiversity and importance. Hot spots of biodiversity.

Environmental Pollution: Definition, Causes, effects and control measures of air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards. Solid waste Management: Causes, effects and control measure of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster Management: Floods, earthquake, cyclone and landslides.

UNIT-III

10 Hours

Social Issues and the Environment from Unsustainable to Sustainable development, urban problems related to energy, Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of pollution) Act. Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation Public awareness.

UNIT-IV

5 Hours

Human Population and the Environment, Population growth, variation among nations. Population explosion – Family Welfare Programme. Environment and human health, Human Rights, Value Education, HIV/AIDS. Women and child Welfare. Role of Information Technology in Environment and human health. Case studies.

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

Semester-III

Course Title: HEALTH SAFETY & DISASTER MANAGEMENT

Course Code: BFI301

L	T	P	C r
3	0	0	3

Total Hours-45

Course Contents

Unit I

10 Hours

Occupational Health and Environmental Safety

Occupational Health Hazards OSHA (Occupational Safety & Health Administration)

Principles of Environmental Engineering Pollution Prevention Waste treatment Disposal of waste

Unit II

11 Hours

Environmental Management and Safety Standards

Standards of Environmental Management System Engineering Control Health Hazards Material handling safety Personal protective Equipment Electrical Hazards and safety

Unit III

13 Hours

Fire Protection and Safety Standards

Introduction to TAC norms Lightning and electrical hazard protection Plan reading and method Standard, symbols, designation Personal hazards Fire escape structural precaution Safe Work Place Basic requirements of Scaffolding Permit To Work System (PTW),HSE Training, Personal Protective Equipment (PPE)

Unit IV

Disaster Management and Relief 11 Hours

Introduction to Disasters and Their Classification Inter-relationship between Disasters and Development Disaster Risk Management in India Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management.

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

Course Title: SEARCH & RESCUE TECHNIQUES AND PARAMEDICS

Course Code: BFI302

L	T	P	C r .
3	0	0	3

Total Hours-45

Course Contents

UNIT I

11 Hours

Search and Rescue Techniques

Introduction to Search Technique Correct Method of Searching a Room Factors Influencing Search & Rescue, Rescue by Fireman, Rescue Using Fire Services Equipment Requisite Qualities of Rescuer, Different Rescue Scenarios Types of Searches, Factors to Consider While Searching Rescue Technique, Shelter in Place, Exit Assist Rescue Using Fire Services Equipment Requisite Qualities of a Rescuer Different Rescue Scenarios

UNIT II

11 Hours

Confined Space Entry and Hazard Management

Defining Confined Space Hazard Recognition Permit Required Confined Spaces & Causes Type of Permits Flammable /Toxic Atmosphere, Flammable Range Effects of Reduced Oxygen Physical Hazards, Entry Requirement Equipment Needed at Confined Space Entry Air Monitoring Equipment Case Studies Ventilation and Inserting Rescue Equipment & Accessories, Entry rescue, non-entry rescue

UNIT III

11 Hours

On-Site Emergency Planning and Management

On-site Emergency Plan Emergency Alarm System Emergency Control Room Emergency Control Programme Off-site Emergency Plan Emergency Evacuation Key personnel Mutual Aid Scheme Security and Media management

UNIT IV

12 Hours

Fundamentals of Paramedics and First Aid

Human Anatomy and Vital Organs Introduction to First Aid Responsibility of First Aider Principles of First Aid Main Three Emergencies Wounds, Bleeding, Dressings & Bandages Types of Injuries Electric Shock, Electric Burn, Effect on Heart Toxic Gases, Cardiac Massage Helping a Person Whose Clothes Have Caught Fire

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

Course Title: FIRE PROTECTION SYSTEM

Course Code: BFI303

L	T	P	C r
3	0	0	3

Total Hours-45

Course Contents

UNIT I **10 Hours**

Fundamentals of Fire Protection System

Introduction to Fire Protection Systems Passive Fire Protection System Firefighting Equipment
Position of extinguishers Fire blankets Fire buckets Hose reel hose

UNIT II **12 Hours**

Design and Application of Hydrant Systems

Introduction to Hydrant System Component and uses of Hydrant system Outdoor Hydrant
System Design Indoor Riser Systems (Dry and Wet Risers) Hydrant System Pumps Hydrant
System Piping

UNIT III **13 Hours**

Advanced Fire Suppression Systems

Introduction to Sprinklers and Spray Systems Sprinklers vs. Hydrant Systems Types and
Operation of Sprinkler Systems Sprinkler System Components Deluge and Water Spray Systems

UNIT IV **10 Hours**

Firefighting Equipment and Standards

Introduction to IS Specification Firefighting Vehicles Fire Extinguishers CFT (Crash Fire Tender)
IS Specifications for Different Types of Fire Extinguishers

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile
Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

Course Title: HEALTH SAFETY AND DISASTER MANAGEMENT PRACTICAL

Course Code: BFI304

L	T	P	C r
0	0	4	2

Total Hours-60

Course Contents

UNIT I

Fire Safety Equipment and Maintenance

Activity 1: Fire Extinguisher Inspection and Maintenance Practice inspecting different types of fire extinguishers, checking pressure levels, expiration dates, and performing routine maintenance.

Activity 2: Fire Alarm System Testing Conduct practical tests on fire alarm systems, including manual call points, smoke detectors, and control panels.

Activity 3: Fire Hose Reel and Hydrant System Operation Demonstrate the operation of fire hose reels and hydrants, including pressure testing and proper handling techniques.

Activity 4: Personal Protective Equipment (PPE) Usage Properly don and doff firefighting PPE, including helmets, gloves, boots, and breathing apparatus, with a focus on safety protocols.

UNIT II

Emergency Response and Evacuation Planning

Activity 1: Fire Drill Planning and Execution Plan and execute a fire drill for a simulated environment, including evacuation routes, roles, and timing analysis.

Activity 2: Emergency Evacuation Techniques; Practice various evacuation techniques, including the use of evacuation chairs, ladders, and safe assembly point identification.

Activity 3: Emergency Communication Systems Set up and test emergency communication systems such as PA systems, intercoms, and emergency broadcast systems.

Activity 4: First Aid and CPR Training Provide hands-on first aid and CPR training, focusing on immediate response to fire-related injuries and smoke inhalation.

UNIT III

Risk Assessment and Hazard Identification

Activity 1: Conducting a Safety Audit Perform a safety audit of a given facility, identifying potential fire hazards and assessing compliance with safety standards.

Activity 2: Hazard Identification and Risk Assessment (HIRA) Carry out a HIRA exercise, documenting fire hazards, assessing risks, and recommending control measures.

Activity 3: Safety Signage and Compliance Inspect and evaluate the placement and condition of safety signage, ensuring compliance with fire safety regulations.

Activity 4: Chemical Safety and Handling Demonstrate safe handling, storage, and labeling of hazardous chemicals, including understanding Material Safety Data Sheets (MSDS).

UNIT IV

Disaster Management and Incident Response

Activity 1: Disaster Preparedness Drills Organize and participate in disaster preparedness drills, simulating scenarios like earthquakes, floods, or chemical spills.

Activity 2: Incident Command System (ICS) Training Role-play different positions within the Incident Command System (ICS) during a simulated disaster response.

Activity 3: Post-Incident Analysis and Reporting Conduct a post-incident analysis of a simulated disaster, including writing an incident report and identifying areas for improvement.

Activity 4: Crisis Communication and Coordination Practice crisis communication strategies, including coordination with emergency services, media management, and public information dissemination.

Course Title: SEARCH & RESCUE TECHNIQUES AND PARAMEDICS PRACTICAL

Course Code: BFI305

L	T	P	C r
0	0	6	3

Total Hours-45

Course Contents

UNIT I

Basic Search and Rescue Operations

Activity 1: Primary Search Techniques Practice primary search techniques in a simulated fire environment, focusing on quick, systematic searching of a building for victims.

Activity 1.2: Victim Location and Marking Learn and apply techniques for locating victims in smoke-filled or low-visibility conditions, and marking searched areas to prevent duplication.

Activity 3: Use of Thermal Imaging Cameras Train in the use of thermal imaging cameras for locating victims in low-visibility conditions such as heavy smoke or darkness

Activity 4: Search Patterns and Team Coordination of Execute different search patterns (e.g., right-hand/left-hand search) while maintaining communication and coordination within a rescue team.

