



# MK UNIVERSITY



Campus: Deesa -Highway, Opp. Hngu, Matarvadi Part, Gujrat-384265  
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## Syllabus

# Diploma in Fire & Safety Management

## Diploma in Fire & Safety Management Programme Structure

**COURSE PERIOD:** 1 Year

**TOTAL SEMESTER:** 2

### SEMESTER I

Sr. No	Course Type	Course Code	Course Name	Hours Per Week			credit	Max Marks		Total
				L	T	P		T	P	
1	MAJOR	DFS101	FUNDAMENTALS OF FIRE ENGINEERING SCIENCE	2	0	2	4	50	50	100
2	MAJOR	DFS102	FIRE CONTROL TECHNOLOGY	2	0	2	4	50	50	100
3	MAJOR	DFS103	PRINCIPLES OF INDUSTRIAL SAFETY AND ACCIDENT PREVENTION	2	0	2	4	50	50	100
4	MAJOR	DFS104	LEADERSHIP, COMMUNICATION & SOFT SKILLS	2	0	2	4	50	50	100
5	MAJOR	DFS105	PRACTICAL	0	0	4	4	0	100	100
Total				8	0	12	20	200	300	500



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## SEMESTER II

Sr. No	Course Type	Course Code	Course Name	Hours Per Week			credit	Max Marks		Total
				L	T	P		T	P	
1	MAJOR	DFS201	RISK MANAGEMENT AND HAZARD CONTROL SYSTEM	2	0	2	4	50	50	100
2	MAJOR	DFS202	HEALTH, SAFETY, ENVIRONMENTAL ENGINEERING AND CONSTRUCTION SAFETY	2	0	2	4	50	50	100
3	MAJOR	DFS203	INDUSTRIAL SAFETY	2	0	2	4	50	50	100
4	MAJOR	DFS204	CONSTRUCTION INDUSTRY SAFETY	2	0	2	4	50	50	100
5	MAJOR	DFS205	FIRE ENGINEERING SCIENCE –I	2	0	2	4	50	50	100
6	MAJOR	DFS206	EMERGENCY PLANING & FIRST AID	2		2	4	50	50	100
Total				12	0	12	24	300	300	600



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## DETAILED SYLLABUS

### SEMESTER I

#### DFS101: FUNDAMENTALS OF FIRE ENGINEERING SCIENCE

Total Credit : 4

##### Unit 1

- History of fire service
- Basic physics
- Units

##### Unit 2

- Guidelines for writing the units
- Force, resultant force
- Laws of force
- Laws of motion

##### Unit 3

- Mass and weight, work, power, energy
- Law of conservation of energy

##### Unit 4

- Mechanics – rest and motion
- Distance and displacement
- Speed and velocity

##### Unit 5

- Acceleration, retardation
- Acceleration due to gravity
- Newton laws of motion

##### Unit 6

- Machines and engines
- Efficiency
- Friction

##### Unit 7

- **Basic Chemistry and physics of fire**
- Atomic structure
- Elements, compounds

##### Unit 8

- Pure substance and mixture
- Physical and chemical changes
- Condition for the changes

##### Unit 9

- Energy changes
- Effects of heat on matter
- Combustion
- Temperature
- Specific heat capacity



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Unit 10

- Catalyst
- Neutralization
- Sublimation
- Heat of decomposing
- Chemical reaction
- Exothermic reaction and endothermic reaction

Unit 11

- Transmission of heat
- Flash and fire point
- Ignition temperature
- Flammables and combustible chemicals

Unit 12

- Spontaneous combustion
- Triangle of combustion



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- Tetrahedron fire
- Spread of fire

## Unit 13

- Classification of fire
- General Causes of fire
- Detection of fire
- Extinguishing methods
- First aid fire fighting equipments

