



# IFE Level 3 Certificate in Fire Science, Operations, Fire Safety and Management (VRQ)

Qualification Number: 500/5922/1

## Introduction

The IFE Level 3 Certificate in Fire Science, Operations, Fire Safety and Management (VRQ) has been developed by the Institution of Fire Engineers (IFE), representatives of Fire and Rescue services and other fire professionals. The content and structure of the qualification has been established to reflect best professional practice.

## Aims of the Qualification

The IFE Level 3 Certificate in Fire Science, Operations, Fire Safety and Management (VRQ) has been designed to enable individuals to demonstrate a wide range of critical knowledge and understanding relevant to the role of Crew Manager in the Fire and Rescue Service. Success in the qualification will enable individuals to demonstrate that they can apply their knowledge and skills to provide solutions in a wide range of fire and rescue situations.

Additionally, success in achieving this qualification will enable candidates to meet the academic requirement for membership of the Institution at Technician grade (TIFireE).

## Target Audience

The qualification will meet the needs of:

- Those employed in Fire and Rescue Service roles across the world, particularly those who are either already in Crew Manager roles or those who wish to develop and demonstrate knowledge and understanding relevant to the role of Crew Manager in preparation for promotion to this role;

- Those operating in specialist fire and rescue contexts, such as aviation or fire prevention/fire safety roles, who need to develop and apply a wide range of knowledge and understanding in their role;
- Other fire professionals who wish to demonstrate their knowledge and understanding of fire engineering science, operations, fire safety and management in the fire and rescue context;
- Individuals throughout the world wishing to achieve membership of the IFE at Technician grade (TIFireE) and to progress to higher levels

## Qualification Structure

In order to achieve the IFE Level 3 Certificate in Fire Science, Operations, Fire Safety and Management (VRQ), candidates must achieve four mandatory units as follows:

- Unit 1: Fire Engineering Science
- Unit 2: Fire Operations
- Unit 3: Fire Safety
- Unit 4: Management and Administration in Fire and Rescue Services

## Form of Assessment

Each unit is assessed separately by an examination.

In each case, the examination, which is one hour in duration, comprises two sections:

### Section one

There are 20 marks available for this section. It contains 20 multiple choice questions and each question is worth one mark. Questions may target any assessment objective within the unit. Candidates should attempt all questions in this section.

### Section Two

There are 30 marks available for this section. Questions in this section take the form of short written answer questions and provide candidates with the opportunity to demonstrate their knowledge and understanding across the content contained in the unit. Candidates should attempt all questions in this section.

## Grading and Certification

### Unit Achievement

Each unit/paper is certificated separately.

Achievement at unit level is not graded. Successful candidates are awarded a Pass Certificate.

In order to achieve a Pass, candidates must obtain at least 50% of the marks available. (Note: grade boundaries are reviewed and confirmed by an expert awarding panel review following each examination session in line with standard examination and awarding procedures.)

### Achievement of the IFE Level 3 Certificate in Fire Science, Operations, Fire Safety and Management (VRQ)

In order to achieve the IFE Level 3 Certificate in Fire Science, Operations, Fire Safety and Management (VRQ), candidates must achieve a Pass in all four mandatory units. The final certificate is not graded – successful candidates will be awarded a Pass Certificate.

Candidates do not need to achieve all four units at the same examination session. Candidates who achieve fewer than four units at one examination session will receive a Unit Certificate for each unit achieved. Candidates have five years in which to achieve all four units.

## **Entry Requirements**

There are no formal entry requirements and candidates are not required to achieve other qualifications prior to undertaking this qualification. However, candidates are advised that this specification provides progression from the Level 2 Certificate in Fire Science, Operations and Safety (VRQ); therefore, candidates who have previously achieved an IFE qualification at Level 2 will be able to build upon relevant knowledge and understanding.

Candidates will need to be able to communicate effectively in writing in order to respond to the written answer questions. In addition, candidates are advised that mathematical skills will be required in order to complete the examinations.

## **Progression**

Candidates who are successful in achieving the IFE Level 3 Certificate in Fire Science, Operations, Fire Safety and Management (VRQ) will have developed knowledge and understanding that will prepare them to undertake further study. Candidates may wish to extend their knowledge and understanding at Level 3 and progress to the IFE Level 3 Diploma. Alternatively, they may wish to progress to the IFE Level 4 Certificate or other qualifications at Level 4. Candidates may choose to progress to specific units only (e.g. Fire Safety) if they prefer to extend aspects of their knowledge rather than achieving full qualifications.

## Unit 1: Fire Engineering Science

Unit Reference Number: Y/505/5749

### Introduction

This unit provides candidates with the opportunity to develop and demonstrate their understanding of fire engineering science and fire behaviour.

The content of the unit has been designed to reflect the technical knowledge that fire professionals need in order to understand the behaviour of fire including the chemistry of fire and the mechanics of firefighting and rescue equipment.