UNIT II

Advanced Rescue Techniques

Activity 1: Victim Extrication Methods Practice advanced victim extrication techniques, including using rescue tools (e.g., spreaders, cutters) to free trapped individuals.

Activity 2: High-Rise Building Rescue Simulate rescue operations in high-rise buildings, including the use of aerial ladders, harnesses, and ropes for victim retrieval.

Activity 3: Confined Space Rescue Perform confined space rescue exercises, learning techniques for safe entry, victim stabilization, and extrication from tight or restricted areas.

Activity 4: Water and Flood Rescue Techniques Engage in water rescue drills, including using life jackets, ropes, and flotation devices, focusing on rescuing victims in flood or water-related scenarios.

UNIT III

Paramedics and Emergency Medical Response

Activity 1: Basic Life Support (BLS) and CPR Receive training in Basic Life Support (BLS) techniques, including CPR, AED usage, and airway management for unconscious victims.

Activity 2: Trauma Care and Wound Management Practice handling trauma cases, including assessing injuries, controlling bleeding, and performing wound care in emergency situations.

Activity 3: Triage and Emergency Assessment Conduct triage in a mass casualty incident, prioritizing victims based on the severity of their injuries and the urgency of medical care needed.

Activity 4: Spinal Immobilization and Patient Transport Learn and apply techniques for spinal immobilization using backboards and cervical collars, followed by safe patient transport.

UNIT IV

Integrated Search, Rescue, and Medical Operations

Activity 1: Simulated Disaster Response Drills Participate in full-scale disaster response drills that integrate search, rescue, and paramedic operations in a coordinated effort.

Activity 2: Multi-Casualty Incident Management Manage a multi-casualty incident by organizing and executing search, rescue, and medical response tasks under simulated conditions.

Activity 3: Use of Rescue Equipment in Complex Scenarios Operate specialized rescue equipment in complex scenarios, such as collapsed buildings or multi-vehicle accidents, ensuring effective victim retrieval.

Activity 4: Post-Rescue Medical Stabilization Practice providing medical stabilization to rescued victims, including administering oxygen, treating shock, and preparing for ambulance transport.

Course Title: FIRE PROTECTION SYSTEM PRACTICAL

Course Code: BFI306

L	T	P	C r
0	0	6	3

Total Hours-45

Course Contents

UNIT I

Fire Detection and Alarm Systems

Activity 1.1: Installation and Testing of Smoke Detectors Practice installing smoke detectors in various settings and conduct tests to ensure they are functioning correctly.

Activity 1.2: Fire Alarm Control Panel (FACP) Operation Learn to operate and troubleshoot a fire alarm control panel, including responding to alarms, silencing systems, and resetting the panel.

Activity 1.3: Integration of Fire Alarm Systems with Building Management Systems (BMS) Integrate fire alarm systems with building management systems, testing automated responses such as door release mechanisms and HVAC shutdowns.

Activity 1.4: Maintenance of Fire Detection Systems Perform routine maintenance on fire detection systems, including battery checks, sensor cleaning, and replacement of faulty components.

UNIT II

Fire Suppression Systems

Activity 2.1: Sprinkler System Installation and Testing Install and test automatic sprinkler systems, including checking water flow, pressure, and system coverage in a building.

Activity 2.2: Operation of Fire Suppression Agents (e.g., CO₂, Foam, Dry Chemical) Learn to operate various fire suppression systems, such as CO₂, foam, and dry chemical, including activation and manual override procedures.

Activity 2.3: Inspection and Maintenance of Fire Suppression Systems Conduct inspections and maintenance of fire suppression systems, ensuring they are ready for activation and compliant with safety standards.

Activity 2.4: Conducting a Live Fire Suppression Drill Participate in a live fire suppression drill using a controlled fire environment to practice activating and using suppression systems effectively.

UNIT III

Passive Fire Protection Systems

Activity 3.1: Installation of Fire-Resistant Doors and Windows Install fire-resistant doors and windows, ensuring proper sealing, fitting, and compliance with fire safety regulations.

Activity 3.2: Application of Fireproof Coatings and Materials Apply fireproof coatings and materials to structural elements such as steel beams and columns, assessing their effectiveness in fire resistance.

Activity 3.3: Inspection of Fire Dampers and Compartmentation Inspect and test fire dampers in HVAC systems and verify the integrity of fire compartmentation barriers within a building.

Activity 3.4: Fire stopping Techniques for Electrical and Plumbing Penetrations Implement fire stopping techniques around electrical and plumbing penetrations in fire-rated walls and floors to prevent the spread of fire and smoke.

UNIT IV

Fire Hydrant and Hose Reel Systems

Activity 4.1: Installation and Testing of Fire Hydrant Systems to Install fire hydrant systems, including hydrant points, hose connections, and valves, followed by testing for water flow and pressure.

Activity 4.2: Operation and Maintenance of Hose Reels Practice the operation of hose reels, including unwinding, nozzle control, and rewinding, along with routine maintenance tasks.

Activity 4.3: Conducting Fire Hydrant Drills Participate in fire hydrant drills, practicing rapid deployment, hose handling, and coordination with fire suppression efforts.

Activity 4.4: Inspection and Testing of Fire Pumps Inspect and test fire pumps, including checking for proper operation, pressure, and flow rate during simulated fire scenarios.

Course Title: PROJECT III

Course Code: BFI307

L	T	P	C r
0	0	6	3

Total Hours-45

Course Contents

Fire Risk Assessment and Mitigation Plan for a Commercial Building

Objective: Conduct a comprehensive fire risk assessment of a commercial building and develop a mitigation plan.

Description: Students will assess a commercial building for fire hazards, evaluate existing fire protection systems, and propose improvements. The project will include risk identification, analysis, and the development of a detailed mitigation plan, including recommendations for fire protection upgrades and emergency preparedness.

Design and Implementation of an Evacuation Plan for a High-Rise Building

Objective: Develop and implement a customized evacuation plan for a high-rise building.

Description: Students will design an evacuation plan tailored to the specific layout and occupancy of a high-rise building. The project will involve analyzing evacuation routes, creating evacuation maps, and conducting drills to test the plan's effectiveness. The plan will include strategies for different scenarios, such as fire, earthquake, or other emergencies

Comparative Study of Fire Suppression Systems in Industrial Settings

Objective: Compare the effectiveness of different fire suppression systems in industrial environments

Description: Students will research and analyze various fire suppression systems used in industrial settings, such as water sprinklers, foam systems, and gas-based suppression systems. The project will involve case studies, performance analysis, and recommendations for specific industrial applications.

Development of a Community Fire Safety Awareness Program

Objective: Create and implement a community-based fire safety awareness program.

Description: Students will design a fire safety awareness program aimed at educating a specific community or group (e.g., schools, residential areas, businesses) about fire hazards, prevention measures, and emergency response. The project will involve creating educational materials, organizing workshops, and evaluating the program's impact.

Analysis of Fire Incidents and Development of Preventive Strategies

Objective: Analyze recent fire incidents and develop strategies to prevent similar occurrences.

Description: Students will select a series of recent fire incidents, analyze their causes, and identify common factors contributing to these fires. The project will involve studying incident reports, interviewing key stakeholders, and proposing preventive measures to reduce the risk

of similar incidents in the future.

Design and Testing of a Custom Fire Detection System for a Specific Environment

Objective: Design and test a fire detection system customized for a unique environment (e.g., a museum, data center, or chemical lab).

Description: Students will design a fire detection system tailored to the specific needs and challenges of a unique environment. The project will involve selecting appropriate sensors, integrating them into a control system, and testing the system in a simulated environment.

Evaluation of Fire Safety Standards Compliance in a Public Building

Objective: Evaluate the compliance of a public building with local and national fire safety standards.

Description: Students will conduct an in-depth evaluation of a public building (e.g., a hospital, school, or shopping mall) to determine its compliance with fire safety standards. The project will include inspecting fire protection systems, emergency exits, signage, and conducting interviews with building management.

Simulation and Analysis of Fire Spread in a Residential Building Using Fire Modeling Software

Objective: Simulate and analyze the spread of fire in a residential building using fire modeling software.

Description: Students will use fire modeling software (e.g., Pyro Sim, FDS) to simulate the spread of fire in a residential building under different scenarios. The project will involve setting up the model, running simulations, and analyzing the results to understand how different factors (e.g., building materials, ventilation) influence fire spread.