## Unit 14

- Fire bucket, Fire beater, hose reel hose
- Portable extinguisher
- depends on weight
- depends on operating method
- depends on content
- depends on position of nozzle
- Construction
- Operation
- Maintenance
- refilling

## Unit 15

- Fixed fire fighting installations using water
- Hydrant or fire water system
- Classification of hydrant system
- Sprinkling system
- Major foam pourer system
- Steam drenching system
- Emulsification
- Special fires and fire fighting
- Air craft fire
- Ships fire

## Unit 16

- Fixed fire fighting installations not using water
  - Complete CO2 flooding system
  - Complete DCP spraying system
  - Complete Halon flooding system
  - Investigation of fire
  - Point, Time and cause of ignition
  - Arson and detection of fires
1. Courseware to be provided by the institution
  2. Reference books are enclosed in annexure 1



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## **Recommended Books**

**"Principles of Fire Safety Engineering: Understanding Fire and Fire Protection" by Das a K**

**2."Electrical Safety Fire Safety Engineering And Safety Management" by Rao S**

**4."Fire Safety and Risk Management: for the NEBOSH National Certificate in Fire Safety and Risk Management" by Fire Protection Association**

**5."Design Fires for Use in Fire Safety Engineering" by Christopher Mayfield and Danny Hopkin**

**"**

**6."Fire Safety Engineering Design of Structures" by John A Purkiss and Long-Yuan Li**

**7."Risk Analysis in Building Fire Safety Engineering" by A Michael Hasofer and V R Beck**

**8."Manual of Fire Safety" by N Sesha Prakash**

**9."Marine Firefighters (Fire Fight! the Bravest)" by Meish Goldish**



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## **Unit 1**

- Hose
- Types of hose
- Characteristic
- Frictional lose
- Material used
- Cause and prevention of mildew



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## **Unit 2**

- Causes and prevention of shock
- Causes and prevention of rubber acid
- Care and maintenance
- Types of hose fittings
- Couplings
- Component parts of inter locking couplings
- Suction coupling wrenches
- Branches, nozzles and branch holders

## **Unit 3**

- Foam making branches
- Nozzles
- Collecting head and suction hose fittings

## **Unit 4**

- Breechings
- Adapters
- Maintenance of hose fittings

## **Unit 5**

- Fire alarm
- Introduction of Electronics and Electricity:-
- Semi conductor Physics
- Circuit Control And Protective Devices

## **Unit 6**

- Transistors
- Principles of fire detectors
- Parts of fire alarm unit
- Control panel

## **Unit 7**

- Type of detectors
- Automatic fire detection
- Classification of detector
- Control and indicating equipment

## **Unit 8**

- Trouble shooting and maintenance
- Intruder alarms
- 1. Courseware to be provided by the institution
- 2. Reference books are enclosed in annexure 1

## **Unit 9**

- **Rope, Lines, knots and ladders**
- Introduction
- Manufacturing materials
- Types of ropes and size

## **Unit 10**

- Cordage
- Causes of deterioration of ropes and lines
- Different type of knots
- Different type of lines





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## **Unit 11**

- Purpose of knots
- Ladders
- Introduction
- Hook ladder, escape ladder, turn table and extension ladder
- Hook ladder belts

## **Unit 12**

- SCBA and foam making equipments
- Introduction
- Physiology of respiration

## **Unit 13**

- Effects of respiration
- Essential fetchers of BA set
- Description and technical details
- Care and maintenance various BA sets

## **Unit 14**

- Advantage and disadvantage of various BA set
- Foam & foam making equipments
- Definition
- Different type of foam concentrate

## **Unit 15**

- Storage
- Characteristics
- Foam branch and its type
- Mechanical foam generator
- Pumps, primers, tenders and water relays
- Introduction, definition
- Deferent types of pumps
  - Deferent types of primers