### Learning Outcomes

Candidates who achieve this unit should be able to:

- Carry out mathematical calculations accurately
- Understand and apply the chemistry of fire
- Understand and apply the principles of hydraulics
- Understand and apply the principles of electricity

### Unit Status

This is a mandatory unit.

### Content

#### 1. Mathematics and Mechanics

Assessment Objective	Knowledge, Understanding and Skills
1.1 Carry out mathematical processes	Processes to include: <ul style="list-style-type: none"> <li>• Transposition and transformation of formulae</li> <li>• Use of standard form of numbers</li> <li>• Simple trigonometry</li> </ul>
1.2 Carry out calculations to determine the area, volume and capacity of various shapes	<ul style="list-style-type: none"> <li>• Shapes including squares, triangles, rectangles, trapeziums, circles, spheres, cylinders, cubes, cuboids, irregularly shaped objects</li> <li>• How to calculate area, volume, capacity</li> <li>• Units of measurement for different purposes</li> </ul>
1.3 Define basic terms and be able to carry out basic calculations that involve physical mechanics	<ul style="list-style-type: none"> <li>• Force</li> <li>• Gravity</li> <li>• Friction</li> <li>• Motion</li> </ul>

	<ul style="list-style-type: none"> <li>• Momentum</li> <li>• Mass</li> <li>• Weight</li> <li>• Pressure</li> <li>• Velocity</li> <li>• Acceleration</li> <li>• Power</li> <li>• Energy</li> <li>• Work</li> </ul>
1.4 Define and carry out calculations involving a) Mechanical Advantage b) Moments of Force	<ul style="list-style-type: none"> <li>• Definition of “Mechanical Advantage”</li> <li>• Definition of “Moments of Force”</li> <li>• Method of calculation</li> </ul>

## 2. Heat

Assessment Objective	Knowledge, Understanding and Skills
2.1 Define the terms “heat” and “temperature” and explain the relationship between them	<ul style="list-style-type: none"> <li>• Definition of “heat”</li> <li>• Definition of “temperature”</li> <li>• Relationship between heat and temperature</li> <li>• Definition of “critical temperature”</li> <li>• Definition of “critical pressure”</li> </ul>
2.2 Understand the effect of heat on materials	<p>Effect of a change of temperature on:</p> <ul style="list-style-type: none"> <li>• Solids</li> <li>• Liquids</li> <li>• Gases</li> </ul> <p>Processes of heat transmission:</p> <ul style="list-style-type: none"> <li>• Conduction</li> <li>• Convection</li> <li>• Radiation</li> </ul> <p>Principles of thermal expansion</p> <ul style="list-style-type: none"> <li>• The thermal expansion of solids</li> <li>• The coefficient of linear expansion</li> <li>• Thermostats</li> <li>• The coefficient of superficial and cubical expansion of solids</li> <li>• Thermal expansion of liquids</li> <li>• Cubical expansion</li> <li>• The effect of expansion on density</li> <li>• The expansion of gases</li> <li>• Temperature, pressure, volume</li> </ul>
2.3 Define the gas laws and carry out calculations	<p>Define and use:</p> <ul style="list-style-type: none"> <li>• Boyle’s Law</li> <li>• Charles’ Law</li> <li>• The Law of Pressures</li> <li>• The General Gas Law</li> </ul>

### 3. Hydraulics

Assessment Objective	Knowledge, Understanding and Skills
3.1 Define and carry out calculations involving: a) Density b) Relative density c) Specific gravity d) Pressures in fluids	<ul style="list-style-type: none"> <li>• Definitions of the terms</li> <li>• Methods of calculation</li> <li>• Understand the significance of the difference in specific gravities between liquids such as petrol and water</li> </ul>
3.2 Define atmospheric pressure and describe methods of measuring and calculating it	<ul style="list-style-type: none"> <li>• Definition of “atmospheric pressure”</li> <li>• Methods of measuring it</li> <li>• Method of calculation</li> </ul>
3.3 Understand and carry out calculations relating to flow of water in hose and pipelines	<ul style="list-style-type: none"> <li>• The conditions required to enable water to flow in hose or pipelines</li> <li>• How to calculate the quantity of water flowing</li> <li>• How to calculate the velocity of water</li> </ul>
3.4 Explain the relationship between pressure, nozzle diameter and discharge from a branch and carry out the relevant calculations	<ul style="list-style-type: none"> <li>• How to calculate the discharge of water</li> <li>• How to calculate the discharge through nozzles</li> <li>• The practical considerations of high nozzle pressures</li> </ul>
3.5 Define the term “jet reaction” and be able to calculate jet reaction forces	<ul style="list-style-type: none"> <li>• Definition of “jet reaction”</li> <li>• Formulae for calculations</li> </ul>
3.6 Understand and explain the operation of pumps and carry out basic calculations	<ul style="list-style-type: none"> <li>• Definition and calculation of water power</li> <li>• Definition of brake power</li> <li>• Calculate pump efficiency</li> <li>• The working of a siphon</li> <li>• The factors to be overcome when pumping/lifting from open water</li> </ul>