SEMESTER- IV

COURSE TITLE: HYDRAULICS & PUMPS

COURSE CODE: BFI401

L	T	P	Credits
3	0	0	3

Total Hours-45

Course Content

UNIT I

10 Hours

Fundamentals of Fire Hydraulics and Fluid Dynamics

Introduction to Fire Hydraulics, Fluid Properties, Flow Dynamics, Pressure and Velocity Measurement, Discharge Measurement.

UNIT II

12 Hours

Pipe Flow Dynamics and Hydraulic Calculations

Pipe Flow Fundamentals, Head Loss and Flow Characteristics, Friction and Pressure Loss, Valves and Flow Control, Hydraulic Calculations and Theorems.

UNIT III

12 Hours

Pump Systems: Types, Operation, and Maintenance

Introduction to Pumps, Types of Pumps, Comparative Analysis, Pump Operation and Maintenance.

UNIT IV

12 Hours

Hydraulic Machines: Principles and Applications

Introduction to Hydraulic Machines, Types of Hydraulic Machines, Specialized Hydraulic Devices, Jet Pump.

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

COURSE TITLE: CONSTRUCTION SAFETY

COURSE CODE: BFI402

L	T	P	Credits
3	0	0	3

Total Hours-45

Course Content

UNIT I

12 Hours

Construction Safety Management and Best Practices

Introduction to Construction Safety, Safety During Project Construction, Safety Protocols for Materials Handling, General Safety Facilities and Precautions, Training and Emergency Preparedness, Safety Training for Project and Operation Staff, Emergency Rescue Equipment and Procedures, Handling Exhaust Gases and Hazardous Materials

UNIT II

11 Hours

Comprehensive Safety in Construction

Trench Shoring Safety, Welding and Cutting Safety, Concrete and Formwork Safety, Electrical Safety in Construction, Tool Safety, Precautions for Electrically Operated Tools, Cartridge Tools: Individual Tools and Safety Precautions.

UNIT III

11 Hours

Scaffold and Formwork Safety in Construction

Introduction to Formworks, Scaffolding Basics, Scaffold Design and Construction, Scaffold Inspection and Maintenance, Scaffold Safety and Accident Investigation, Safety Standards and Case Studies.

UNIT IV

11 Hours

Practical Safety Training and On-Site Applications

Construction Site Visits, Scaffold Erection and Dismantling, Safety Equipment Demonstrations, Tool Safety Practices, Safety Meetings and Drills, Emergency Preparedness, Material Handling and PPE.

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

COURSE TITLE: LAW RELATED TO SAFETY, HEALTHY & ENVIRONMENT**COURSE CODE: BFI403**

L	T	P	Credits
3	0	0	3

Total Hours-45**Course Content****UNIT I****08 Hours****Regulatory Framework for Industrial Safety**

Introduction to the Factories Act, 1948, Interrelation of Acts and Rules

UNIT II**12 Hours****Safety and Legislation Acts**

Indian Explosives Act, 1884, Calcium Carbide Rules, 1987, Static & Mobile Pressure Vessel Rules, Fire Prevention Legislation, Fire Insurance Assessment.

UNIT III**13 Hours****Environmental Protection and Pollution Control Regulations**

Environment (Protection) Act, 1986, Manufacture, Storage, and Import of Hazardous Chemicals (MSIHC) Rules, Water (Prevention and Control of Pollution) Act, Air (Prevention and Control of Pollution) Act, Chemical Accidents (Emergency Planning, Preparedness, and Response) Rules, 1996.

UNIT IV**12 Hours****Safety Regulations for Gas, Petroleum, and Electricity Management**

Gas Cylinder Rules, 2004, Petroleum Act, 1934 with Petroleum Rules, 2002, Electricity Act, 2003 with Rules, Safety Protocols for Electrical Installations and Operations.

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

COURSE TITLE: HYDRAULICS & PUMPS PRACTICAL
COURSE CODE: BFI404

L	T	P	Credits
0	0	4	2

Total Hours-60

Course Content

Unit 1: Fundamentals of Hydraulics

Activity 1: Understanding Hydraulic Principles

Conduct experiments to demonstrate basic hydraulic principles, such as Pascal's Law and Bernoulli's Equation, using hydraulic benches and fluid flow setups.

Activity 2: Flow Rate Measurement

Measure and analyze the flow rates of different hydraulic systems, including calculating flow velocity and volume based on pressure and pipe dimensions.

Activity 3: Pressure Drop Calculation

Calculate and measure pressure drops in hydraulic systems using various types of pipes, fittings, and valves to understand how different components affect system performance.

Activity 4: Hydraulic System Simulation

Use simulation software to model hydraulic systems, including analyzing the effects of different configurations on system performance and efficiency.

Unit 2: Pump Operation and Maintenance

Activity 1: Pump Installation and Setup

Install and set up various types of pumps (centrifugal, positive displacement) in a controlled environment, ensuring proper alignment and operational readiness.

Activity 2: Pump Performance Testing

Test pump performance under various conditions, including measuring flow rates, pressure, and efficiency to evaluate operational effectiveness.

Activity 3: Routine Maintenance Procedures

Perform routine maintenance tasks on pumps, such as checking for leaks, inspecting seals, and replacing worn parts to ensure reliable operation.

Activity 4: Troubleshooting Pump Issues

Diagnose and troubleshoot common issues with pumps, including vibration, cavitation, and reduced performance, using appropriate tools and techniques.

Unit 3: Hydraulics in Fire Protection Systems

Activity 1: Hydrant Flow Testing

Conduct flow testing of fire hydrants to determine water flow rates and pressure, assessing the capability of the hydrant to meet fire protection requirements.

Activity 2: Fire Pump System Configuration

Configure and test fire pump systems to ensure they provide adequate pressure and flow for fire suppression, including integrating pumps with fire sprinkler systems.

Activity 3: Design of Hydraulic Fire Protection Systems

Design hydraulic systems for fire protection, including calculating pump capacities, pipe sizes, and system pressure requirements based on building specifications.

Activity 4: Evaluation of Pump Performance in Fire Scenarios

Simulate fire scenarios to evaluate pump performance under emergency conditions, including assessing system response and effectiveness in delivering water to firefighting equipment.

Unit 4: Advanced Hydraulic System Analysis

Activity 1: Advanced Flow Dynamics

Analyze complex flow dynamics in hydraulic systems, including studying turbulent vs. laminar flow and the impact of system modifications on flow characteristics.

Activity 2: Energy Efficiency in Hydraulic Systems

Evaluate the energy efficiency of hydraulic systems, including assessing the impact of various components on overall system efficiency and identifying opportunities for optimization.

Activity 3: Hydraulic System Modeling

Develop and analyze detailed hydraulic models using simulation software, including incorporating real-world data to predict system behavior and performance.

Activity 4: Integration of Hydraulics and Pumps

Integrate hydraulic systems with pump systems in a practical setup, including optimizing system design for performance and efficiency in fire safety applications.

COURSE TITLE: FIRE PROTECTION SYSTEM PRACTICAL**COURSE CODE: BFI405**

L	T	P	Credits
0	0	6	3

Total Hours-45**Course Content****Unit 1: Fire Detection Systems****Activity 1: Installation and Testing of Smoke Detectors**

Install various types of smoke detectors (ionization, photoelectric) and test their functionality to ensure they detect smoke accurately and trigger alarms.

Activity 2: Heat Detector Calibration

Calibrate and test heat detectors to ensure they activate correctly in response to rising temperatures and are set to appropriate thresholds.

Activity 3: Manual Pull Station Setup

Install and test manual pull stations to ensure they are easily accessible and function properly in triggering fire alarms.

Activity 4: Integration of Detection Systems

Integrate different fire detection systems (smoke detectors, heat detectors, manual pull stations) with a central alarm panel and test their coordination and response.

Unit 2: Fire Suppression Systems**Activity 1: Fire Sprinkler System Installation**

Install and configure fire sprinkler systems, including selecting appropriate heads, setting up piping, and ensuring proper water flow and coverage.

Activity 2: Operation of Fire Extinguishers

Demonstrate the correct use of different types of fire extinguishers (water, foam, CO2, dry chemical) for various classes of fires and conduct practical extinguishing exercises.