## **Unit 16**

- Working principle of various pumps primers
- Maintenance and trouble shooting
- Testing of pumps
- Advantages and disadvantages
- Water relay system
- Open circuit system
- Closed circuit system
- Different type of tenders and Fire alarm system
- Operation and maintenance of various tenders
- Water, foam, Co2, DCP and emergency tenders



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#### Recommended Books

- ***A Handbook of Fire Technology*** by R.S. Gupta
- ***NFPA Handbook***
- ***Manual of Fire Safety*** by N. Sessa Prakash
- ***Essentials of Firefighting and Fire Department Operations*** by IFSTA (International Fire Service Training Association)
- ***Handbook of Fire & Explosion Protection Engineering Principles for Oil, Gas, Chemical & Related Facilities*** by Dennis P. Nolan.
- ***Industrial Fire Control Concepts: The Practical Guide to Facility Fire Protection*** by Jeffrey Moore
- ***Principles of Fire Safety Engineering*** by Akhil Kumar Das.
- ***Fireground Strategies*** by Anthony Avillo.
- ***The Tactical Firefighter*** by Mark van der Feyst, Matt Wehrle, and Rob Wiggins

Professional organizations such as the [Institution of Fire Engineers \(INDIA\)](#) and the NFPA also offer extensive publications and training materials.



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## **DFS103: PRINCIPLES OF INDUSTRIAL SAFETY AND ACCIDENT PREVENTION**

**Total Credit : 4**

### **Unit 1**

- Introduction to Safety
- Goals, Need, History of Safety.
- Importance of Industrial safety

### **Unit 2**

- Accident Causation
- Definition
- Case study

### **Unit 3**

- Theories and principles of accident Causation
- The effect of accident,
- Unsafe Act
- Unsafe condition,

### **Unit 4**

- Unpredictable performance,
- Consequences of accident.
- Accident prevention programmes

### **Unit 5**

- Cost analysis and Accident Prevention
- Direct accident,
- Indirect accident,

### **Unit 6**

- Accident Prevention Methods
- Accident Investigation
- Accident Reporting

### **Unit 7**

- Accident Investigation,
- Accident Investigation Report
- Promotion Role

### **Unit 8**

- Pre- accident Strategy and Health Policy
- Safety Department
- Safety Committee and Function

### **Unit 9**

Physical hazards  
Chemical hazards  
Mechanical hazards

### **Unit 10**

- Housekeeping and Importance
- Advantages of good house keeping
- Post Accident strategy

### **Unit 11**



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- First Aid
- Fire fighting
- Accident Investigation.



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Unit 12

- Role of government, Management, workers and trade unions
- promoting safety in industry

Unit 13

- First Aid
- Introduction
- Body structure and functions

Unit 14

- Position of causality
- The unconscious casualty
- Fracture and dislocation

Unit 15

- Injuries to muscles and joints
- Resuscitation
- Bleeding

Unit 16

- Management of shock
- Burns, scalds and accidents caused by electricity
- Rescue and transport of casualty

## **Recommended Books**

- ***Principles of Industrial Safety Management: Understanding the Ws of Safety at Work*** by Akhil Kumar Das
- ***Fundamental Principles of Occupational Health and Safety*** (ILO)
- ***On the Practice of Safety*** by Fred A. Manuele**Practical Techniques & Methods**
- ***Accident/Incident Prevention Techniques*** by Charles D. Reese**Industrial Plant Safety**
- ***Core Principles and Practical Training*** by Hashem Shatnawi (eBook**Specialized & Broader Context**)
- ***Safety Management Practices for Hazardous Materials*** by Marcel Dekker
- ***Handbook of Human Factors and Ergonomics*** (5th Edition)



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## **DFS104: LEADERSHIP, COMMUNICATION & SOFT SKILLS**

**Total Credit: 4**

### Unit 1

- Introduction
- Definition of leadership
- Function of leadership
- Qualities of leadership

### Unit 2

- Organization:
- Definition
- Elements of good organization
- Principles of organization
- Advantages of organization