### 4. Chemistry

Assessment Objective	Knowledge, Understanding and Skills
4.1 Define and use chemical terms	Terms to include: <ul style="list-style-type: none"> <li>• Atom</li> <li>• Element</li> <li>• Compound</li> <li>• Mixture</li> <li>• Solution</li> <li>• Solubility</li> <li>• Suspension</li> <li>• Metal</li> <li>• Non-metal</li> </ul>
4.2 Describe the construction of an atom and show how the electron shell configuration has an effect on reactivity	<ul style="list-style-type: none"> <li>• Definition of “reactivity”</li> <li>• Components of an atom – protons, neutrons, electrons, shell</li> <li>• Elements that are most reactive</li> </ul>

	<ul style="list-style-type: none"> <li>• Elements that are least reactive</li> <li>• Periodic Table</li> </ul>
4.3 Understand and apply chemistry to fire	<ul style="list-style-type: none"> <li>• Understand that combustion is a type of chemical reaction</li> <li>• Types of flame: premixed flame, diffusion flame</li> <li>• Explain the term flammable with respect to a fuel/oxygen mixture</li> <li>• Principles involved in the extinction of fire by:                             <ul style="list-style-type: none"> <li>○ Smothering</li> <li>○ Cooling</li> <li>○ Starvation</li> </ul> </li> <li>• Components of the fire triangle: fuel, heat, oxygen</li> <li>• Components of fire tetrahedron: fuel, heat, oxygen, chemical chain</li> </ul>
4.4 Define the terms flashpoint, fire point and spontaneous ignition temperatures	Definition of: <ul style="list-style-type: none"> <li>• Flashpoint</li> <li>• Fire point</li> <li>• Spontaneous ignition temperatures</li> </ul>
4.5 Describe the classes of fire and name the extinguishing media appropriate for each class	<ul style="list-style-type: none"> <li>• Classes of fire:                             <ul style="list-style-type: none"> <li>○ Ordinary combustibles- paper, plastic, wood, fabric, etc.</li> <li>○ Flammable liquids- fuel, oil, kerosene,</li> <li>○ Electrical equipment/Fires involving energised electrical equipment</li> <li>○ Flammable Metals- magnesium, aluminium, etc</li> <li>○ Cooking related e.g. grease, lard, etc.</li> </ul> </li> <li>• Define the term “calorific value”</li> </ul>

## 5. Electricity

Assessment Objective	Knowledge, Understanding and Skills
5.1 Define and use basic electrical units to solve problems	Define and use the following in calculations: <ul style="list-style-type: none"> <li>• Volts</li> <li>• Amperes</li> <li>• Ohms</li> <li>• Watts</li> <li>• Joules</li> <li>• Electrical current</li> </ul>
5.2 Describe and use Ohm’s Law to solve problems	<ul style="list-style-type: none"> <li>• Principles of Ohm’s Law</li> <li>• Use Ohm’s Law to solve problems</li> </ul>
5.3 Identify types of electrical cable and explain their use	Types to include: <ul style="list-style-type: none"> <li>• PVC</li> <li>• Other plastic sheathed</li> <li>• Mineral-insulated</li> <li>• Copper sheathed</li> </ul>
5.4 Describe the different types of protective devices and explain their use	Types to include: <ul style="list-style-type: none"> <li>• Residual Current Device (RCD)</li> <li>• Miniature circuit breakers (MCB)</li> <li>• Fuses</li> </ul>

5.5 Recognise potentially dangerous domestic loading conditions	Conditions to include: <ul style="list-style-type: none"><li>• Overloading sockets</li><li>• Incorrect use of extension leads</li><li>• Incorrect/unsafe wiring conditions</li><li>• Non-compliant electrical conditions</li></ul>
5.6 Explain the purpose and significance of conductors and insulators	<ul style="list-style-type: none"><li>• Purpose of conductors</li><li>• Examples of conductors e.g. copper, aluminium</li><li>• Examples of insulators for different purposes</li></ul>



## Unit 2: Fire Operations

Unit Reference Number: R/505/5751

### Introduction

This unit focuses on the strategies and activities required to tackle a wide range of fire and rescue operational scenarios.

### Learning Outcomes

Candidates who achieve this unit should be able to:

- Identify and explain the factors to be taken into account when pre-planning for incidents
- Understand the issues and strategies to be employed when firefighting or carrying out rescues
- Understand the operation and deployment of fire fighting equipment

### Unit Status

This is a mandatory unit.