Activity 3: Testing of Standpipe Systems

Test standpipe systems for fire suppression in multi-story buildings, including checking water pressure, flow rates, and hose functionality.

Activity 4: Fire Suppression System Maintenance

Perform routine maintenance tasks for fire suppression systems, such as inspecting and servicing sprinkler heads, fire extinguishers, and other suppression equipment.

Unit 3: Fire Alarm Systems**Activity 1: Fire Alarm System Installation**

Install and configure fire alarm systems, including setting up control panels, detectors, and alarm devices, and ensure proper wiring and connectivity.

Activity 2: Alarm Notification Devices Testing

Test various alarm notification devices (bells, strobes, horns) to ensure they are functioning correctly and providing adequate warning in different environments.

Activity 3: System Integration and Programming

Integrate fire alarm systems with other building systems (e.g., HVAC, elevators) and program the alarm system to manage different fire scenarios and response protocols.

Activity 4: System Testing and Troubleshooting

Conduct comprehensive testing of fire alarm systems, including troubleshooting common issues and ensuring system reliability and performance.

Unit 4: Fire Protection System Design and Assessment**Activity 1: Design of Fire Protection Systems**

Develop fire protection system designs for various types of buildings and facilities, including selecting appropriate systems and layout based on building codes and standards.

Activity 2: Fire Protection System Assessment

Assess existing fire protection systems for compliance with safety standards and codes, including evaluating system effectiveness and identifying areas for improvement.

Activity 3: Simulation of Fire Scenarios

Simulate fire scenarios to test the effectiveness of fire protection systems, including assessing response times, system activation, and overall effectiveness.

Activity 4: Preparation of Fire Protection Plans

Create detailed fire protection plans for specific buildings or facilities, including system layouts, maintenance schedules, and emergency response procedures.

COURSE TITLE: LAW RELATED TO SAFETY, HEALTH & ENVIRONMENT PRACTICAL**COURSE CODE: BFI406**

L	T	P	Credits
0	0	6	3

Total Hours-45**Course Content****Unit 1: Understanding and Applying Safety, Health, and Environmental Laws****Activity 1: Review of Relevant Legislation**

Study and summarize key safety, health, and environmental regulations relevant to fire safety, including OSHA standards, Environmental Protection Agency (EPA) guidelines, and local fire safety laws.

Activity 2: Compliance Checklist Creation

Develop a compliance checklist for a facility or workplace based on relevant safety, health, and environmental laws to ensure adherence to legal requirements.

Activity 3: Case Law Analysis

Analyze case studies of legal issues related to safety, health, and environmental violations, and evaluate the application of laws in these scenarios.

Activity 4: Practical Application Exercise

Apply legal requirements in a simulated environment by creating a safety management plan that incorporates legal standards for health, safety, and environmental protection.

Unit 2: Risk Assessment and Legal Compliance**Activity 1: Conducting Legal Risk Assessments**

Perform risk assessments to identify potential legal compliance issues related to safety, health, and environmental regulations in a simulated or real-world setting.

Activity 2: Developing Risk Management Strategies

Develop risk management strategies to address legal compliance issues identified during risk assessments, including preventive and corrective measures.

Activity 3: Safety Audit Simulation

Conduct a safety audit to evaluate compliance with legal requirements, including documenting findings, assessing corrective actions, and preparing audit reports.

Activity 4: Legal Documentation and Reporting

Prepare and review legal documentation and reports related to safety, health, and environmental compliance, including incident reports and compliance records.

Unit 3: Training and Awareness Programs**Activity 1: Designing Legal Compliance Training**

Create and design training programs focused on legal compliance related to safety, health, and environmental regulations for employees or management.

Activity 2: Conducting Compliance Workshops

Conduct workshops to educate employees and management about their legal responsibilities and the importance of complying with safety, health, and environmental laws.

Activity 3: Evaluating Training Effectiveness

Assess the effectiveness of compliance training programs through feedback surveys, quizzes, and practical evaluations to ensure understanding and adherence.

Activity 4: Developing Educational Materials

Develop educational materials such as handbooks, posters, and digital resources to support ongoing awareness and compliance with safety, health, and environmental laws.

Unit 4: Legal and Regulatory Compliance in Emergency Situations

Activity 1: Emergency Response Plan Evaluation

Review and evaluate emergency response plans to ensure they comply with legal requirements for safety, health, and environmental protection.

Activity 2: Simulating Legal Compliance During Emergencies

Simulate emergency scenarios to test the effectiveness of legal compliance measures, including documenting adherence to regulations and response protocols.

Activity 3: Post-Incident Legal Review

Conduct a legal review of post-incident reports and actions to ensure compliance with safety, health, and environmental laws and regulations.

Activity 4: Preparing for Regulatory Inspections

Prepare for and conduct mock regulatory inspections to assess readiness for compliance with safety, health, and environmental laws.

COURSE TITLE: PROJECT IV
COURSE CODE: BFI407

L	T	P	Credits
0	0	6	3

Total Hours-45

Comprehensive Fire Safety Plan for an Industrial Facility

Objective: Develop a comprehensive fire safety plan for an industrial facility, addressing unique hazards and compliance with regulations.

Description: Students will assess the fire risks specific to an industrial facility, considering factors like hazardous materials, machinery, and large-scale operations. They will design a fire safety plan that includes fire detection, suppression systems, emergency evacuation procedures, and employee training programs.

Emergency Response and Evacuation Strategy for a Large Public Event

Objective: Design an emergency response and evacuation strategy for a large public event (e.g., a concert, sports event).

Description: Students will plan a strategy to manage fire safety during a large public event, including crowd management, emergency communications, and evacuation procedures. They will consider challenges such as high occupancy, temporary structures, and variable access points.

Fire Risk Assessment and Safety Improvements in a Heritage Building

Objective: Conduct a fire risk assessment for a heritage building and propose safety improvements that preserve the building's integrity.

Description: Students will evaluate the fire risks associated with a heritage building, considering its construction materials, historical value, and occupancy. They will propose fire safety enhancements that minimize risk while respecting the building's architectural and historical significance.

Analysis of Fire Incident Data and Development of Preventive Strategies

Objective: Analyze fire incident data from a specific region or industry and develop targeted preventive strategies.

Description: Students will collect and analyze data on fire incidents, identifying trends, common causes, and high-risk factors. Based on their findings, they will propose strategies to prevent future incidents, focusing on education, regulation, or technology.

Design and Implementation of a Fire Safety Training Program for Employees in a High-Risk Industry

Objective: Design and implement a fire safety training program for employees in a high-risk industry (e.g., chemical manufacturing, oil and gas).

Description: Students will develop a tailored training program that addresses the specific fire hazards and safety protocols relevant to a high-risk industry. The program will include theoretical modules, practical exercises, and an assessment of employee understanding and readiness.

Evaluation of Fire Safety Systems in High-Rise Buildings

Objective: Evaluate the fire safety systems in a high-rise building, focusing on compliance with modern fire safety standards.

Description: Students will conduct an in-depth evaluation of the fire safety systems in a high-rise building, including fire detection, suppression, and evacuation systems. They will assess compliance with current fire safety standards and recommend upgrades or modifications where necessary.

Development of a Fire Emergency Response Plan for a Healthcare Facility

Objective: Create a fire emergency response plan specifically for a healthcare facility, addressing

the unique challenges of evacuating patients and staff.

Description: Students will design an emergency response plan tailored to a healthcare facility, considering factors such as patient mobility, medical equipment, and staff coordination. The plan will include evacuation procedures, fire drills, and communication protocols to ensure the safety of all occupants.

Research and Development of New Fire Suppression Technologies

Objective: Research and explore innovative fire suppression technologies, focusing on their application in specific industries or environments.

Description: Students will investigate emerging fire suppression technologies, such as watermist systems, aerosol-based suppressants, or advanced foam systems. They will evaluate their effectiveness, potential applications, and benefits over traditional methods.