### Unit 3

- Communication  
Definition
- Methods of Communication
- Barriers to Communication
- Oral Communication

### Unit 4

- Speaking skills
- Listening skills
- Non verbal communication
  
- Interview



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## Unit 5

- Written communication
- Letter writing skills
- Internal Communications

## Unit 6

- Formal and Informal reports
- Notice
- Agenda
- Minutes

## Unit 7

- Safety communication
- Managerial communication
- Communication with employees with conducting training

## Unit 8

- Emergency communication
- Meeting documentation
- Communication documents

## Unit 9

### Essentials of Grammar:

- Parts of Speech
- Punctuation
- Vocabulary Building
- Phonetics

## Unit 10

### Office Management:

- Types of Correspondence
- Receipt and Dispatch of Mail
- Filing Systems
- Classification of Mail.
- Role & Function of Correspondence
- MIS
- Managing Computer

## Unit 11

### Letter & Resume Writing:

- Types of Letters-Formal / Informal
- Importance and Function
- Drafting the Applications
- Elements of Structure
- Preparing the Resume
- Do's & Don'ts of Resume
- Helpful Hints

## Unit 12

### Group Discussion & Presentation:

- Definition
- Process
- Guidelines





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- Helpful Expressions
- Evaluation

#### Unit 13

##### Presentation Skills:

- Importance of Presentation Skills
- Capturing Data
- Voice & Picture Integration
- Guidelines to make Presentation Interesting
- Body Language
- Voice Modulation
- Audience Awareness

#### Unit 14

- Presentation Plan
- Visual Aid
- Forms of Layout
- Styles of Presentation.

#### UNIT 15

##### Interview Preparation:

- Types of Interview
- Preparing for the Interviews
- Attending the Interview
- Interview Process

#### Unit 16

- Employers Expectations
- General Etiquette
- Dressing Sense
- Postures & Gestures



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Recommended books:

Leadership & Personal Effectiveness

- The 7 Habits of Highly Effective People by Stephen R. Covey
- Humble Leadership: The Power of Relationships, Openness, and Trust by Edgar Schein & Peter Schein
- HBR's 10 Must Reads on Managing Yourself Communication & People Skills
- How to Win Friends and Influence People by Dale Carnegie
- How to Talk to Anyone: 92 Little Tricks for Big Success in Relationships by Leil Lowndes
- We Need to Talk: How to Have Conversations That Matter by Celeste Headlee
- Speaking Up without Freaking Out by Matt Abrahams

Soft Skills & Empathy

- Compassion Inc.: Unleashing the Power of Empathy in Life and Business by Gaurav Sinha Tiny Humans, Big Lessons by Sue Ludwig
- HBR's 10 Must Reads on Strengthening Your Soft Skills:



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## **DFS105: PRACTICAL**

**Total Credit: 4**

### Unit 1

- Drills
- Squad drill
- Hose drill

### Unit 2

- Knots and lines
- Hydrant drill

### Unit 3

- MTU drill
- Ladder drill
- Picking up drill

### Unit 4

- Practical training
- First Aid Fire Fighting Equipments



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## Unit 5

- Breathing apparatus
- Hydraulic pressure testing
- Industrial exposure training

## Unit 6

- Practical training
- Personal Protective equipment
- Fire alarm

## Unit 7

- First aid
- Smoke chamber/confined space
- Industrial exposure training

## Unit 8

Safety Precautions



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## **SEMESTER II**

### **DFS201: RISK MANAGEMENT AND HAZARD CONTROL SYSTEM**

**Total Credit: 4**

#### **Unit 1**

- Hazards
- Definition
- Glossary of Terms

#### **Unit 2**

- Risk Management
- Hazards Control System
- System safety
- Job Hazard analysis

#### **Unit 3**

- Hazop
- Fault tree Analysis
- Failure mode and effect Analysis

#### **Unit 4**

- Physical and chemical properties of hazardous materials
- Introduction
- Major industrial hazards

