

MNPE-09425068494

In Collaboration with

**Karnataka State Open
University**

Manasagangotri, Mysore-6

Syllabus

Diploma in Fire & Safety Management

www.maanarmadaedu.org

Diploma in Fire & Safety Management Programme Structure (Face to Face)

ELIGIBILITY - 10th Class pass under 10+2 system.

COURSE PERIOD: 1 Year

TOTAL SEMESTER: 2

SEMESTER I

SUBJECT TITLE	SUBJECT CODE	MARKS			Credit
		Theory	Practical	Total	
FUNDAMENTALS OF FIRE ENGINEERING SCIENCE	DFS-101	50	50	100	4
FIRE CONTROL TECHNOLOGY	DFS-102	50	50	100	4
PRINCIPLES OF INDUSTRIAL SAFETY AND ACCIDENT PREVENTION	DFS-103	50	50	100	4
LEADERSHIP, COMMUNICATION & SOFT SKILLS	DFS-104	50	50	100	4
PRACTICAL	DFS-105		100	100	2

SEMESTER II

SUBJECT TITLE	SUBJECT CODE	MARKS			Credit
		Theory	Practical	Total	
RISK MANAGEMENT AND HAZARD CONTROL SYSTEM	DFS-201	50	50	100	4
HEALTH, SAFETY, ENVIRONMENTAL ENGINEERING AND CONSTRUCTION SAFETY	DFS-202	50	50	100	4
INDUSTRIAL SAFETY	DFS-203	50	50	100	4
CONSTRUCTION INDUSTRY SAFETY	DFS-204	50	50	100	4
FIRE ENGINEERING SCIENCE –I	DFS-205	50	50	100	2
EMERGENCY PLANING & FIRST AID	DFS-206	50	50	100	2

DETAILED SYLLABUS

SEMESTER I

DFS 301: FUNDAMENTALS OF FIRE ENGINEERING SCIENCE

Total Credit : 4

Block 1

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

Block 2

Unit 1

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

Unit 2

- Machines and engines
- Efficiency
- Friction

Unit 3

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

Unit 4

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

Block 3

Unit 1

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

Unit 2

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

Unit 3

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

Unit 4

- Spontaneous combustion
- Triangle of combustion
- Tetrahedron fire
- Spread of fire

Block 4

Unit 1

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

Unit 2

- 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 3

- 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 4

- 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

DFS 302: FIRE CONTROL TECHNOLOGY

Total Credit : 4

Block 1

Unit 1

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

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

Block 2

Unit 1

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

Unit 2

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

Unit 3

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

Unit 4

- Trouble shooting and maintenance
- Intruder alarms
- 1. Courseware to be provided by the institution

2. Reference books are enclosed in annexure 1

Block 3

Unit 1

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

Unit 2

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

Unit 3

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

Unit 4

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

Block 4

Unit 1

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

Unit 2

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

Unit 3

- 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 4

- 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

DFS 303: PRINCIPLES OF INDUSTRIAL SAFETY AND ACCIDENT PREVENTION

Total Credit : 4

Block 1

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

Block 2

Unit 1

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

Unit 2

- Accident Prevention Methods
- Accident Investigation
- Accident Reporting

Unit 3

- Accident Investigation,
- Accident Investigation Report
Promotion Role

Unit 4

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

Block 3

Unit 1

Physical hazards
Chemical hazards
Mechanical hazards

Unit 2

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

Unit 3

- First Aid
- Fire fighting
- Accident Investigation.

Unit 4

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

Block 4

Unit 1

- First Aid
- Introduction
- Body structure and functions

Unit 2

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

Unit 3

- Injuries to muscles and joints
- Resuscitation
- Bleeding

Unit 4

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

DFS 304: LEADERSHIP, COMMUNICATION & SOFT SKILLS

Total Credit: 4

Block 1

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
- Interviews

Block 2

Unit 1

- Written communication
- Letter writing skills
- Internal Communications

Unit 2

- Formal and Informal reports
- Notice
- Agenda
- Minutes

Unit 3

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

Unit 4

- Emergency communication
- Meeting documentation
- Communication documents

Block 3

Unit 1

Essentials of Grammar:

- Parts of Speech
- Punctuation
- Vocabulary Building
- Phonetics

Unit 2

Office Management:

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

- Managing Computer

Unit 3

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 4

Group Discussion & Presentation:

- Definition
- Process
- Guidelines
- Helpful Expressions
- Evaluation

Block 4

Unit 1

Presentation Skills:

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

Unit 2

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

UNIT 3

Interview Preparation:

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

Unit 4

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

DFS 305: PRACTICAL

Total Credit: 2

Block 1

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

Block 2

Unit 1

- Breathing apparatus
- Hydraulic pressure testing
- Industrial exposure training

Unit 2

- Practical training
- Personal Protective equipment
- Fire alarm

Unit 3

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

Unit 4

Safety Precautions

NOTE:

- 1) Drills and practical training will continue through out the year according to unit wise.
- 2) Industrial exposure training may conducts at various industries and organizations.