SEMESTER- V

COURSE TITLE: EXPLOSION & FIRE DYNAMICS

COURSE CODE: BFI501

L	T	P	Credits
3	0	0	3

Total Hours-45

Course Content

Unit 1: Understanding Explosion Characteristics and Stoichiometry 10 Hours

- Introduction to Explosion Characteristics
- Explosion Hazards
- Stoichiometry for Explosive Gases
- Stoichiometry for Hydrocarbons and Wood

Unit 2: Flammability Limits, Ignition, and Explosion Theories 12 Hours

- Understanding Flammability Limits
- Ignition and Flammability Characteristics
- Classification of Flammable Materials
- Explosion Hazards: Case Studies
- Analysis of the TWA Flight 800 Disaster and Lessons Learned

Unit 3: Techniques for Explosion Prevention 13 Hours

- Introduction to Explosion Prevention
- Ventilation Techniques
- Separation and Physical Barriers
- Alternative Explosion Prevention Techniques
- Preventing the Formation of Explosive Atmospheres

Unit 4: Fire Dynamics and Human Behavior in Fire Emergencies 10 Hours

- Fundamentals of Fire Dynamics
- Flame Spread Mechanisms
- Phases of Fire Development
- Compartment and Unconfined Fires
- Human Behavior in Fire Emergencies

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

COURSE TITLE: SALVAGE & FIRE ACCIDENT INVESTIGATION

COURSE CODE: BFI502

L	T	P	Credits
3	0	0	3

Total Hours-45

Course Content

Unit 1: Salvage Operations: Planning, Execution, and Equipment 11 Hours

- Introduction to Salvage Operations
- Executing Salvage Operations
- Essential Equipment for Salvage Operations
- Best Practices for Equipment Usage in Challenging Conditions

Unit 2: Fire Situation Evaluation and Loss Mitigation 10 Hours

- Introduction to Fire Loss Calculation
- Flame Temperature Measurement
- Heat Release Rate Calculation
- Salvage Operations in Various Occupancies

Unit 3: Fundamentals of Fire and Accident Investigation 13 Hours

- Introduction to Fire Investigation
- Accident Investigation Methodology
- Management of Incident and Information Collection
- Determining the Origin of Fire
- Documenting the Investigation
- Protecting the Crime Scene
- Basic Steps for Accident Investigation

Unit 4: Advanced Techniques in Fire and Accident Investigation 11 Hours

- Fire Pattern Analysis
- Fire Cause Determination
- Forensic Analysis in Fire Investigation
- Technology in Fire Investigation
- Investigating Fatal Fires
- Case Studies and Real-World Applications

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

COURSE TITLE: FIRE PREVENTION MEASURES

COURSE CODE: BFI503

L	T	P	Credits
3	0	0	3

Total Hours-45

Course Content

Unit 1: Comprehensive Fire Prevention Strategies and Safety Analysis 11 Hours

- Basic Philosophy and Principles of Fire Prevention
- Safety Sampling and Survey Techniques
- Fire Safety Inspections and Audits
- Total Loss Control and Damage Control Systems
- C Hazard Analysis and System Safety Techniques
- Work Permit Systems

Unit 2: Fire Propagation Hazards and Structural Fire Protection 10 Hours

- Hazards of Fire Propagation
- Concept of Separation and Compartmentalization
- Fire Propagation through Building Features
- Methods of Segregation
- Fire Rating of Structural Elements
- Fireproofing Techniques

Unit 3: Fire Loss Management and Insurance Considerations 13 Hours

- Expenses and Losses in Fire Incidents
- Additional Premiums for Perils and Expenses
- Documents Required by Insurers
- Fire Loss Management in Industry
- Fire Loss Control Program
- Sequence of Risk Control

Unit 4: Advanced Fire Case Studies and Escape Route Design 11 Hours

- Detailed Analysis of Major Fire Incidents
- Escape Route Design and Components
- Smoke Movement and Control
- Case Study Insights into Escape Route Effectiveness
- Evaluation of Success and Failures in Evacuation
- Recommendations for Improving Escape Route Design Based on Case Studies

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

COURSE TITLE: EXPLOSION & FIRE DYNAMICS PRACTICAL
COURSE CODE: BFI504

L	T	P	Credits
0	0	4	2

Total Hours-60

Course Content

Unit 1: Understanding Explosion Dynamics

Activity 1: Simulated Explosion Testing

Conduct controlled explosions in a laboratory setting to study the effects of different types of explosive materials and their impact on structures and surroundings.

Activity 2: Pressure Wave Measurement

Measure and analyze pressure waves produced by explosions using pressure sensors and high-speed cameras to understand their dynamics and effects.

Activity 3: Blast Injury Simulation

Simulate and analyze the impact of explosions on human health and safety, including the use of mannequins and injury assessment tools to study blast injuries.

Activity 4: Fireball and Fragmentation Analysis

Study the behavior of fireballs and flying debris resulting from explosions, including using simulators to visualize fragmentation patterns and their impact.

Unit 2: Fire Dynamics and Behavior

Activity 1: Fire Behavior Simulation

Use fire dynamics simulation software to model and analyze fire behavior under various conditions, including different fuel types, ventilation scenarios, and building layouts.

Activity 2: Heat Transfer Measurement

Measure and analyze heat transfer in fire scenarios using thermal sensors and data loggers to understand the spread of heat and its effects on materials and structures.

Activity 3: Fire Growth and Spread Analysis

Conduct experiments to observe and measure fire growth and spread patterns in controlled environments, including studying factors such as fuel load, ventilation, and fire suppression methods.

Activity 4: Smoke Movement and Toxicity Testing

Analyze smoke movement and toxicity in fire scenarios, using smoke machines and gas detectors to measure the distribution of smoke and harmful gases.

Unit 3: Explosion and Fire Interaction

Activity 1: Combined Explosion and Fire Scenario Testing

Simulate combined explosion and fire scenarios to study their interaction and impact on structures, materials, and safety systems.

Activity 2: Structural Impact Assessment

Assess the impact of explosions and subsequent fires on building structures, including the evaluation of structural integrity and potential failure points.

Activity 3: Fire Suppression Effectiveness

Test the effectiveness of various fire suppression methods in controlling fires caused by explosions, including water, foam, and dry chemical agents.

Activity 4: Emergency Response Simulation

Conduct emergency response simulations for incidents involving both explosions and fires, focusing on coordination, resource management, and response strategies.

Unit 4: Post-Incident Analysis and Reporting

Activity 1: Post-Incident Scene Analysis

Analyze the scene of a simulated explosion and fire to identify causes, damage patterns, and the effectiveness of response measures.

Activity 2: Data Collection and Interpretation

Collect and interpret data from explosion and fire dynamics experiments, including pressure measurements, temperature readings, and structural damage assessments.

Activity 3: Preparation of Incident Reports

Prepare detailed incident reports based on post-incident analysis, including findings, conclusions, and recommendations for future prevention and response.

Activity 4: Presentation of Findings

Present findings from the explosion and fire dynamics practicals to peers and stakeholders, including visual aids and data analysis to support conclusions and recommendations.

COURSE TITLE: SALVAGE & FIRE ACCIDENT INVESTIGATION**COURSE CODE: BFI505**

L	T	P	Credits
0	0	6	3

Total Hours-45**Course Content****Unit 1: Fire Salvage Techniques****Activity 1: Salvage Operations Simulation**

Conduct simulated salvage operations to recover valuables and critical equipment from a fire-damaged environment, including the use of tools and techniques for safe salvage.

Activity 2: Water and Smoke Damage Mitigation

Practice methods for mitigating water and smoke damage in fire-affected areas, including the use of drying equipment and cleaning techniques.

Activity 3: Preservation of Evidence During Salvage

Demonstrate techniques for preserving evidence during salvage operations, ensuring that crucial information is not lost or contaminated.

Activity 4: Salvage Plan Development

Develop a comprehensive salvage plan for a simulated fire incident, including prioritizing items for salvage, coordinating with response teams, and managing resources.

Unit 2: Fire Incident Investigation**Activity 1: Evidence Collection and Documentation**

Practice the collection and documentation of evidence from a simulated fire scene, including taking photographs, making sketches, and recording observations.

Activity 2: Conducting Interviews

Simulate interviews with witnesses, survivors, and first responders to gather information relevant to the fire incident investigation.

Activity 3: Fire Cause and Origin Determination

Analyze fire scenes to determine the cause and origin of the fire, using methods such as fire pattern analysis, burn patterns, and electrical testing.

Activity 4: Preparing Investigation Reports

Prepare detailed investigation reports based on findings from the simulated fire scene, including analysis of evidence, conclusions about the cause of the fire, and recommendations for preventing similar incidents.