#### **Unit 5**

- Types and consequences of major industrial hazard



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- Effects on human body
- Precautions while fire fighting
- Unit 6
  - Stages of combustion
  - Hazards of combustion
  - Stability and inflammability
- Unit 7
  - BLEVE
  - Fire extinguishment
  - Flammable Solids, Liquids and Gas
- Unit 8
  - Petrochemicals and other hydrocarbons
  - Tank fire – storage tank, trucks, service stations
  - High pressure pipe lines
- Unit 9
  - Pressurized and liquefied gases
  - Natural gas
  - Petroleum gases
  - Refrigerants etc.
- Unit 10
  - Acetylene
  - Metals
  - Non metals
- Unit11
  - Other hazardous properties
  - Harmful contamination of air and water
  - Toxicity
- Unit 12
  - orrosiveness
  - Radioactive hazards
  - Special precaution for handling
- Unit 13
  - Emergency preparedness
  - Pesticides
  - Explosion
- Unit 14
  - Deflagration and detonation of gas
  - Dust explosion
  - Confined and unconfined vapor cloud explosion
- Unit 15
  - Safety Management and legislation
  - Functions of safety management



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Unit 16

- Factories Act 1948 (chapter 3,4,5)
- Workmen compensation Act 1923 (objectives and coverage's)

**Recommended Books :**

- Principles of Risk Management and Insurance by George E. Rejda and Michael McNamara
- ISO 31000: Risk Management in Action
- The Risk Management Handbook: A Practical Guide to Managing the Multiple Dimensions of Risk edited by David
- The Failure of Risk Management: Why It's Broken and How to Fix It by Douglas W. Hubbard Hazard Control & Safety Engineering
- Managing the Risks of Organizational Accidents by James Reason
- High Integrity Systems and Safety Management in Hazardous Industries (edited by David J Smith)
- Practical Hazops, Trips and Alarms by David Macdonald
- Risk Assessment and Hazard Control.

**Decision Making and Quantitative Analysis**

- Thinking, Fast and Slow by Daniel Kahneman
- Risk Analysis: A Quantitative Guide by David





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**DFS202 : HEALTH, SAFETY, ENVIRONMENT ENGINEERING AND  
CONSTRUCTION SAFETY**

**Total Credit: 4**

**Unit 1**

- Safety, Health and Environment
- Occupational Health Hazards
- Control of occupational deceases

**Unit 2**

- OSHA,
- ILO
- Ergonomics

**Unit 3**

- Introduction
- Definition
- Objectives
- Advantages

**Unit 4**

- Principles of Environmental Engineering
- Pollution Prevention
- Waste treatment
- Disposal of waste

**Unit 5**

- Standards of Environmental Management System
- Engineering Control Health Hazards
- Material handling safety

**Unit 6**

- Personal protective Equipments
- Electrical Hazards and safety.

**Unit 7**

- Introduction of construction industry
- Construction Safety Organization
- Work permit system

**Unit 8**

- Hot permit
- Electrical permit
- Vessel entry permit
- Excavation permit
- Confined space entry permit
- Acid area entry permit

**Unit 9**

- Safety at work
- Machine guarding
- Ventilation
- Lighting



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## Unit 10

- Safety at construction site
- Hazards
- Scaffolding and working platform
- Welding and cutting

## Unit 11

- Rigging and hoisting
- Handling and storage of compressed gas
- Excavation work
- Concreting and cementing work

## Unit 12

- Transportation of men and material
- Lock out and tag out
- Shoring
- Waste control disposal

## Unit 13

- Building construction, TAC and NBC rules
- Inspection of site, high rise building

## Unit 14

- Fire protection introduction to TAC norms
- Earth quake
- Lightning and electrical hazard protection
- Building construction

## Unit 15

- Building materials
- Plan reading and method
- Standard, symbols, designation
- Personal hazards
- Fire escape structural precaution