### Content

#### 1. Pre-Planning

Assessment Objective	Knowledge, Understanding and Skills
1.1 Understand the value of pre-planning for incidents	<ul style="list-style-type: none"><li>• Significance of topography</li><li>• The safety of emergency and non-emergency personnel</li><li>• Safety with regard to environmental impact</li><li>• The nature of premises and processes</li><li>• Water supplies</li><li>• Liaison with key site personnel</li><li>• Other external partners/stakeholders</li></ul>

## 2. Command and Control

Assessment Objective	Knowledge, Understanding and Skills
2.1 Understand and explain the application of Command and Control principles and procedures	<ul style="list-style-type: none"> <li>• Risk assessment methodology</li> <li>• Fire and Rescue Service responsibilities at incidents</li> <li>• Use of control units and forward controls on the incident ground and their relationship to Fire and Rescue Service control centres</li> <li>• Understand the following within the Incident Command System:                             <ul style="list-style-type: none"> <li>○ The levels of control (operational, tactical and strategic)</li> <li>○ The main elements of the <i>Incident Command System</i></li> <li>○ The principles and benefits of <i>sectorisation</i></li> <li>○ The importance of limiting the <i>Span of Control</i></li> <li>○ The tactical modes employed for firefighting</li> <li>○ The use of support or functional roles</li> <li>○ Firefighter safety at operational incidents</li> </ul> </li> </ul>
2.2 Understand incident management techniques	<ul style="list-style-type: none"> <li>• The first actions on arrival at an incident</li> <li>• The process of Dynamic Risk Assessment</li> <li>• How to assess assistance needs</li> <li>• Environment considerations</li> <li>• The use of breathing apparatus at all stages in an incident, including safety, emergency and relief procedures</li> <li>• The indications of dangerous conditions, e.g. building collapse</li> <li>• Methods of salvage and ventilation</li> <li>• Methods of reaching and attacking the seat of the fire</li> <li>• The selection, use and limitations of specialised appliances</li> </ul>
2.3 Basic principles of fire investigation including methods of scene preservation and evidence collection	<ul style="list-style-type: none"> <li>• Purpose of investigation</li> <li>• Scene control measures to:                             <ul style="list-style-type: none"> <li>○ ensure maximum preservation of evidence</li> <li>○ minimise the risk of scene contamination;</li> </ul> </li> <li>• Contemporaneous notes</li> <li>• Principles that underpin the collation and analysis of evidence</li> <li>• Preparation of materials for handover to a specialist investigator</li> </ul>

### 3. Fire and Rescue Procedures

Assessment Objective	Knowledge, Understanding and Skills
3.1 Describe in relation to specific risks, methods of attack, hazards to firefighters and others, the environment and the appropriate procedures when attending incidents	Incidents involving: <ul style="list-style-type: none"> <li>• Occupied buildings and structures, including domestic and high rise property</li> <li>• Basements and tunnels</li> <li>• Roofs</li> <li>• Shopping complexes</li> <li>• Atrium buildings</li> <li>• Historic buildings and premises containing valuable artefacts including museums and galleries</li> <li>• Premises used to supply gas (natural and manufactured), electricity and other fuels for power</li> <li>• Incidents involving natural gas, LPG and acetylene</li> <li>• Petrochemical installations including fuel storage and the refining of hydrocarbons</li> <li>• Refrigeration plants</li> <li>• Laboratories</li> <li>• Railway premises and rolling stock</li> <li>• Road transport and roadways including motorways</li> <li>• Explosives stores and ordnance factories</li> <li>• Premises with likely dust explosion hazards</li> <li>• Forests, heaths, bush and crops (wildland fires)</li> <li>• High-rise buildings</li> <li>• Marine incidents</li> <li>• Aviation incidents</li> </ul>
3.2 Understand the general principles and methodologies involved in dealing with rescue situations	<ul style="list-style-type: none"> <li>• Entry into buildings and vehicles</li> <li>• Searching for trapped persons</li> <li>• Rescue of trapped persons</li> <li>• Rescues from or near water</li> <li>• Rescues using lines and ropes</li> </ul>
3.3 Describe in relation to incidents which do not necessarily involve fires, the principal hazards, methods of protection and the procedures	<ul style="list-style-type: none"> <li>• Lift and escalator incidents</li> <li>• Underground accidents (including trench collapse)</li> <li>• Rescues from cliffs, cranes, silos</li> <li>• Rescues from collapsed buildings</li> <li>• Extraction of persons from machinery</li> <li>• Hazardous loads including methods of protection and decontamination of equipment and personnel</li> <li>• Rescues at transport related incidents</li> <li>• Rescues from or near water</li> </ul>

### 4. Water Supplies

Assessment Objective	Knowledge, Understanding and Skills
4.1 Describe the provision of water	<ul style="list-style-type: none"> <li>• Water distribution systems</li> </ul>

supply systems for firefighting purposes	<ul style="list-style-type: none"> <li>• The purpose of a ring main and its principal components</li> <li>• The causes of poor flow in mains</li> <li>• Hydrant installation and its principal components</li> </ul>
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## 5. Pumps and Primers