Unit 3: Legal and Regulatory Aspects**Activity 1: Understanding Fire Investigation Laws**

Review and discuss legal requirements and regulations related to fire investigations, including reporting obligations and evidence handling protocols.

Activity 2: Compliance with Investigation Standards

Ensure compliance with national and international standards for fire investigations, including the use of recognized procedures and practices.

Activity 3: Case Study Analysis

Analyze case studies of real fire investigations to understand legal and regulatory challenges, and apply lessons learned to hypothetical scenarios.

Activity 4: Preparing for Court Testimony

Simulate court testimony related to fire investigations, including preparing and presenting evidence, responding to cross-examination, and understanding the role of expert witnesses.

Unit 4: Post-Incident Analysis and Reporting**Activity 1: Conducting Post-Incident Debriefs**

Lead debriefing sessions after simulated fire incidents to evaluate the response, salvage, and investigation processes, identifying strengths and areas for improvement.

Activity 2: Analysis of Fire Incident Reports

Review and analyze fire incident reports to evaluate the effectiveness of response actions, salvage operations, and investigation findings.

Activity 3: Developing Improvement Recommendations

Develop and present recommendations for improving fire safety practices, response strategies, and investigation procedures based on post-incident analysis.

Activity 4: Presenting Findings to Stakeholders

Prepare and deliver presentations of fire investigation findings and recommendations to stakeholders, including emergency responders, management, and regulatory agencies.

COURSE TITLE: FIRE PREVENTION MEASURES PRACTICAL

COURSE CODE: BFI506

L	T	P	Credits
0	0	6	3

Total Hours-45

Course Content

Unit 1: Fire Prevention Systems and Equipment

Activity 1: Installation and Maintenance of Fire Alarms

Practice installing and maintaining various types of fire alarm systems, including smoke detectors, heat detectors, and manual pull stations.

Activity 2: Inspection and Testing of Fire Suppression Systems

Perform inspections and functional tests on fire suppression systems, such as sprinklers, foam systems, and clean agent systems, ensuring they are operational and compliant with regulations.

Activity 3: Fire Extinguisher Placement and Maintenance

Determine appropriate locations for fire extinguishers based on hazard assessment and test their maintenance procedures, including pressure checks and recharging.

Activity 4: Implementation of Fire Barriers and Compartmentation

Demonstrate the installation and inspection of fire barriers and compartmentation to prevent the spread of fire and smoke within a building.

Unit 2: Fire Risk Assessment and Prevention Planning

Activity 1: Conducting Fire Risk Assessments

Perform fire risk assessments in various settings to identify potential fire hazards and vulnerabilities, and develop risk mitigation strategies.

Activity 2: Creating Fire Prevention Plans

Develop comprehensive fire prevention plans based on risk assessment findings, including recommendations for hazard elimination and control measures.

Activity 3: Reviewing and Updating Fire Prevention Policies

Review existing fire prevention policies and procedures, and update them to reflect current best practices and regulatory requirements.

Activity 4: Fire Safety Audits

Conduct fire safety audits of buildings or facilities to evaluate compliance with fire prevention measures and recommend improvements.

Unit 3: Fire Prevention Training and Awareness

Activity 1: Designing Fire Safety Training Programs

Create training programs focused on fire prevention techniques, including fire safety practices for employees and building occupants.

Activity 2: Conducting Fire Safety Drills

Organize and lead fire safety drills to practice fire prevention and response procedures, evaluating their effectiveness and areas for improvement.

Activity 3: Developing Fire Safety Educational Materials

Develop educational materials such as brochures, posters, and digital resources to raise awareness about fire prevention measures.

Activity 4: Evaluating Training Effectiveness

Assess the effectiveness of fire safety training programs through feedback surveys, quizzes, and practical evaluations.

Unit 4: Emergency Preparedness and Fire Prevention

Activity 1: Developing Emergency Response Plans

Create detailed emergency response plans that integrate fire prevention strategies and outline procedures for different types of fire emergencies.

Activity 2: Implementing Fire Prevention Measures

Implement fire prevention measures based on the emergency response plans, including creating and installing signage, barriers, and safety equipment.

Activity 3: Testing and Evaluating Emergency Systems

Test emergency systems such as fire alarms, emergency lighting, and evacuation routes to ensure they support fire prevention and response efforts.

Activity 4: Post-Incident Analysis

Conduct post-incident analysis of fire prevention measures following simulated or real fire emergencies, including reviewing the effectiveness of preventive actions and identifying areas for improvement.

COURSE TITLE: PROJECT V

COURSE CODE: BFI507

L	T	P	Credits
0	0	6	3

Total Hours-45

Course Content

Development and Implementation of a Fire Safety Management System for a Multi-Use Complex

Objective: Design and implement a fire safety management system for a multi-use building complex (e.g., a shopping mall with residential and office spaces).

Description: Students will develop a comprehensive fire safety management system tailored to the needs of a multi-use complex, integrating fire prevention, detection, suppression, and emergency response. The system should address the unique challenges of different types of spaces within the complex.

Fire Safety and Risk Assessment for a Critical Infrastructure Facility

Objective: Conduct a fire safety and risk assessment for a critical infrastructure facility (e.g., power plant, data center).

Description: Students will evaluate fire risks specific to a critical infrastructure facility, including potential threats to operations and safety. They will analyze existing fire protection measures and propose enhancements to mitigate identified risks.

Creation of a Fire Safety Compliance Program for a Large Organization

Objective: Develop a fire safety compliance program for a large organization, ensuring adherence to relevant regulations and standards.

Description: Students will create a compliance program that includes policies, procedures, training, and audits to ensure that a large organization meets fire safety regulations. The program should address specific industry requirements and organizational needs.

Research and Proposal for Integrating Advanced Fire Suppression Systems in High-Rise Buildings

Objective: Research and propose advanced fire suppression systems suitable for high-rise buildings.

Description: Students will investigate advanced fire suppression technologies, such as clean agent systems or advanced sprinklers, and evaluate their applicability for high-rise buildings. They will develop a proposal for integrating these systems into existing or new high-rise structures.

Outcome: A research paper and proposal document, including a comparative analysis of technologies, integration plans, and potential benefits and challenges.

Development of a Fire Safety Training and Simulation Program for Emergency Responders

Objective: Design and implement a fire safety training and simulation program for emergency responders.

Description: Students will create a training program that includes simulation exercises, scenario-based training, and evaluation methods for emergency responders. The program should focus on practical skills, decision-making, and response strategies.

Evaluation of Fire Safety Measures in a Large Public Venue

Objective: Assess and evaluate the fire safety measures in a large public venue (e.g., stadium, convention center).

Description: Students will conduct a thorough evaluation of fire safety measures in a large public venue, including fire detection, suppression systems, and crowd management. They will identify any gaps or areas for improvement and provide recommendations.

Analysis of Post-Fire Recovery Strategies and Their Effectiveness

Objective: Analyze post-fire recovery strategies and their effectiveness in restoring affected areas or facilities.

Description: Students will study post-fire recovery efforts in various scenarios, such as residential, commercial, or industrial fires. They will assess the effectiveness of recovery strategies, including damage assessment, restoration processes, and long-term impacts.

SEMESTER-VI

COURSE TITLE: SAFETY LEGISLATIONS

COURSE CODE: BFI601

L	T	P	Credits
3	0	0	3

Total Hours-45

Course Content

Unit 1: Safety Organization and Performance Management 10 Hours

- Safety Committee Formation and Role
- Safety Awareness Programs
- Appraisal of Plant Safety and Performance Measurement
- Total Loss Control Concept
- Introduction to Productivity, Quality, Reliability, and Safety (PQRS) Theory

Unit 2: Safety Training: Design, Implementation, and Evaluation 11 Hours

- Assessment of Training Needs
- Design and Development of Training Programs
- Training Methods and Strategies
- Training for Different Roles
- Evaluation of Training Programs
- Types of Training Programs

Unit 3: Safety Promotion, Human Behavior, and Motivation in Safety Management 13 Hours

- Safety Promotion and Publicity
- Safety Suggestion Schemes
- Human Behavior and Safety
- Motivational Theories and Safety
- Role of Key Personnel in Safety Motivation
- Role of the Safety Department

Unit 4: Workplace Design, Safety Measures, and Housekeeping 11 Hours

- Concept of Workplace Design
- Control Measures for Safety and Productivity
- Housekeeping and Safety
- Safety Observations and Inspections
- Loss Control and Damage Management
- Safety Inventory System