## Unit 16

- Floor openings, staircase, escalators etc.
- Fire hazard in a building
- Building collapse and symptoms
- Fire tower/fire escape



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## Recommended Books:

- ***Fundamentals of Safety, Health & Environmental Management*** by Rabindranath Jana
- ***Industrial Safety, Health and Environment Management Systems*** by Prof. Sunil S. Rao and R.K. Jain
- ***Environmental, Safety, and Health Engineering*** by Gayle Woodside and Dianna Kocurek
- ***Introduction to Health and Safety in Construction*** by Ed Ferrett and Phil Hughes
- ***Pearson Construction Safety Management***
- ***Safety, Occupational Health and Environmental Management in Construction***
- ***Safety for Construction Sites and Workers*** by Dr. Ramdas B Jadhav
- ***Applied Construction: Health and Safety*** by TC Haupt
- ***Electrical Safety, Fire Safety Engineering and Safety Management*** by Prof. Sunil S. Rao
- ***The Safety Professional's Handbook***



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## **DFS203: INDUSTRIAL SAFETY**

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### **Unit 1                      Industrial Hazards**

Physical hazards

Chemical hazards

Mechanical hazards

### **Unit 2**

Biological hazards



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Ergonomic hazards

Noise hazards

### **Unit 3**

Chemical safety

Toxicity

IDLH (Immediate Danger to Life and Health)

### **Unit 4**

Chemicals - Storage, Handling and Transportation

Preventive measures for chemical spillage

Transport Emergency Card (TREM Card)

### **Unit 5                   Electrical Safety**

What is electricity

Safety in use of electricity

Dangers from electricity

### **Unit 6**

Importance of safety equipments in design and use of switches, switch

fuses, circuit breakers and isolating lines

Over load and short circuit protection

### **Unit 7**

Earth fault protection

Earthing of electrically driven equipments

ELCB

Precautions

### **Unit 8**

Static electricity

Electrical shock treatment



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Points to be checked at the electrical system



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## **UNIT 9                    Workshop Safety**

Hand tools and Power tools

Safety while using Grinding stone

## **Unit 10**

Welding and gas cutting safety

Dangerous points

Lubrication Safety

## **UNIT 11                    Hazard Evaluation Techniques**

Hazard Study

Job safety analysis

Fault tree analysis

## **Unit 12**

Event tree analysis

Failure modes and effects analysis

Relative ranking techniques

## **Unit 13                    Monitoring of Safety Performance**

Statistics of accidents

Frequency rate and severity rate

Frequency severity incidence

Safe – T – score

## **Unit 14                    Petroleum Refineries**

Refinery Process

Classification of Petroleum Products

Storage Tanks



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## **UNIT 15**

### **House Keeping**

Definition

Need for house keeping

Importance in view of safety

Methods

## **Unit 16**

### **Safety Inspections**

Safety Audit

Safety Survey

Plant safety inspection

Safety tour

Safety samplings





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#### Recommended Books

- Safety Professionals Handbook (ASSP): Comprehensive reference for standards, regulations, and best practices.
- Accident Prevention Manual for Business and Industry (National Safety Council)
- Fundamentals of Occupational Safety and Health
- The 8 Habits of a Highly Effective Safety Culture
- Save Lives
- Supervisors' Safety Manual
- Safety Management System and Documentation Training Programme Handbook (Paul SV
- Industrial Safety, Health and Environment Management Systems (Sunil S. Rao
- Fundamentals Of Process Safety Engineering
- Safety in Chemical Plants/Industry and Its Management
- Occupational Health and Safety in the Food and Beverage Industry



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## **DFS204: CONSTRUCTION INDUSTRY SAFETY**

**Total Credit: 4**

### **Unit 1                      Safe Work Place**

Safe means of access

Fall Protection

Safety while working on Roofs

PFASS (Personal Fall Arrest Safety System)