Assessment Objective	Knowledge, Understanding and Skills
5.1 Explain the operating principles and use of pumps	<ul style="list-style-type: none"> <li>• The operating principles of centrifugal and peripheral pumps including high-pressure pumps</li> <li>• The operating principles and application of ejector pumps</li> <li>• Advantages and disadvantages of different types of pump</li> <li>• The basic principles of high volume pumping and the circumstances in which it would be used</li> </ul>
5.2 Describe the principles of operation of the common primers	Primers <ul style="list-style-type: none"> <li>• Reciprocating</li> <li>• Water ring</li> <li>• Water seal</li> <li>• Gas ejector – exhaust gas</li> </ul>
5.3 Describe pump cooling systems	<ul style="list-style-type: none"> <li>• Direct</li> <li>• Indirect</li> </ul>
5.4 Outline the pump gauges and ancillary equipment along with potential pump faults	<ul style="list-style-type: none"> <li>• The gauges to be found on a typical fire service pump and their purpose</li> <li>• Methods of using suction hose in a range of applications</li> <li>• Potential faults and other symptoms that may arise when working from a pressure-fed supply or open water</li> </ul>

## 6. Equipment and its operational use

Assessment Objective	Knowledge, Understanding and Skills
6.1 Describe the different types of hose	<ul style="list-style-type: none"> <li>• Characteristics of good delivery hose</li> <li>• Methods of testing delivery and suction hose</li> <li>• The principles of the design and operation of various types of coupling for delivery and suction hose</li> </ul>
6.2 Describe the design and use of branches, monitors and breechings	<ul style="list-style-type: none"> <li>• Hand held branches, controlled and uncontrolled</li> <li>• Dividing and collecting breechings</li> <li>• Ground and aerial monitors</li> <li>• Jet and spray nozzles</li> </ul>
6.3 Describe the characteristics and use of the various types of firefighting foam	<ul style="list-style-type: none"> <li>• Categories of firefighting foam</li> <li>• The uses of the following: protein, fluoroprotein, synthetic, film forming, alcohol resistant foam</li> </ul> Principle performance characteristics of: <ul style="list-style-type: none"> <li>○ A low expansion branchpipe or generator</li> <li>○ A medium expansion branchpipe or generator</li> </ul>

	<ul style="list-style-type: none"> <li>○ A high expansion generator</li> <li>● The relative expansion ratios associated with low, medium and high expansion foam making</li> </ul>
6.4 Describe the characteristics and applications of the various types of ropes and lines used in the Fire and Rescue Service	<ul style="list-style-type: none"> <li>● Natural and man-made ropes</li> <li>● Construction of these types of rope</li> <li>● Care of and causes of damage to ropes and lines</li> </ul>
6.5 Describe the use of ladders and the procedures for safe working at height	<ul style="list-style-type: none"> <li>● Safety precautions to be observed when handling, pitching and climbing ladders</li> <li>● General principles of working with ladders</li> <li>● Safe and unsafe working angles when pitching ladders</li> <li>● Acceptable alternative uses for fire service ladders</li> </ul>
6.5 Describe the performance requirements and the construction of the various types of Breathing Apparatus and associated equipment	<ul style="list-style-type: none"> <li>● Principal component parts and the passage of air from the cylinder at high pressure to the wearer in a specific type of compressed air apparatus</li> <li>● Breathing Apparatus communications equipment</li> <li>● Safety procedure used to control the use of Breathing Apparatus by up to 12 wearers</li> <li>● Methods of testing a specific type of apparatus</li> <li>● Hand operated resuscitation apparatus and typical automatic resuscitator</li> </ul>
6.6 Describe the performance requirements and the construction of the various types of chemical protective clothing	<ul style="list-style-type: none"> <li>● Principles of clothing design to give total environmental protection by being 'gas tight', or limited protection against splashing by harmful chemicals</li> <li>● Testing and maintenance procedures to be adopted for such items</li> </ul>
6.7 Describe the type of equipment used in relation to hazardous substance incidents	<p>Types of equipment to include:</p> <ul style="list-style-type: none"> <li>● Personal protective equipment</li> <li>● Radiation measuring equipment</li> <li>● Decontamination equipment</li> </ul>

## 7. Mobilisation and Communication

Assessment Objective	Knowledge, Understanding and Skills
7.1 Outline the methods of summoning personnel and transmitting call information and instructions	<p>Communication with:</p> <ul style="list-style-type: none"> <li>● Fire stations</li> <li>● Individuals at locations other than fire stations</li> <li>● Mobile fire appliances</li> </ul>
7.2 Describe equipment used and operating principles	<ul style="list-style-type: none"> <li>● Functions and responsibilities of control centres</li> <li>● Equipment used in Fire &amp; Rescue Services control rooms including the use of computer aided mobilising systems</li> <li>● Radio systems and their use:                             <ul style="list-style-type: none"> <li>○ Radio systems using VHF, UHF and digital workings</li> <li>○ Use of radio systems both on and off the incident ground</li> </ul> </li> </ul>

## Unit 3: Fire Safety

Unit Reference Number: L/505/5750

### Introduction

This unit focuses on fire safety issues in relation to the built environment, covering methods of construction and methods for detecting and protecting buildings and people from fire.