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

COURSE TITLE: COMBUSTION PRODUCTS & ITS EFFECTS ON LIFE SAFETY
COURSE CODE: BFI602

L	T	P	Credits
3	0	0	3

Total Hours-45

Course Content

Unit 1: Fundamentals of Combustion and Combustion Products 10 Hours

- Pyrolysis and Combustion
- Generation of Combustion Products
- Effects and Toxic Properties of Combustion Products
- Monitoring and Detection Equipment

Unit 2: Impact of Combustion Products on Environment and Human Health 13 Hours

- Effects of Combustion Products on the Environment
- Effects of Combustion Products on Human Health
- Effects from Inhalation of Combustion Products
- Effects from Indirect Consumption of Combustion Products
- Food Chain Contamination
- Water Supply Contamination

Unit 3: Hazards and Toxicity of Fire Products 10 Hours

- Understanding Hazards of Smoke
- Toxicity of Specific Combustion Products
- Evaluation of Smoke Toxicity
- Toxicity Models

Unit 4: Impact of Fire Products on Firefighters and Fire Victims 12 Hours

- Effects of Irritant Smoke on Firefighters
- Effects of Non-Irritant Smoke on Firefighters
- Effects of Asphyxiation from Combustion Products
- Effects on Fire Victims
- Dealing with Asphyxiation
- Post-Incident Care

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

COURSE TITLE: INDUSTRIAL HYGIENE & OCCUPATIONAL HEALTH

COURSE CODE: BFI603

L	T	P	Credits
3	0	0	3

Total Hours-45

Course Content

Unit 1: Industrial Toxicology and Environmental Health 10 Hours

- Industrial Toxicology: Gases and Vapors
- Solvents and Their Toxicity
- Dust, Fibers, and Particulates
- Industrial Noise
- Ionizing and Non-Ionizing Radiation
- Thermal Ergonomics

Unit 2: Principles and Methods of Air Sampling and Analysis 13 Hours

- General Principles of Air Sampling
- Air Sampling Methods
- Analysis of Air Samples
- Equipment for Air Sampling
- Sampling and Analysis of Asbestos Fibers

Unit 3: Control Methods for Air Quality in Industrial Workplaces 10 Hours

- Local Exhaust Ventilation
- Dilution Ventilation
- Respiratory Protection
- Ventilation Norms and Requirements
- Measurement Techniques

Unit 4: Occupational Diseases and Biological Monitoring 12 Hours

- Occupational Skin Diseases
- Occupational Respiratory Diseases
- Diseases from Metals
- Diseases from Pesticides, Solvents, and Gases
- Occupational Cancer
- Biological Monitoring

Transaction Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

COURSE TITLE: SAFETY LEGISLATIONS PRACTICAL

COURSE CODE: BFI604

L	T	P	Credits
0	0	4	2

Total Hours-60

Course Content

Unit 1: Understanding and Applying Safety Legislation

Activity 1: Review of Fire Safety Legislation

Study and summarize key fire safety regulations, such as the National Fire Protection Association (NFPA) codes, Occupational Safety and Health

Administration (OSHA) standards, and local fire safety laws.

Activity 2: Compliance Checklist Development

Develop a compliance checklist based on current fire safety legislation to evaluate the adherence of different facilities to legal requirements.

Activity 3: Legal Case Studies

Analyze case studies of legal issues related to fire safety and assess how legislation was applied to prevent or address these issues.

Activity 4: Application of Regulations in a Simulated Environment

Apply fire safety regulations in a simulated environment, including designing a compliant fire safety plan and conducting a mock inspection.

Unit 2: Risk Assessment and Legal Requirements

Activity 1: Conducting Risk Assessments

Perform risk assessments in a controlled setting to identify potential hazards and evaluate compliance with safety regulations.

Activity 2: Preparing Risk Assessment Reports

Create detailed risk assessment reports that include hazard identification, risk evaluation, and recommendations for compliance with safety legislation.

Activity 3: Implementing Control Measures

Develop and implement control measures based on risk assessment findings, ensuring they align with legal requirements and best practices.

Activity 4: Reviewing Compliance Documentation

Review and analyze compliance documentation from various organizations, including safety audits, inspection reports, and corrective action plans.

Unit 3: Safety Training and Education

Activity 1: Designing Safety Training Programs

Design and create safety training programs that address key legislative requirements and promote awareness of fire safety regulations.

Activity 2: Conducting Safety Workshops

Conduct workshops on fire safety legislation for employees or peers, including interactive activities and assessments to ensure understanding.

Activity 3: Evaluating Training Effectiveness

Evaluate the effectiveness of safety training programs by conducting post-training assessments and gathering feedback from participants.

Activity 4: Developing Safety Communication Materials

Create communication materials, such as posters, handbooks, or digital resources, to inform employees about fire safety regulations and procedures.

Unit 4: Emergency Preparedness and Legal Compliance

Activity 1: Developing Emergency Response Plans

Develop comprehensive emergency response plans that meet legal requirements and address potential fire hazards and safety issues.

Activity 2: Conducting Mock Drills

Organize and execute mock emergency drills to test the effectiveness of response plans and ensure compliance with safety regulations.

Activity 3: Reviewing Incident Reports

Review and analyze incident reports to assess compliance with safety regulations and identify areas for improvement in emergency response procedures.

Activity 4: Regulatory Audit Simulation

Simulate a regulatory audit of a facility's fire safety practices, including preparing for and conducting the audit, and responding to findings and recommendations.

COURSE TITLE: COMBUSTION PRODUCTS & ITS EFFECT ON LIFE SAFETY PRACTICAL**COURSE CODE: BFI605**

L	T	P	Credits
0	0	4	2

Total Hours-60**Course Content****Unit 1: Analysis of Combustion Products****Activity 1: Collection and Analysis of Combustion Gases**

Collect samples of combustion gases from controlled burn tests and analyze them using gas analyzers to identify levels of carbon monoxide, carbon dioxide, nitrogen oxides, and other by-products.

Activity 2: Measurement of Smoke Density

Measure the density of smoke produced during combustion tests using smoke density meters, and evaluate its impact on visibility and breathing.

Activity 3: Testing for Particulate Matter

Use particulate matter sensors to measure and analyze particulate emissions from different combustion materials, assessing their potential health risks.

Activity 4: Evaluating Chemical By-products

Analyze samples for the presence of harmful chemical by-products (such as hydrogen cyanide and formaldehyde) using appropriate detection methods.

Unit 2: Impact of Combustion Products on Human Health**Activity 1: Health Risk Assessment of Combustion By-products**

Conduct a risk assessment to evaluate the potential health impacts of different combustion products on humans, including short-term and long-term effects.

Activity 2: Simulation of Smoke Inhalation Effects

Simulate exposure to smoke in a controlled environment and assess its effects on respiratory health and overall wellbeing using physiological monitoring tools.

Activity 3: Assessment of Indoor Air Quality

Measure indoor air quality during and after a controlled burn to understand the impact of combustion products on indoor environments.

Activity 4: Evaluating Personal Protective Equipment (PPE)

Test and evaluate the effectiveness of different types of PPE (such as respirators and protective clothing) in protecting against combustion products.

Unit 3: Life Safety and Fire Protection Measures**Activity 1: Design and Testing of Ventilation Systems**

Design and test various ventilation systems to assess their effectiveness in removing combustion products and improving air quality in affected areas.

Activity 2: Assessment of Smoke Detectors and Alarm Systems

Test the functionality of smoke detectors and alarm systems under different fire scenarios to ensure timely detection and response.

Activity 3: Simulation of Evacuation Procedures

Simulate evacuation procedures in environments exposed to combustion products, evaluating the effectiveness of emergency plans and the impact on occupant safety.

Activity 4: Review of Fire Safety Standards and Codes

Review and apply fire safety standards and codes related to combustion products, including guidelines for ventilation, detection, and emergency response.

Unit 4: Emergency Response and Mitigation

Activity 1: Development of Response Protocols

Develop and document emergency response protocols for incidents involving combustion products, focusing on evacuation, medical treatment, and containment measures.

Activity 2: Training and Drills for Combustion Product Incidents

Conduct training sessions and drills for first responders and facility staff on handling incidents involving combustion products and managing their effects.