### **Unit 2                      Scaffolding**

Parts of Scaffold

Ladder Access

Working on Scaffold

### **Unit 3**

Basic requirements of Scaffolding

Erection of Scaffolding

### **Unit 4**

Scaffolding Safety

Scaffold Inspection

### **Unit 5                      Ladders**

Types of Ladders

Selection of Ladder

### **Unit 6**

Positioning ladders

Safety Precautions

### **Unit 7                      Permit To Work System (PTW)**

Definition

Hot Work Permit

Cold Work Permit

### **Unit 8**

Responsibilities relating with PTW

Circumstances when Permit is required

Confined Space entry



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## **Unit 9                    HSE Training**

Importance of Safety Education

Safety Training

Objectives of HSE training and education

## **Unit 10**

Induction Training

In-house Training

Specialised Training

Tool Box Meeting (TBM)

## **Unit 11                    Personal Protective Equipment (PPE)**

Need and importance of PPE

Employer's responsibilities

Employees responsibilities

## **Unit 12**

Types of PPE

Head Protection



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Eye and Face Protection

Ear Protection

## **Unit 13**

Hand Protection

Leg Protection

Skin Protection

Respiratory protection

## **Unit 14            HSE Training**

Importance of Safety Education

Safety Training

Objectives of HSE training and education

## **Unit 15**

Induction Training

In-house Training

## **Unit 16**

Specialised Training

Tool Box Meeting (TBM)



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## Recommended Books :

**1926 OSHA Construction Industry Regulations**

**Construction Safety Handbook: A Practical Guide to OSHA Compliance and Injury Prevention:.**

Safety Management in Construction (Principles and Practice) by Khanna Publishers.

***Safety Fundamentals and Best Practices in Construction Industry***

***Safety at Height: A Holistic View of Fall Management*** from Routledge's offerings.

***BIM and Construction Health and SafetyIndustrial Safety, Health and Environment Management Systems*** from Khanna Publishers.

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**Government Sites:** [DGFASLI \(India\)](#) for manuals.



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## **DFS205: Fire Engineering Science**

**Total Credit: 2**

### **Unit 1**

#### **Analysis and interpretation of data**

Extract and tabulate given data and express that data in the form of:-

- a) Graphs
  - b) Histograms and bar charts
  - c) Circular diagrams (pie charts)
- Obtain median, mean and norm values from given data

Extend graphs to:-

- a) Project values from given data (extrapolate)
- b) Deduce values from missing data (interpolate)

### **Unit 2**

#### **Mechanics**

Define the SI system of units in terms of basic and derived units

Describe and carry out simple calculations involving the equations of motion

Describe Newton's Laws of Motion



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Use vector quantities to find resultant values  
Apply vector methods to force and motion problems  
Calculate moments around a fulcrum including the use of levers and parallel force  
Carry out calculations involving centres of gravity and buoyancy

### **Unit 3**

Define stress strain, describe Hooke's Law and carry out calculations involving these terms  
Apply the calculations of work, power, density and efficiency to practical examples  
Describe and calculate the friction force between two surfaces in contact

#### **Hydraulics**

Define the following terms and demonstrate the relationship between them:-

- a) Density
  - b) Specific gravity
  - c) Pressure in fluids
- Solve problems involving the terms referred  
Define "streamline flow"

### **Unit 4**

Show how the principle of atmospheric pressure is used in pumping systems either as an aid to flow or as a means of measuring flow  
Use the laws of friction to calculate energy losses in piped water supplies  
In relation to pumps, define water power, brake power and efficiency. Carry out basic calculations involving these terms

### **Unit 5**

Explain the relationship between velocity and discharge of water through hose of differing diameters  
Discuss the purpose and design of branches and nozzles  
Calculate the theoretical and the effective height of a jet