### Learning Outcomes

Candidates who achieve this unit should be able to:

- Understand the basic methods of building construction and the implications of different structures and materials in case of fire
- Apply the principles of fire safety
- Analyse fire resistance in relation to buildings and building materials
- Understand and explain the operation of fire protection equipment

### Unit Status

This is a mandatory unit.

### Content

#### 1. Building Construction, Characteristics and Use of Building Materials

Assessment Objective	Knowledge, Understanding and Skills
1.1 Identify and describe the elements of structure within a building	<p>Elements to include:</p> <ul style="list-style-type: none"> <li>• Function of a column and principal materials used in construction (including timber, brick, stone, reinforced concrete, cast iron, steel)</li> <li>• Function and types of beams (including structural, continuous) and the reaction of an applied load on a beam</li> <li>• Function of walls (external walls, separating walls, compartment walls, load-bearing walls or part-load bearing walls)</li> <li>• Principal types of load-bearing wall construction</li> <li>• Principles of brick wall construction</li> <li>• Role of cavity walls</li> <li>• Floors (timber-joisted, compressed board panels, reinforced concrete and hollow block)</li> <li>• Methods of supporting floor joists in or on walls</li> <li>• Roofs and component parts</li> <li>• Staircases and component parts</li> </ul>

<p>1.2 Explain the construction and function of doors and fire doors</p>	<ul style="list-style-type: none"> <li>• Construction and operating principles of the different types of doors</li> <li>• Function of doors in relation to fire</li> <li>• Use of fire doors for smoke control purposes</li> <li>• Fire doors and their associated components</li> </ul>
<p>1.3 Describe the physical effects of fire on a range of building elements and materials and describe the methods used to improve their fire resistance</p>	<ul style="list-style-type: none"> <li>• Building elements to include those listed in 1.1 above</li> <li>• Building materials to include:                         <ul style="list-style-type: none"> <li>○ Timber</li> <li>○ Brick</li> <li>○ Stone</li> <li>○ Steel</li> <li>○ Aluminium</li> <li>○ Concrete (reinforced and pre stressed)</li> <li>○ Glass</li> <li>○ Building boards and building slabs</li> <li>○ Insulating materials</li> <li>○ Paint</li> <li>○ Plastics</li> </ul> </li> <li>• Glazing including different types of glazing found in buildings and the performance in fire of the different types of glazing</li> <li>• Modern methods of building construction and implications in fire situations</li> <li>• Fire resistance in relation to stability, integrity and insulation</li> </ul>
<p>1.4 Identify the advantages and disadvantages of using different materials</p>	<p>Materials to include:</p> <ul style="list-style-type: none"> <li>• Steel</li> <li>• Lead</li> <li>• Copper</li> <li>• Zinc</li> <li>• Aluminium</li> <li>• Concrete (reinforced and pre stressed)</li> <li>• Timber</li> <li>• Stone</li> <li>• Brick</li> <li>• Laminated timber</li> </ul>

## 2. Fixed Installations

Assessment Objective	Knowledge, Understanding and Skills
<p>2.1 Understand the types and purpose of sprinkler systems and describe their operation</p>	<ul style="list-style-type: none"> <li>• Five main types of sprinkler installations:                         <ul style="list-style-type: none"> <li>○ Wet type</li> <li>○ Dry pipe</li> <li>○ Alternative (wet and dry)</li> <li>○ Pre-action</li> <li>○ Recycling pre-action</li> </ul> </li> <li>• Systems based on wet pipe and dry pipe may also include extensions of the following additional type: tail end dry type and deluge</li> </ul>

	<ul style="list-style-type: none"> <li>• Two categories of sprinkler heads:                         <ul style="list-style-type: none"> <li>○ Fusible solder</li> <li>○ Quartzoid bulb</li> </ul> </li> <li>• The relationship between the different colours of sprinkler heads</li> <li>• The controls, gauges and alarms of an automatic sprinkler system</li> <li>• Accepted sources of water supply: town mains, elevated private reservoir, gravity tank, suction and booster pumps, and pressure tanks</li> </ul>
2.2 Understand the purpose of a drencher system and describe its operation	<ul style="list-style-type: none"> <li>• Main types of drencher system and their operation</li> </ul>
2.3 Understand the purpose of water spray projector systems and describe the operation of these systems	<ul style="list-style-type: none"> <li>• The action of water and steam in extinguishing an oil fire</li> <li>• Differentiate between the two types of water spray systems installed as fixed equipment</li> </ul>
2.4 Understand and describe the design principles and component parts of rising mains	<ul style="list-style-type: none"> <li>• Dry and Wet</li> <li>• Downcomers</li> </ul>
2.5 Understand and describe extinguishing systems that do not use water	<p>Systems include:</p> <ul style="list-style-type: none"> <li>• Gas flooding systems – CO<sub>2</sub>, FM200, Nitrogen, Inert Gas</li> </ul>
2.6 Understand and describe the principles underlying simple smoke control and ventilation systems	<ul style="list-style-type: none"> <li>• Principles smoke control and ventilation systems</li> </ul>
2.7 Outline the use, siting and maintenance of portable and fixed extinguishing equipment	<ul style="list-style-type: none"> <li>• Sprinkler Systems</li> <li>• Drenchers</li> <li>• Water spray projectors and water mist systems</li> <li>• Rising mains</li> <li>• Foam systems</li> <li>• Gas/vapour systems</li> <li>• Dry powder systems</li> </ul>