SEMESTER II

DFS 401: RISK MANAGEMENT AND HAZARD CONTROL SYSTEM

Total Credit: 4

Block 1

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

Block 2

Unit 1

- Types and consequences of major industrial hazard
- Effects on human body
- Precautions while fire fighting

Unit 2

- Stages of combustion
- Hazards of combustion
- Stability and inflammability

Unit 3

- BLEVE
- Fire extinguishment
Flammable Solids, Liquids and Gas

Unit 4

- Petrochemicals and other hydrocarbons
- Tank fire – storage tank, trucks, service stations
- High pressure pipe lines

Block 3

Unit 1

- Pressurized and liquefied gases
- Natural gas
- Petroleum gases
- Refrigerants etc.

Unit 2

- Acetylene
- Metals
- Non metals

Unit 3

- Other hazardous properties
- Harmful contamination of air and water
- Toxicity

Unit 4

- Corrosiveness
- Radioactive hazards
- Special precaution for handling

Block 4

Unit 1

- Emergency preparedness

- Pesticides
- Explosion

Unit 2

- Deflagration and detonation of gas
- Dust explosion
- Confined and unconfined vapor cloud explosion

Unit 3

- Safety Management and legislation
- Functions of safety management

Unit 4

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

DFS 402 : HEALTH, SAFETY, ENVIRONMENT ENGINEERING AND CONSTRUCTION SAFETY

Total Credit: 4

Block 1

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

Block 2

Unit 1

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

Unit 2

- Personal protective Equipments
- Electrical Hazards and safety.

Unit 3

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

Unit 4

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

Block 3

Unit 1

- Safety at work
- Machine guarding
- Ventilation
- Lighting

Unit 2

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

Unit 3

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

Unit 4

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

Block 4

Unit 1

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

Unit 2

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

Unit 3

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

Unit 4

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

Block 1

Unit 1 Industrial Hazards

Physical hazards

Chemical hazards

Mechanical hazards

Unit 2

Biological hazards

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)

Block 2

Unit 1 Electrical Safety

What is electricity

Safety in use of electricity

Dangers from electricity

Unit 2

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

fuses, circuit breakers and isolating lines

Over load and short circuit protection

Unit 3

Earth fault protection

Earthing of electrically driven equipments

ELCB

Precautions

Unit 4

Static electricity

Electrical shock treatment

Points to be checked at the electrical system

Block 3

UNIT 1 Workshop Safety

Hand tools and Power tools

Safety while using Grinding stone

Unit 2

Welding and gas cutting safety

Dangerous points

Lubrication Safety

UNIT 3 Hazard Evaluation Techniques

Hazard Study

Job safety analysis

Fault tree analysis

Unit 4

Event tree analysis

Failure modes and effects analysis

Relative ranking techniques

Block 4

Unit 1 Monitoring of Safety Performance

Statistics of accidents

Frequency rate and severity rate

Ladder Access

Working on Scaffold

Unit 3

Basic requirements of Scaffolding

Erection of Scaffolding

Unit 4

Scaffolding Safety

Scaffold Inspection

Block 2

Unit 1 Ladders

Types of Ladders

Selection of Ladder

Unit 2

Positioning ladders

Safety Precautions

Unit 3 Permit To Work System (PTW)

Definition

Hot Work Permit

Cold Work Permit

Unit 4

Responsibilities relating with PTW

Circumstances when Permit is required

Confined Space entry

Block 3

Unit 1 HSE Training

Importance of Safety Education

Safety Training

Objectives of HSE training and education

Unit 2

Induction Training

In-house Training

Specialised Training

Tool Box Meeting (TBM)

Unit 3 Personal Protective Equipment (PPE)

Need and importance of PPE

Employer's responsibilities

Employees responsibilities

Unit 4

Types of PPE

Head Protection

Eye and Face Protection

Ear Protection

Block 4

Unit 1

Hand Protection

Leg Protection

Skin Protection

Respiratory protection

Unit 2 HSE Training

Importance of Safety Education

Safety Training

Objectives of HSE training and education

Unit 3

Induction Training

In-house Training

Unit 4

Specialised Training

Tool Box Meeting (TBM)

DFS 405: Fire Engineering Science

Total Credit: 2

Block 1

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
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

Block 2

Unit 1

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 2

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 3

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

Unit 4

Heat

Define and calculate:-

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

Apply the use of calculations involving the transfer of heat

Calculate linear, superficial and volumetric expansion using the relevant coefficients

Apply the Gas Laws to calculations involving changing conditions of heat

DFS 206: EMERGENCY PLANING & FIRST AID

Total Credit: 4

Block 1

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

Block 2

Unit 1 Hazard Communication

Safe Handling of hazardous substance

Material Safety Data Sheet (MSDS)

Unit 2

Use of hazardous and Toxic substance

Storage and Handling

Transportation of Hazardous substance

Unit 3

First Aid

Introduction

Action at Emergency.

The practice of First Aid

Principles of First Aid

Unit 4

Training in First Aid

General rules of First Aid

Block 3

Unit 1

Shocks

Electrical Shock

Artificial Respiration

Unit 2

Cardio Pulmonary Resuscitation

Chocking

Unit 3

Fainting

Poisoning

Open Wounds

Unit 4

Control of bleeding

Burns and Scalds

Heart Attack

Block 4

Unit 1

Resuscitation.
Disorder of respiratory system.
Disorder of Circulation.

Unit 2

Wound & Bleeding.
Disorders of consciousness.
Bone, Joint & Muscle injury.
Burns & Scalds.

Unit 3

Effect of heat & cold.
Foreign bodies.
Poisoning.

Unit 4

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