#### **Electricity**

Describe electric current as a flow of electrons  
Describe how electrical energy is generated and distributed  
Explain the characteristics of alternating and direct current

### **Unit 6**

Describe the operation and characteristics of a step-up and step-down transformer  
Explain Ohm's Law and calculate the relationship between resistance, amperage and voltage in simple circuits (parallel and series).  
Use Ohm's Law to solve problems

### **Unit 7**

Explain the magnetic and chemical effects of electrical currents and show how these phenomena are applied in:-  
a) Electric motors  
b) Primary and secondary electric cells

Describe the function and method of operation of fuses and circuit breakers  
Define and solve problems involving resistance variation with temperature and resistivity  
Apply the concept of power to electrical circuits



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## **Unit 8**

### **Heat**

Define and calculate:-

- a) Specific heat capacity
- b) Latent heat of vaporisation

Apply the use of calculations involving the transfer of heat





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## Recommended Books:

- ***SFPE Handbook of Fire Protection Engineering***
- ***Introduction to Fire Dynamics*** by Dougal Drysdale
- ***Chemistry of Fire***
- ***Fundamentals of Physics*** by Halliday, Resnick, Walker
- ***Building Construction for the Fire Service*** by Francis L. Brannigan
- ***Fire Protection Engineering in Building Design***
- ***Elementary Fire Engineering Handbook***
- ***Fireground Hydraulics / Fire Service Hydraulics***
- ***Coordinating Ventilation*** by Nicholas Papa
- ***Fire Officer's Handbook of Tactics*** by Norman
- ***Fundamentals of Fire Risk Assessment Calculations.***
- ***Sax's Handbook of Dangerous Substances / Croner's Dangerous Substances***
- **Institution of Fire Engineers (IFE) Publications**
- **Fire Engineering (Magazine/Books)**
- **National Fire Protection Association (NFPA) Standards**



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## **DFS206: EMERGENCY PLANING & FIRST AID**

**Total Credit: 4**

### **Unit 1                      On site Emergency Planning**

On-site Emergency Plan

Emergency Alarm System

Emergency Control Room

### **Unit 2**

Key personnel

Emergency Control Program

### **Unit 3                      Off site Emergency Planning**

Off-site Emergency Plan

Mutual Aid Scheme

Emergency Evacuation

### **Unit 4**

Security and Media management

### **Unit5    Hazard Communication**

Safe Handling of hazardous substance

Material Safety Data Sheet (MSDS)

### **Unit 6**

Use of hazardous and Toxic substance

Storage and Handling

Transportation of Hazardous substance

### **Unit 7    First Aid**

Introduction

Action at Emergency.



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The practice of First Aid

Principles of First Aid

## **Unit 8**

Training in First Aid

General rules of First Aid

## **Unit 9**

Shocks

Electrical Shock

Artificial Respiration

## **Unit 10**

Cardio Pulmonary Resuscitation

Chocking

## **Unit 11**

Fainting

Poisoning

Open Wounds

## **Unit 12**

Control of bleeding

Burns and Scalds

Heart Attack

## **Unit 13**

Resuscitation.

Disorder of respiratory system.

Disorder of Circulation.

## **Unit 14**

Wound & Bleeding.

Disorders of consciousness.

Bone, Joint & Muscle injury.

Burns & Scalds.



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## Unit 15

Effect of heat & cold.  
Foreign bodies

Poisoning.

## Unit 16

Dressing & Bandages.  
Handling & transport of injured.  
Emergency First Aid.

## Recommended Books:

- ACEP First Aid Manual, 5th Edition.
- The Survival Medicine Handbook
- St John Ambulance First Aid Manual
- First Aid for the USMLE Step 1
- Tintinalli's Emergency Medicine: A Comprehensive Study Guide
- Harrison's Principles of Internal Medicine & Cecil Medicine:
- Oxford Handbook of Clinical Medicine
- Medicine for the Outdoors
- Bushcraft First Aid