### 3. Alarm Systems

Assessment Objective	Knowledge, Understanding and Skills
3.1 Identify situations when using manual means of warning of fire are suitable and understand their limitations	<p>Types of manual system to include:</p> <ul style="list-style-type: none"> <li>• Hand gong</li> <li>• Call point only system</li> <li>• Handbell</li> <li>• Voice</li> </ul>
3.2 Understand and describe the design and operating principles of electrical fire alarm systems	<ul style="list-style-type: none"> <li>• The operating principles of open and closed circuit alarm systems</li> <li>• The different types of automatic fire detection systems</li> <li>• The types of detectors used in the installation and operation of electrical fire alarm systems</li> <li>• Stages in fire development in relation to automatic fire</li> </ul>



	<p>detectors</p> <ul style="list-style-type: none"> <li>• Reduction of false alarms and unwanted fire signals</li> <li>• Impact of false alarms</li> </ul>
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#### 4. Principles and Planning for Fire Safety

Assessment Objective	Knowledge, Understanding and Skills
4.1 Describe and understand the principles of means of escape in case of fire	<ul style="list-style-type: none"> <li>• Definition of “means of escape”</li> <li>• Evacuation strategies</li> <li>• Principles of means of escape in relation to:                             <ul style="list-style-type: none"> <li>○ Construction</li> <li>○ Time of evacuation</li> <li>○ Occupancy</li> <li>○ Exits</li> <li>○ Travel distance</li> <li>○ Management control</li> </ul> </li> </ul>
4.2 Understand and describe the principles of access and the provision of facilities for fire appliances and firefighters	<ul style="list-style-type: none"> <li>• Access to premises and facilities</li> </ul>
4.3 Understand the importance of a fire risk assessment and the principles underpinning the process	<ul style="list-style-type: none"> <li>• The need for the fire risk assessment process and review</li> <li>• The key elements of a fire safety management system</li> <li>• Definition of the terms <b>hazard</b> and <b>risk</b> in relation to fire safety</li> <li>• Human behaviour that may be presented in fire situations</li> </ul>
4.4 Understand and describe how community fire safety strategies can contribute to reducing the incidence of fire	<ul style="list-style-type: none"> <li>• Engaging with local community and partners to provide fire safety advice</li> <li>• Plans to work with community groups</li> </ul>

## Unit 4: Management and Administration in Fire and Rescue Services

Unit Reference Number: Y/505/5752

### Introduction

This unit focuses on the importance of effective management and administration skills in fire and rescue contexts. It covers organisational structure, leadership and management skills, performance management and training and development.

### Learning Outcomes

Candidates who achieve this unit should be able to:

- Understand the structure of organisations and the links between different parts of the organisation
- Identify and evaluate factors affecting the performance of individuals, teams and organisations
- Understand how to manage and motivate teams
- Understand health and safety issues

### Unit Status

This is a mandatory unit.

### Content

#### 1. Elements of Organisation

Assessment Objective	Knowledge, Understanding and Skills
1.1 Understand and describe the principles of organisational structure	<ul style="list-style-type: none"> <li>• Chain of command</li> <li>• Organisational structure</li> <li>• Responsibilities and reporting relationships</li> <li>• Line management</li> <li>• Functional management/departments</li> <li>• Characteristics of an effective structure</li> <li>• Potential results of an inappropriate structure</li> <li>• Presentation of structures/organograms</li> <li>• Importance of effective communication</li> </ul>
1.2 Identify and describe roles and responsibilities within an organisation	<ul style="list-style-type: none"> <li>• Responsibilities of top level and middle managers, first line supervisors and front line staff</li> <li>• Purpose and content of job descriptions and person specifications</li> <li>• Define and describe the relationship between task needs, group needs and individual needs</li> </ul>

	<ul style="list-style-type: none"> <li>• Importance of performance management</li> </ul>
1.3 Understand the importance of planning and identify the types of plans that organisations may use	<ul style="list-style-type: none"> <li>• Types of plans to include:                             <ul style="list-style-type: none"> <li>○ Strategic Plan</li> <li>○ Business Plan</li> <li>○ Project Plan</li> <li>○ Team/Department Plan</li> </ul> </li> <li>• Features of plans</li> <li>• Operational plans</li> </ul>
1.4 Identify and explain the importance of the three Es	<p>Three Es:</p> <ul style="list-style-type: none"> <li>• Economy</li> <li>• Efficiency</li> <li>• Effectiveness</li> </ul>
1.5 Explain the importance of health and safety at work	<ul style="list-style-type: none"> <li>• Duties of employers with regard to health and safety</li> <li>• Duties of employees with regard to health and safety</li> <li>• Risk assessment and safety statement</li> <li>• Safe Person Concept</li> <li>• Protective equipment and protective measures</li> <li>• Reporting accidents</li> <li>• Health and safety issues</li> </ul>