Activity 3: Evaluation of Fire Safety Equipment

Test and evaluate fire safety equipment (such as fire extinguishers and suppression systems) for their effectiveness in controlling fires and reducing the production of harmful by-products.

Activity 4: Post-Incident Analysis and Reporting

Perform a post-incident analysis of a simulated fire scenario involving combustion products, including reviewing response effectiveness and making recommendations for improvement.

COURSE TITLE: INDUSTRIAL HYGIENE & OCCUPATIONAL HEALTH PRACTICAL**COURSE CODE: BFI606**

L	T	P	Credits
0	0	4	2

Total Hours-60**Course Content****Unit 1: Monitoring and Measurement of Workplace Hazards****Activity 1: Air Quality Monitoring**

Conduct air quality assessments using portable air monitors to measure levels of pollutants such as particulate matter, carbon monoxide, and volatile organic compounds (VOCs).

Activity 2: Noise Level Measurement

Measure noise levels in various industrial environments using sound level meters, and analyze data for compliance with occupational noise standards.

Activity 3: Temperature and Humidity Monitoring

Utilize instruments to measure and record temperature and humidity levels in work environments, evaluating their impact on worker comfort and safety.

Activity 4: Lighting Assessment

Perform lighting assessments using light meters to ensure adequate illumination in workplaces and comply with safety standards.

Unit 2: Hazardous Material Management**Activity 1: Chemical Safety and Storage**

Review and practice proper handling, storage, and disposal of hazardous chemicals, including the use of safety data sheets (SDS) and personal protective equipment (PPE).

Activity 2: Spill Response and Cleanup

Simulate chemical spill scenarios and practice response techniques, including containment, cleanup, and decontamination procedures.

Activity 3: Hazard Communication and Labelling

Develop and evaluate hazard communication programs, including proper labelling of chemicals and creating safety signage.

Activity 4: Personal Protective Equipment (PPE) Selection and Use

Conduct a practical session on selecting appropriate PPE based on the nature of chemical hazards and demonstrating its correct usage.

Unit 3: Health Risk Assessment and Control**Activity 1: Ergonomic Assessment**

Perform ergonomic assessments of workstations and tasks to identify potential musculoskeletal hazards and recommend corrective measures.

Activity 2: Conducting Health Risk Assessments

Carry out health risk assessments for various workplace scenarios, including evaluating exposure to physical, chemical, and biological hazards.

Activity 3: Development of Control Measures

Develop and propose control measures for identified health risks, including engineering controls, administrative controls, and PPE.

Activity 4: Health Surveillance and Monitoring

Implement and analyze health surveillance programs, including conducting pre-employment and periodic health checks for workers exposed to specific hazards.

Unit 4: Emergency Preparedness and Response

Activity 1: Occupational Health Emergency Planning

Create and practice occupational health emergency plans, including responses to chemical exposures, heat stress, and respiratory emergencies.

Activity 2: Simulation of Occupational Health Scenarios

Conduct simulations of various occupational health scenarios (e.g., exposure to toxic substances, ergonomic injuries) and practice appropriate response actions.

Activity 3: Health and Safety Training Workshops

Develop and conduct training workshops on occupational health topics for workers, including the use of case studies and interactive activities.

Activity 4: Incident Investigation and Reporting

Simulate an investigation of an occupational health incident, including gathering evidence, interviewing witnesses, and preparing a detailed incident report with recommendations for prevention.

COURSE TITLE: PROJECT VI
COURSE CODE: BFI606

L	T	P	Credits
0	0	6	3

Total Hours-45

Course Content

1. Development of a Comprehensive Fire Safety Plan for a Large Urban Area

Objective: Create a comprehensive fire safety plan for a large urban area, including risk assessment, emergency response coordination, and public education.

Description: Students will develop a detailed fire safety plan for a large urban area, addressing diverse challenges such as high-density housing, commercial spaces, and critical infrastructure. The plan should include strategies for risk reduction, emergency response coordination, and community engagement.

2. Design and Implementation of an Integrated Fire Safety and Security System for a High- Rise Complex

Objective: Design and implement an integrated fire safety and security system for a high-rise residential or commercial complex.

Description: Students will create a system that combines fire safety measures (e.g., fire alarms, sprinklers) with security features (e.g., access control, surveillance) to enhance overall safety in a high-rise complex. The project will include system design, integration, and testing.

3. Research and Development of a Smart Fire Detection and Suppression System

Objective: Research and develop a smart fire detection and suppression system using advanced technologies like IoT or AI.

Description: Students will design a smart fire detection and suppression system that leverages technologies such as the Internet of Things (IoT) or artificial intelligence (AI) to improve fire safety. The system should provide real-time monitoring, automated response, and data analytics.

4. Implementation of a Fire Safety Awareness and Training Program for a Multi-National Corporation

Objective: Develop and implement a fire safety awareness and training program tailored for employees of a multi-national corporation.

Description: Students will create a comprehensive training program that addresses the diverse needs of employees in a multi-national corporation, considering varying regulations, languages, and cultural contexts. The program will include training modules, assessment tools, and feedback mechanisms.

5. Analysis and Optimization of Fire Safety Procedures in a Large Industrial Facility

Objective: Analyze and optimize fire safety procedures in a large industrial facility to enhance efficiency and effectiveness.

Description: Students will review current fire safety procedures in an industrial facility, identify areas for improvement, and propose optimized procedures that address operational challenges and enhance overall safety.

6. Design and Evaluation of a Fire Safety Mobile Application

Objective: Design and evaluate a mobile application aimed at improving fire safety awareness and emergency response.

Description: Students will develop a mobile application that provides users with fire safety information, emergency alerts, and response guides. The project will include app design, feature implementation, and user testing.

7. Comprehensive Post-Fire Investigation and Analysis for a Recent Major Fire Incident

Objective: Conduct a detailed post-fire investigation and analysis of a recent major fire incident, focusing on causes, impacts, and lessons learned.

Description: Students will investigate a recent major fire incident, analysing its causes, impacts on people and property, and response effectiveness. They will draw lessons from the incident and propose recommendations for improving fire safety practices.

Course Title: PERSONALITY DEVELOPMENT PROGRAMME
Course Code: BAU608

L	T	P	Credits
2	0	0	2

Total Hours:30

NIT-I 10Hours

Introduction to Generic Skills: Importance of Generic Skill Development (GSD), Global and Local Scenario of GSD, Life Long Learning (LLL) and associated importance of GSD.

Managing Self: Knowing Self for Self Development- Self-concept, personality, traits, multiple intelligence such as language intelligence, numerical intelligence, psychological intelligence etc., Managing Self – Physical- Personal grooming, Health, Hygiene, Time Management, Managing Self – Intellectual development -Information Search: Sources of information, Reading: Purpose of reading, different styles of reading, techniques of systematic reading, Note Taking: Importance of note taking, techniques of note taking, Writing: Writing a rough draft, review and final draft. Managing Self – Psychological, Stress, Emotions, Anxiety-concepts and significance, Techniques to manage the above.

UNIT-II 5Hours

Managing in Team: Team - definition, hierarchy, team dynamics, Team related skills- sympathy, empathy, co-operation, concern, lead and negotiate, work well with people from culturally diverse background, Communication in group - conversation and listening skills.

UNIT-III 10 Hours

Task Management: Task Initiation, Task Planning, Task execution, Task close out, Exercises/case studies on task planning towards development of skills for task management

Problem Solving: Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving, Different approaches for problem solving. Steps followed in problem solving. Exercises/case studies on problem solving.

UNIT-IV 5Hours

Entrepreneurship: Introduction, Concept/Meaning and its need, Competencies/qualities of an entrepreneur, Entrepreneurial Support System e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institute (SISIs), Small Industries Development Bank of India (SIDBI), National Bank of Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State/National level. Market Survey and Opportunity Identification (Business Planning)- How to start a small scale industry, Procedures for registration of small-scale industry, List of items reserved for exclusive manufacture in small-scale industry, Assessment of demand and supply in potential areas of growth, understanding business opportunity, Considerations in product selection, Data collection for setting up small ventures. Project Report Preparation- Preliminary Project Report, Techno-Economic Feasibility Report, Exercises regarding “Project Report Writing” for small projects.

Transaction Mode

Lecture Seminar e-Team Teaching e-Tutoring Dialogue Peer Group Discussion Mobile Teaching Self-Learning Collaborative Learning and Cooperative Learning