## 2. Leadership and Management

Assessment Objective	Knowledge, Understanding and Skills
2.1 Understand and describe recognised management theories	<p>Management theories to include:</p> <ul style="list-style-type: none"> <li>• Scientific Management</li> <li>• Hierarchy of Needs</li> <li>• Hawthorne Studies</li> <li>• Theory of Motivation</li> <li>• Theory X and Theory Y</li> </ul>
2.2 Understand the importance of staff motivation in driving high performance and identify issues that influence motivation	<p>Issues affecting motivation and performance including:</p> <ul style="list-style-type: none"> <li>• Poor organisational design</li> <li>• Poor delegation</li> <li>• Poor communication</li> <li>• Excessive conflict</li> <li>• Poor co-ordination</li> <li>• Weak control</li> </ul>
2.3 Explain the principles that underpin effective delegation	<ul style="list-style-type: none"> <li>• Definition of delegation</li> <li>• Successful and unsuccessful strategies</li> </ul>
2.4 Describe different leadership styles and assess the advantages and disadvantages for different situations	<p>Leadership styles to include:</p> <ul style="list-style-type: none"> <li>• Autocratic</li> <li>• Bureaucratic</li> <li>• Charismatic</li> <li>• Democratic</li> <li>• Laissez-faire</li> <li>• People-oriented and task-oriented styles</li> <li>• Transactional</li> <li>• Transformational</li> <li>• Situational</li> </ul>

2.5 Understand the principles that underpin an effective approach to counselling	<ul style="list-style-type: none"> <li>• Definition of counselling</li> <li>• Features of a good counselling procedure</li> </ul>
2.6 Understand the principles that underpin an effective approach to discipline	<ul style="list-style-type: none"> <li>• Definition of “discipline”</li> <li>• Features of a good disciplinary procedure</li> <li>• Stages of a disciplinary procedure</li> </ul>
2.7 Understand the importance of valuing equality and diversity for an organisation and the principles that underpin equality and diversity	<ul style="list-style-type: none"> <li>• Definition of “equality”</li> <li>• Definition of “diversity”</li> <li>• Definition of “direct discrimination”</li> <li>• Definition of “indirect discrimination”</li> <li>• Equality and diversity policies</li> </ul>

### 3. Record Keeping and Reporting Procedures

Assessment Objective	Knowledge, Understanding and Skills
3.1 Explain the importance of good record keeping and identify methods of managing records	<ul style="list-style-type: none"> <li>• The need for record keeping</li> <li>• Advantages of good record keeping</li> <li>• Types of record keeping systems</li> <li>• Reviewing systems of record keeping</li> <li>• Types of records maintained</li> <li>• Use of records to improve performance</li> </ul>
3.2 Explain the importance of budgets and budgetary control	<ul style="list-style-type: none"> <li>• Definition of the term <i>budget</i></li> <li>• Revenue costs and Capital Expenditure</li> <li>• Features of a good budget</li> <li>• Advantages of budgetary control</li> <li>• Problems associated with budgetary control</li> </ul>

### 4. Training and Development

Assessment Objective	Knowledge, Understanding and Skills
4.1 Understand how managers can use learning and development opportunities to improve team performance and plan for the future	<ul style="list-style-type: none"> <li>• The benefits of learning and staff development for individuals and organisations</li> <li>• Training plans</li> <li>• How to set SMART learning objectives</li> <li>• Evaluating the benefits of training</li> </ul>
4.2 Understand the importance of training and the methods to identify and meet the necessary training needs	<ul style="list-style-type: none"> <li>• Definition of the term “training needs”</li> <li>• Training needs analyses</li> <li>• Planning to meet training needs</li> <li>• Staff appraisal and training</li> </ul>
4.3 Identify and describe different types of training and explain the benefits	Types of training to include: <ul style="list-style-type: none"> <li>• Induction</li> <li>• On-the-job</li> <li>• Continuing Professional Development</li> </ul>
4.4 Identify the features of a good training programme	<ul style="list-style-type: none"> <li>• Objectives</li> <li>• Plan/Schedule for training</li> <li>• Delivery options including on and off the job</li> </ul>

	<p>components</p> <ul style="list-style-type: none"><li>• Training aids to including IT resources</li><li>• Assessment/Qualifications</li><li>• Evaluation of learning</li></ul>
4.5 Understand the purpose and value of exercise plans	<ul style="list-style-type: none"><li>• Purpose of exercises</li><li>• Types of exercise – discussion-based, table top, live and combinations of these</li><li>• Developing exercise plans</li></ul>